WESTERN
PACIFIC
REGIONAL
FISHERY
MANAGEMENT
COUNCIL

Amendment 4

to the

Fishery Management Plan for the Pelagics Fisheries of the Western Pacific Region

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Extend the Hawaii Longliner Moratorium For a total of 3 Years

June 1991

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1.0 PREFACE

1.1 Introduction

When the Fishery Management Plan (FMP) for the Pelagic Fisheries of the Western Pacific Pacific Region was being developed, the objectives of the Pacific Fishery Management Council (Council) were to curtail foreign longline fishing in the U.S. Exclusive Economic Zone (EEZ) of the Council's region, and to promote the development of the domestic fisheries for pelagic species. Both of these objectives have been fulfilled much beyond the Council's expectations. Foreign longline fishing in the EEZ ceased in 1980, and the recent growth of domestic longline fishing has been nearly exponential.

In 1989, domestic longline landings in Hawaii exceeded the largest amount ever landed in the EEZ surrounding Hawaii by foreign longline fleets, which was 8.6 million pounds in 1976. In addition, the foreign fleets caught only 13 percent billfish in 1976, which amounted to some 1.1 million pounds. Billfish landings by the Hawaii longline fleet were of similar magnitude in 1988, had tripled by 1989 and had reached 5.6 million pounds by 1990.

The Council's management concerns when the FMP was being formulated was that the large catches of foreign longliners were thought to be adversely affecting the domestic pelagic fisheries (Section 4.3). Since the Council's FMP has been successful in ending foreign longline fishing in the EEZ to provide for the development of the domestic fisheries for pelagic species, and now that the domestic longline fishery is larger than the foreign longline fishery ever was, the Council needs to pause and consider how much development of the domestic fisheries is enough (see Sections 4.3 and 4.4 and Appendix A).

The Hawaii longline fishery for pelagic species (tuna, marlin, swordfish, oceanic sharks, and other species) has more than tripled during the past 3 years. During 1987, around 40 vessels were engaged in longline fishing in Hawaii. Presently[1], there are 172 longline vessels which have general permits issued by the National Marine Fisheries Service (NMFS) to fish for pelagic species out of Hawaii[2]. This unprecedented, unplanned, and uncontrolled expansion of the domestic tuna-billfish longline fleet in Hawaii has triggered numerous reports of increased gear conflicts between segments of the longline fleet and Hawaii's small boat fishermen (trollers and handliners) and has raised concerns about fishery interactions and about data collection and longliner non-compliance with State of Hawaii licensing and reporting

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[1] As of May 16, 1991

[2] However, only 124 of the permitted longline vessels fished during the first quarter of 1991. The other permitted vessels were inactive in the longline fishery.

requirements. Concerns have also arisen over the lack of presently available comprehensive data with which to monitor the fisheries and assess potential impacts of increasing longline fishing pressure on the stocks of fish being harvested and on the different fisheries for pelagic species in Hawaii. In addition, there has been some evidence longliner interactions with endangered Hawaiian monk seals, threatened sea turtles and protected sea birds, especially albatrosses.

Based on these concerns, the Council, at its meeting on December 5, 1990, voted to ask the Secretary of Commerce (Secretary) to issue an emergency rule to establish a moratorium (through emergency rule-making procedures) to halt the entry of more vessels into the Hawaii longline fishery for pelagic species[3]. The Secretary agreed with the Council's request, and issued an interim emergency rule to that effect. The interim emergency rule became effective on April 23, 1991 (*Federal Register*, Vol 56, No. 71, April 12, 1991 pg. 14866). (Emergency rules are effective for 90 days with a possible extension to 180 days).

1.2 Principal Requirements of the Interim Emergency Rule

The Council decided that the effective date of the emergency moratorium would be December 5, 1990. Vessels entering the Hawaii longline fishery after the December 5, 1990 cut-off date are ineligible for continued participation in the Hawaii longline fishery during the interim emergency period unless they meet the qualifying criteria. The wording of the criteria to make the emergency moratorium operational is as follows:

"A vessel participating in the Hawaii Longline Fishery by fishing, landing or transshipping fish, whose owner or owners cannot document for such vessel either:

(1) ownership of the vessel landing fish in Hawaii taken by longline gear, or

(2) a substantial financial commitment or investment in gear for participating in the longline fishery by such vessel, which was located in Hawaii or the EEZ surrounding Hawaii,

prior to December 5, 1990, will be ineligible for continued participation in the Hawaii longline fishery during the emergency action period.

Except that a person who, prior to June 21, 1990, had made substantial financial commitment or investment in the construction of a new fishing vessel or in

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[3] Prior to taking this action, the Council had sent out a warning to persons considering entering the Hawaii longline fishery after June 21, 1990 that they may be ineligible for continued participation should the Council decide to limit longline fishing efforts in the future (**Federal Register**, Vol. 55, No.44, July 26, 1990, p. 30491). This was intended to slow the pace of new entry to the fishery, but longline vessels kept on coming in ever increasing numbers.

the refitting of a vessel[4] for participation in the longline fishery in Hawaii or the EEZ surrounding Hawaii and who can clearly establish that his or her intent to participate in the fishery was formulated prior to, or contemporaneously with, the commitment or investment may not be excluded from participating in the fishery with this vessel.

Owners of vessels currently fishing in the Northwestern Hawaiian Islands (NWHI) lobster fishery who do not meet the initial qualifications shall also be issued a limited entry permit.[5]"

Vessels not having a valid limited entry permit are prohibited to fish for, possess, retain, transship, or land in Hawaii management unit species that were taken on longline gear in or beyond the U.S. EEZ of Hawaii. Initially-issued limited entry permits can only be transferred once with the sale of a vessel during the period of the emergency moratorium[6]. If the application for the limited entry permit is filed by a partnership or corporation, the application must identify the names of owners and their respective ownership share of the partnership or corporation. Changes of 50 percent or more of the ownership of a partnership or corporation will be considered a permit transfer. If 50 percent or more of the ownership of the permit passes to persons other than those listed on the initial limited entry permit application form, the Regional Director must be notified of the changes and be provided with copies of the documents establishing the ownership changes with 30 days. Upon transfer of a permit, the transferee must apply to the Regional Director to have the permit issued in their name. The transferee must provide satisfactory documentation of the transfer and of the nature of the corporate, partnership or individual ownership of the permit.

In addition, limited entry longline permits can be transferred during the interim emergency moratorium period with the sale of a vessel in cases of extreme hardship,

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[4] At its May 14-16, 1991 meeting, the Council requested that the emergency moratorium be modified to allow "persons who, prior to June 21, 1990, had made substantial financial commitment or investment in the refitting of a vessel for participation in the longline fishery in Hawaii ..." to qualify for a limited entry permit under the emergency moratorium. The initial eligibility criteria for the emergency moratorium was limited to investment in the construction of a new vessel.

[5] The Council recently instituted an emergency season closure with the NWHI lobster fishery due to stock concerns. In addition, Amendment 7 to the Crustacean FMP proposes additional 180-day closures each year. The Council voted to allow the five lobster vessels not initially qualified to obtain limited entry permits in order to mitigate hardships imposed by management restrictions.

[6] At its December 5-6, 1990 meeting, the Council decided that permits should not be transferable in the emergency period except in cases of extreme hardship. However, at its May 14-16, 1991 meeting, the Council requested that the emergency moratorium be modified to allow for a one-time transfer of an initially issued limited entry permit in addition to cases of extreme hardship.

such as death or terminal illness preventing the vessel owner from participating in the fishery. Such cases will be reviewed by the Council, and the Regional Director of the National Marine Fisheries Service (NMFS), in consultation with the Council, may allow the transfer of limited entry permits in cases of extreme hardship. In all other cases, a limited entry permit is valid only for the vessel for which it is issued during the emergency moratorium period.

Although limited entry permits are transferable or assignable to other owners subject to the above conditions, a vessel owner may replace his vessel but only if the harvesting capacity of the replacement vessel is not upgraded. The Regional Director must determine that the replacement vessel has a harvesting capacity that is comparable to the original permitted vessel. Vessel size, range, hold capacity, gear configurations and other factors shall be considered in making determinations of comparability of a vessel's harvesting capacity.

The Council has requested the Secretary to extend the current interim emergency moratorium for an additional 90 days with the modifications mentioned in footnotes 4 and 5.

1.3 Preparers

This amendment to the FMP for the Pelagic Fisheries of the Western Pacific Region was prepared by Justin Rutka, Council staff, with information provided by the Honolulu Laboratory of the NMFS and by the State of Hawaii Division of Aquatic Resources. Dr. Sam Pooley, an economist with the Honolulu Laboratory of the NMFS prepared the Regulatory Analysis (Section 8.3.1). Drs. Christofer Boggs and Robert Skillman, also with the Honolulu Laboratory of the NMFS, reviewed a draft of this amendment and made many useful comments and editorial suggestions. Svein Fougner and Alvin Katekaru, staff members with the Southwest Region of the NMFS, also provided input on this amendment.

1.4 Public Review and Comment

The Magnuson Fishery Conservation and Management Act (Magnuson Act) requires the Regional Councils to involve fishermen and other interested parties in developing FMPs and amendments. This is to ensure that those who can be affected will have an opportunity to give the Regional Councils their views about a proposed action and alternatives considered and to provide information to the Regional Councils.

Many of the actions proposed in this amendment were initially discussed by the Council at its June 18 - 20, 1990 meeting. At that time, the Pelagic Plan Monitoring Team (PMT) recommended the adoption of a moratorium and setting a control date on the entry of new longline vessels into the Hawaii fishery. These subjects were

discussed at length on June 18, 1990 at a Council sponsored Fishermen's Forum. The Council deferred taking action on the PMT's moratorium recommendation at this meeting. Instead, the Council announced a "control date" of June 21, 1990 to advise then current and prospective longline participants that the Council was going to consider limited entry for the fishery and might use historical participation or investment in the fishery by that date as criteria for eligibility for permits under a limited entry program. However, new vessels continued to enter the fishery, and the control date alone did not slow down the rate of entry to the fishery.

During August and September 1990, "scoping" meetings, were held with fishermen on each of the main Hawaiian islands. The purposes of these meetings were to discuss the nature of gear conflicts and fishery interaction between longliners and troll and handline fishermen in each area and what type of regulations participants thought might help alleviate these problems. While the meetings primarily focused on interactions between longliners and small boat fishermen, participants also brought up other issues of concern to them. On each of the islands, establishment of a moratorium and development of a limited entry program to restrict the number of longline vessels in Hawaii was considered equally important as area closures to longliners to reduce gear conflict and fishery interaction.

At its September 27 - 28, 1990 meeting, the Council again discussed the problems due to the unabated growth in the Hawaii longline fishery and means to deal with the problems. The need for limited entry in the longline fishery was also taken up at a Fishermen's Forum on September 27, 1990. At its September 1990 meeting, the Council requested the PMT and Council staff evaluate placing a cap on further entry of longliners in Hawaii and to consult with the Advisory Panel in evaluating the language of June 21, 1990 control date criteria.[7]

In October of 1990, the PMT again recommended establishing a 3-year moratorium period. In November of 1990, the Council received petitions (500 signatures) and many letters requesting that the Council limit the number of longliners in Hawaii. On November 19, 1990, the Council's Pelagic Species Advisory Sub-Panel met to review the Plan Monitoring Team's recommendations related to the moratorium proposal. Approximately 70 people, including longliners and small boat interests attended the open meeting of the Advisory Panel. Trollers and handline fishermen strongly favored establishing a moratorium for longliners, while the few longline

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[7] The language of the June 21, 1990 control date criteria referred to "person" entering the Hawaii longline fishery rather that owners of longline vessels. Under this general wording, not only would an owner (or owners) of longline vessels who meet the qualifying criteria be eligible for a permit but also any captain or crew member who had served on a longline vessel prior to the control date. It was the Council's intent to have the eligibility criteria apply only to vessel owners to limit the pool of eligible vessels. The language of the control date was subsequently changed to refer to vessel owners and not persons in general. (**Federal Register**, Vol. 56, No. 60, March 28, 1991, pgs 12891 - 12892).

representatives who attended this meeting were split on the moratorium issue. Those longliners who met the qualification criteria were in favor of the moratorium proposal, while those who could not meet the eligibility criteria spoke against the moratorium proposal. In the end, Advisory Panel members present at the meeting voted unanimously that a moratorium on new entry in the longline fishery should be imposed. The Panel recommended that vessel owners must provide "proof positive" that they had previously participated in the fishery, and vessel owners who do not qualify should be given 90 days from the effective date of a moratorium to leave the fishery.

In November of 1990, the Council received another wave of petitions and individual letters on the moratorium issue. More than 400 people signed a petition calling for "appropriate action" that would safeguard traditional fisheries and limit fishing effort of longline vessels. Twenty-five longliners signed a petition in favor of excluding longline vessels from the fishery which entered after June 21, 1990. Several other petitions signed by over 100 people and many individual letters also urged the Council to place a moratorium on longline fishing in Hawaii. The Council also mailed a questionnaire to all fishermen on the Council's mailing list who fish for pelagic species. Eighty eight percent of respondents said yes to the question of whether there should be a moratorium and 12 percent said no.

At its December 5, - 6, 1990 meeting, the Council devoted both days of the meeting to moratorium related issues. At this meeting, the Council heard testimony from 29 individuals, ranging from attorneys, recreational fishermen, charter boat fishermen, longliners, fish processors and buyers. Of those giving formal testimony, 13 favored the moratorium and 6 were opposed. Others wanted the initial June 21, 1990 control date extended to allow them to continue to fish in the fishery. There were some comments from fishermen in the bottomfish and lobster fisheries who were concerned about the longliners entering their fisheries if they were displaced by the moratorium.

A public hearing on the draft of Amendment 4 was held on May 13, 1991. Under the emergency moratorium on new entry into the Hawaii longline fishery that went into effect on April 23, 1991, vessels which do not qualify for a limited entry permit cannot land their fish in Hawaii, irrespective of whether the fish were harvested beyond the 200 mile U.S. EEZ surrounding Hawaii. In February, the Council voted to modify the moratorium language when preparing this amendment to allow vessels fishing exclusively outside the EEZ to land their fish in Hawaii, regardless of whether or not they qualify under the moratorium. The Council also voted to solicit public comments on this issue at the May 13th public hearing and to reconsider their February action at the May Council meeting. Most of the testimony received on this issue were against allowing landing in Hawaii of fish caught by longliners fishing exclusively beyond the EEZ. The Council considered the public comments received at its May 14 - 17, 1991 meeting and made appropriate changes.

Proposed rules to implement this amendment will be published in the *Federal Register*. The Secretary will consider comments from the public in deciding whether to approve the proposed amendment. The final rule will be responsive to comments received and, as appropriate, these comments will be incorporated into the final regulations.

1.5 Responsible Agencies

The Council was established by the Magnuson Fishery Conservation and Management Act, (Magnuson Act) to develop fishery management plans for fisheries in the U.S. EEZ around American Samoa, Hawaii (including the Northwestern Hawaiian Islands), Guam, the Northern Mariana Islands, and United States possessions in the Pacific (Figure 1)[8]. Once a fishery management plan is approved by the Secretary, it is implemented by federal regulations which, in turn, are enforced by the National Marine Fisheries Service (NMFS) and the U.S. Coast Guard.

The FMP for Pelagic Fisheries of the Western Pacific Region (which addresses fisheries for billfish, oceanic sharks, mahimahi, and wahoo) became effective on March 23, 1987. Regulations pertaining to the domestic fisheries are in title 50, Code of Federal Regulations, Part 685. Regulations governing foreign fisheries are in part 611, Subpart F -- Western Pacific Ocean.

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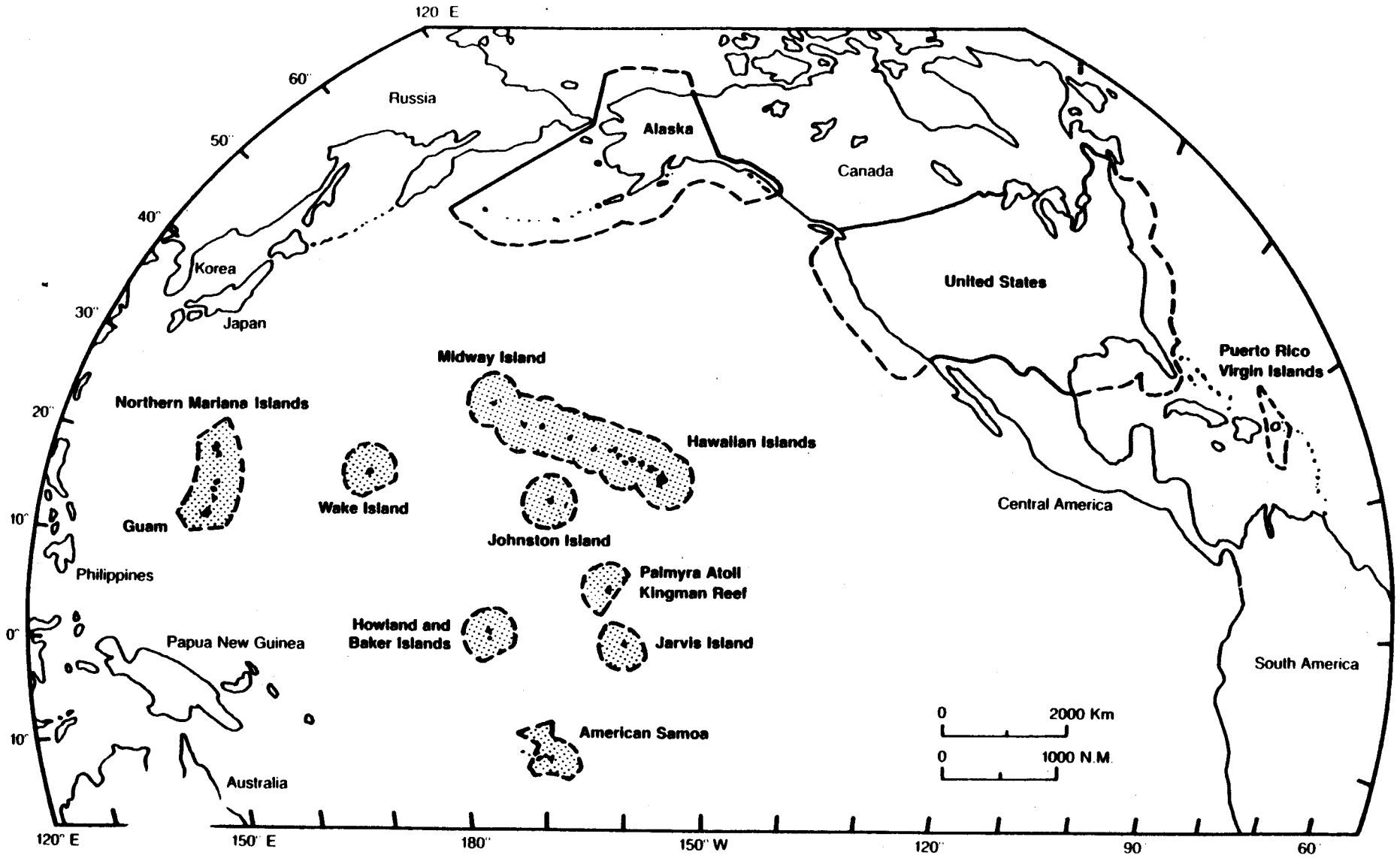
[8] Howland and Baker Islands, Jarvis Island, Johnston Atoll, Kingman Reef and Palmyra Island, and Wake Island.

Figure 1



Western Pacific Council jurisdiction (shaded) -- the EEZ around American Samoa, Guam, Hawaii, the Northern Mariana Islands and other US islands in the Pacific.

(backgrnd/bh)

May 22, 1991

2.0 PROPOSED ACTIONS

Amendment 4 to the FMP is needed to extend the moratorium for a total of three years. This action will provide a period of stability in which the Council, the NMFS, and the fishing industry will continue with data collection and analysis, evaluation of long term management alternatives (including limited entry), and a selection of a long term management regime with full public participation during the moratorium period. The Council's 3-year research plan, which is designed to quantify the effect of total local fishing effort (all gears) on yield, and what contribution each gear type (troll, handline, and longline) makes to the total yield is given in Appendix A.

The Council believes in pro-active management to conserve the pelagic resources and to prevent overfishing. It is prudent to temporarily halt the unregulated expansion of the longline fleet and postpone extraction of possible additional harvests until it can be shown that additional harvests are sustainable. It is also judicious to determine the impact of domestic longline fishing on the local abundance of pelagic fish (quantify the magnitudes of fishery interactions -- Section 4.3) so that negative fishery interactions between longliners and trollers and handline fisheries can be minimized. This strategy contrasts with waiting until sufficient evidence exists to show that the expanding fishery reached the point of economic or local overfishing (Section 4.4), or worse yet, biological overfishing, some years earlier and then reacting with management measures to rebuild the stocks to acceptable levels.

In this amendment, the Council has specifically identified the following criteria for persons to be eligible to receive a limited entry permit during the requested 3-year moratorium period:

(1) persons who certify that they were owners[9] of domestic fishing vessels when those vessels made landings of longline-caught fish in Hawaii on or before December 5, 1990 (same as the emergency action);

(2) persons who were owners of domestic vessels which had engaged in transshipment of longline-caught fish in the U.S. Exclusive Economic Zone (EEZ) surrounding the Hawaiian islands on or before December 5, 1990 (same as the emergency action);

(3) persons who made a substantial financial commitment or investment (documented expenditures of at least $25,000) by December 5, 1990 in

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[9] Owner, as used in the emergency regulation, means a person who is identified on the current owner of the vessel as described in the Certificate of documentation (CG-1270) issued by the U.S. Coast Guard for a documented vessel or in a registration certificate issued by a state or the U.S. Coast Guard for an undocumented vessel.

longline gear for a domestic fishing vessel that they owned that was located in Hawaii as of December 5, 1990 (same as the emergency action);

(4) persons who, prior to June 21, 1990, had made a substantial financial commitment or investment (documented expenditures of at least $25,000) in the construction of a new fishing vessel or in the refitting of a domestic fishing vessel for participation in the longline fishery in Hawaii or the EEZ surrounding Hawaii and who can clearly establish that his or her intent to participate in the fishery was formulated prior to or contemporaneously with the commitment or investment (same as the requested changes to the emergency action); or

(5) owners of vessels currently fishing in the Northwestern Hawaii Islands (NWHI) lobster fishery who do not qualify under the provisions of the emergency moratorium and do not qualify for limited entry permits for the NWHI fishery for bottomfish.

An owner (whether individual, partnership, or corporation) who meets at least one of the above criteria would be eligible to receive a limited entry permit for the Hawaii longline fishery. Prospective entrants into the fishery must state their intent to apply for a limited entry permit within three months of this amendment's final regulations as published in the *Federal Register*. The deadline is intended to provide the Council and the NMFS with firm information on the expected upper limit of potential participants in Hawaii's longline fishery during the three year moratorium period. It is the overall intent of the Council not to increase the fishing effort in Hawaii's longline fleet. Permittees would not be obligated to start fishing upon receiving a limited entry permit. Rather, anyone who believes that they can document meeting at least one of the qualifying criteria and who wishes to receive a limited entry permit would be required to state their intent of entering the fishery within 3 months of the effective date of this amendment. Those who fail to meet this deadline would automatically be disqualified to fish with longline gear based out of Hawaii during the duration of the moratorium.

Persons who fail to meet at least one of the above criteria would be prohibited from fishing for, possessing, retaining, transshipping, or landing management unit species in Hawaii which were taken in the U.S. EEZ surrounding the Hawaiian islands. Moreover, a person who has obtained a permit by having participated in a transshipment activity but who has not met any of the other criteria would be ineligible for a permit to catch or land fish taken on longline gear in the EEZ of Hawaii.

A domestic longline vessel fishing exclusively outside of the EEZ of Hawaii (international waters) would not be permitted to land its catches in Hawaii until it had

a limited entry permit. At present, the area of operation of longline vessels cannot be monitored accurately in a cost-effective manner (say with automated vessel tracking systems). Allowing the expansion of the longline fishery beyond the EEZ would be unenforceable and would render the moratorium ineffective since it is presently not feasible to verify that vessels not meeting the qualifying criteria would indeed be fishing beyond the EEZ of Hawaii.

The Council is now pursuing experimenting with three alternative remote systems for indicating vessel position to provide an efficient enforcement program. The completion of the experimentation and choice of a vessel tracking system are expected to be accomplished by the end of 1991. The Council has clearly indicated that when vessel tracking systems become available they should be required as an effective aid to enforcement of both the moratorium regulations and other closure regulations such the protected species zone longline closure in the Northwestern Hawaiian Islands and the longline closures designed to reduce gear conflicts around the Main Hawaiian Islands.

When these systems have been evaluated and are considered operational, the Council may reconsider the issue of whether landings of fish harvested exclusively beyond the EEZ of Hawaii by domestic vessels (which do not qualify under the moratorium criteria) should be allowed to land their fish in Hawaii. The Council will base its decision on whether or not to allow such landings on a number of judgmental standards including: (1) potential social and economic impacts on all pelagic fisheries, (2) potential biological implications, (3) cost-effectiveness of the alternative vessel tracking systems and who (fishermen, government, or both) pays for the tracking systems, and (4) enforcement concerns.

The following procedure will be followed should the Council decide to institute an automatic vessel position indicating system requirement. A separate decision which may be reconsidered is whether to allow landing of fish harvested exclusively outside the EEZ by vessels not holding limited entry permits.

1. NMFS will carry out a test of three alternate systems in July 1991.

2. A report indicating the results of the test will be provided to the Council in August.

3. The Council will evaluate the test results and assess the benefits and costs of alternate systems at its meeting in August and will decide whether one or more systems would provide an effective means for monitoring vessel activity to enforce the moratorium or other measures, including area closures. The Council will base its decision on such factors as the potential impacts on all pelagic fisheries; the potential biological implications; the cost-effectiveness of the alternative systems;

whether the cost would be borne by the government or by the industry or both; and enforcement concerns.

4. If the Council concludes at that meeting or any subsequent meeting that a position indicating system should be imposed, the Council will prepare a report with the information and rationale for its recommendation to the Regional Director. This will include recommendations (if any) for changes in management measures if the system is adopted. (For example, vessels fishing only outside the EEZ could be exempt from the moratorium on vessels operating in the EEZ because a position indicating system would provide enforcement of the moratorium program.)

5. The Regional Director will file a notice in the *Federal Register* describing the Council's proposal and the information and rationale for the proposal, and providing a minimum period of thirty days for public comment on the proposal.

6. After the close of the comment period, the Regional Director shall decide whether to impose the system (including management measures if included) as proposed by the Council. If he agrees, a notice to that effect shall be filed in the *Federal Register* and the requirement shall go into effect within a set period after publication (to allow vessel operators to make the necessary purchase and installation of equipment).

7. If the Regional Director disapproves the Council's proposal, a notice shall be filed indicating the reasons for disapproval. The Regional Director shall present this finding to the Council with recommendations for further action (if any).

Under this amendment to the FMP (as under the requested changes to the emergency moratorium rules) permits could only be transferred once with a change of ownership of a vessel during the moratorium period subject to the following conditions:

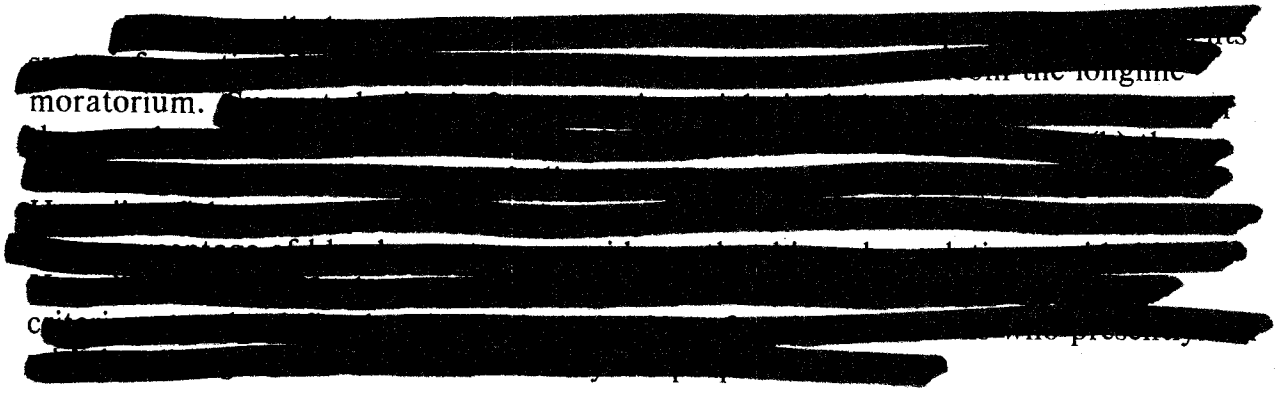
1. If the application for the limited entry permit is filed by a partnership or corporation, the application must identify the names of owners and their respective percentage share of the partnership or corporation and provide copies of the corporation or partnership papers provided which establish ownership.

2. If 50 percent or more of the ownership of a permitted vessel passes to persons other than listed on the permit application form, the Regional Director must be notified of the change and provided copies of the appropriate documents establishing the changes within 30 days.

3. Changes of 50 percent or more of the ownership of a partnership or corporation will be considered a transfer. Layerings of partnerships or corporations will not insulate a permit holder from application of this criteria.

4. Upon transfer of a permit, the transferee must apply to the Regional Director to have the permit issued in their name. The transferee must provide satisfactory documentation of the transfer and of the corporate, partnership or individual ownership of the permit. The transferred permit cannot be used until this process is completed.

In addition to allowing a one-time transfer of permits after their initial issuance, the Council decided that permits could also be transferred with the sale of a vessel in cases of extreme hardship, i.e. death or terminal illness preventing the vessel owner from continued participation in the fishery. The Council further decided to establish a Review Board which would advise the Council and the Council in turn would advise the Regional Director of the NMFS on issuance of limited entry permits, transfer of permits, and replacement of vessels. The Regional Director, in consultation with the Council, is charged with the decision to approve or disapprove such transfer.



3.0 RELATED COUNCIL ACTIONS

When the Council's FMP for pelagic species was initially implemented on March 23, 1987, reliance was placed on the existing catch and fishing effort reporting systems of the State of Hawaii and the territories of American Samoa and Guam. The State of Hawaii system has demonstrated major weakness due to inadequate reporting of commercial catch and effort information by domestic fishermen -- both longliners and small boat fishermen (trollers and handliners)[10]. To correct the problems due to non-reporting or under-reporting of commercial catches, the Council requested the Department of Commerce to make non-compliance with State catch and landings reporting requirements a federal violation. On October 25, 1990, the Department of Commerce issued a rule to that effect, and the rule became effective on November 26, 1990 (*Federal Register*, Vol.55, No. 207, October 25, 1990, p.42967).

Besides establishing the initial June 21, 1990 control date at its June 1990 meeting, the Council also voted to request the Secretary of Commerce to implement emergency measures requiring federal permits for all U.S. fishing vessels using longline gear, transshipping fish within the EEZ taken on longline gear, or landing longline-caught fish in ports of Hawaii, Guam, and American Samoa. The Council's request for emergency actions also included a requirement that operators of longline vessels maintain a daily catch and effort logbook[11]. The Council's request for this set of emergency measures was approved by the Secretary of Commerce and the measures became effective on November 27, 1990. (*Federal Register*, Vol. 55, No. 22, November 27, 1990, pgs. 49285-49289)[12].

The Council developed and the Secretary approved an amendment to the FMP[13] to continue the longliner permit and daily logbook requirements beyond the

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[10] In 1987, the landings reported to the State of Hawaii by longliners were far below the estimates of longliner landings made by the Honolulu Laboratory of the National Marine Fisheries Service (e.g. tenfold shortfall for big-eye tuna and sevenfold for striped marlin). Landings of commercial trollers and handliners were also under reported but by smaller amounts. Recreational fishermen are not required to report on their fishing activities.

[11] The use of longlines less than one (1) nautical mile in length is exempted from Federal permit and daily logbook requirements under an interim emergency rule which became effective on November 27, 1990 (**Federal Register**, Vol. 55, No. 228, November 27, 1990, pgs. 49285 - 49289).

[12] This interim emergency rule also authorized the placement of observers on board longline vessels that intended to fish within 50 nautical miles off certain of the Northwestern Hawaiian Islands (NWHI) which are inhabited by protected animals. This provision has since been replaced by a new emergency rule which prohibits longline fishing entirely within 50 miles of each of the NWHI including the channel waters between the islands (see following page).

[13] **Federal Register**, Vol. 56, No. 64, April 3, 1991, pgs. 13611-13616.

expiration date of the emergency rule (May 24, 1991). The amendment also requires domestic longline vessel operators to affix the vessel's official number on the floats of the longline gear so that the fishing gear can be traced.

The interim emergency rule promulgated on November 27, 1990 which included permitting requirements, logbooks, fishing information, and observer coverage for longline vessels (if they intended to fish within 50 nautical miles of certain of the NWHI) grew out of concerns that the exceedingly rapid growth in the Hawaii-based longline fleet would have an adverse impact on fish stocks, on the small boat fisheries, and on protected species, including the endangered Hawaiian monk seal and seabirds. Recent events have given credence to these concerns. Information regarding incidental hooking and snagging of monk seals confirms the occurrence of interactions with the longline fishery. There is persuasive evidence that longline fishing around the NWHI has resulted not only in incidental interactions with the Hawaiian monk seals but with numerous albatrosses as well.

As a result, the Council and the NMFS co-sponsored a public hearing on these issues in Honolulu on February 26, 1991. The Council subsequently met in an open session February 27 - March 1, 1990 to further discuss the issues. The Council concluded that prohibiting longline fishing within 50 miles of each of the NWHI, including the channel waters between islands that are more than 100 nautical miles apart, would be an appropriate action, and requested the Secretary of Commerce to institute an emergency closure of these waters to longline fishing. The Secretary concurred with the Council's proposal and issued an emergency ruling closing the area within 50 nautical miles of the NWHI as well as corridors between these islands to the longline fishery. This rule became effective on April 15, 1991 (*Federal Register*, Vol. 56, No. 75, April 18, 1991, pgs. 15842-15844). The Council has submitted a proposed amendment to the pelagic species FMP to make permanent the closures that were implemented by the emergency action.

Besides closing certain areas around the NWHI to longline fishing to preclude or minimize interactions with protected species, the Council on April 17, 1991, also requested the Secretary of Commerce to implement an interim emergency rule which would establish a longline closure area[14] in the main Hawaiian islands. This action is needed to minimize gear conflicts between the longline and troll/handline fisheries for pelagic species in the waters off of the main Hawaiian islands. The Council has also requested that all longline vessels be required to carry vessel position fixing devices as soon as it is operationally feasible to employ this vessel tracking technology in Hawaii. Vessel tracking systems will greatly facilitate the enforcement of these closures to longline fishery.

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[14] Proposed closure to longline fishery of 50 miles around the islands of Maui and Hawaii counties, and a 75 mile closure around the island of Oahu and the islands of Kauai County.

4.0 NEED FOR THE PROPOSED ACTIONS

4.1 Extremely Rapid Growth in the Size of the Longline Fleet and Harvests

The FMP was implemented at a time (1987) when there were few problems in the domestic fisheries for pelagic species (tuna, billfish, oceanic sharks and associated species). The small-scale commercial fisheries and the recreational fisheries for pelagic species were well established, and Hawaii-based longline fishery was just experiencing a reversal of a slow, decades long decline. Prior to recent times, the longline fishery in Hawaii reached a peak (in the number of active vessels) in 1950 when there were 73 sampan-style vessels engaged in longline fishing. The longline fishery was in a continuous decline during the next 25 years, bottoming out in 1976 when there were only 17 longliners operating in Hawaii. Only 13 of these longliners fished full time. (Table 1 lists the number of longline vessels in Hawaii, 1948 - present).

The longline fishery started growing again during the first half of the 1980's. By 1983 there were 37 vessels fishing with longline gear. During 1987, Hawaii there were close to 50 longliners operating in Hawaii, with about half of the fleet consisting of the traditional wooden sampans built before 1960, the other half consisting of larger, western style vessels built of steel and fiberglass.

In January 1989, the Coast Guard informed the Council that 22 fishing vessels equipped with longline gear had applied to change their documented home ports from ports in the Gulf of Mexico to Honolulu. At that time, 9 of these vessels were reportedly enroute to Hawaii from the Gulf of Mexico via the Panama Canal and San Diego. Soon many other vessels from Gulf Coast and East Coast ports started to arrive in Hawaii in increasing numbers. By April 1990, the longline fleet had grown to nearly 100 vessels with vessels arriving from Alaska, California, the Gulf of Mexico and the East Coast. At the end of 1990, there were 138 longline vessels in Hawaii.

As of May 16, 1991, the NMFS had issued 172 general permits to vessels to fish with longline gear in Hawaii.

The fishing capacity of the Hawaii-based longline fleet has grown at a much faster rate than the number of vessels in the fleet. In 1950, the 76 vessel fleet of sampan-style longliners then operating in Hawaii had a maximum daily "hook capacity"of about 20,000 hooks, with the average number of hooks set per vessel per day during the 1950's and 1960's being about 300 hooks. During 1988, the average number of hooks set per vessel per day was around 1,000 hooks, varying from 650 - 1,700. The present fleet of longliners in Hawaii has a maximum hook capacity of between 150,000 - 200,000 hooks per day, or a tenfold increase since the 1950's and 1960's.

TABLE 1

NUMBER OF LONGLINE VESSELS IN HAWAII
1948-PRESENT

Year	Oahu	Hawaii	Kauai	Total
1948	27	30	2	59
1949	29	42	2	73
1950	30	42	4	76
1951	31	32	4	67
1952	31	21	4	56
1953	35	20	3	58
1954	31	20	3	54
1955	33	17	2	52
1956	33	16	2	51
1957	33	14	2	49
1958	31	12	1	44
1959	27	12	2	41
1960	27	10	1	38
1961	25	9	2	36
1962	25	9	1	35
1963	24	7	1	32
1964	24	7	-	31
1965	24	6	-	30
1966	23	5	-	28
1967	21	5	-	26
1968	19	3	-	22
1969	19	4	-	23
1970	20	4	-	24
1971	20	3	-	23
1972	19	4	-	23
1973	17	2	-	19
1974	16	2	-	18
1975	15	2	-	17
1976	15	2	-	17
1977	15	3	-	18
1978	16	4	-	20
1979	16	2	-	18
1980	19	3	-	22
1981	21	4	-	25
1982	23	4	-	27
1983				37
1984-85	----------no reliable data----------			
1986				39
1987				37
1988				50
1989				80
1990				138
Present*				170

Sources: 1948-1982 HDAR unpublished records
1983-1990 NMFS Market Monitoring Program
*Present: NMFS permit data

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The location and depth of fishing have also changed dramatically during recent years. Up through the late 1960's, most of the traditional longliners fished within 20 miles of shore of the main Hawaiian islands, but a few of the vessels ranged 300 - 400 miles from homeport. By 1985, some boat captains reported longlining activities up to 600 miles from Honolulu, and by 1986 the fishing range of some of the larger vessels expanded to 800 miles from port. Areas which produced good catches then included the seamounts southwest of the Island of Hawaii, the Molokai fracture zone north of that island, Necker Ridge, the seamounts extending south of the Hawaiian Archipelago toward Johnston Atoll, and the Musician Seamounts north of the main Hawaiian islands.

At present, vessels in the Hawaii longline fleet range in length from about 25 to 113 feet. Seventy five percent of the vessels in the fleet are larger than 56 feet in length. The new federal logbook program shows that 27 percent of the longline fishing effort occurred outside of the EEZ in the first quarter of 1991. Twenty three percent of the total longline fishing effort took place within 50 to 75 miles of the main Hawaiian island during this period. These results should be tempered by the fact that the data only cover the winter period when bigeye tuna are most abundant in Hawaiian waters. Seasonal conditions in fishing operations and the seasonal availability of different species could likely alter the geographic fishing patterns revealed by the current information. Yellowfin tuna and blue marlin are known to breed in the summer months in the waters of the main Hawaiian islands, and during the summer months, longliners have taken substantial numbers of these two species near the main Hawaiian islands.

The longline fishery in Hawaii has now become the largest component of the State's commercial fisheries. Estimates of commercial landings by species in terms of total weight and numbers of fish caught of longline, and troll, and handline vessels in Hawaii and the number of vessels participating in these commercial fisheries for 1987 - 1990 are presented in Tables 2 and 3. There are no catch estimates available for the recreational sector of the State's fisheries, but recreational catches are believed to be substantial.

The data in Tables 2 and 3 (supplemented by market data contained in the annual reports on the pelagic fisheries and other fisheries) put the Hawaii-based longline fishery in perspective.

* Longline landings (all species combined) grew very rapidly and dramatically between 1987 - 1990, while commercial troll and handline landings (all species combined) increased slightly between 1987 and 1988 and then declined each year during 1989 and 1990 (Table 2).

TABLE 2
Estimated Species Composition of Commercial Landings[1] (in 1,000 pounds)
of Longliners and Trollers and Handline Fishermen in Hawaii, 1987 - 1990

Species Category	Longline				Troll & Handline Combined			
	1987	1988	1989	1990	1987	1988	1989	1990
Tunas								
Bigeye	1,790	2,740	3,140	3,360	100	350	640	600
Yellowfin Tuna	580	1,310	2,160	2,500	2,740	2,630	1,090	1,210
Albacore Tuna	330	680	550	430	10	30	30	10
Skipjack Tuna	[2]	20	20	210	210	410	450	280
Other Tunas[3]	0	0	0	-	10	-	10	20
Total Tunas	2,700	4,750	5,870	6,300	3,070	3,420	2,220	2,120
Other Pelagics								
Blue Marlin	110	230	[redacted]	830	840	880	[redacted]	560
Striped Marlin	600	1,110	1,340	1,260	90	270	180	140
Swordfish	[4]	[4]	620	3,410	60	[4]	40	210
Other Billfish[5]	150	200	290	140	[2]	150	70	40
Mahimahi	50	40	180	390	960	580	900	1,090
Ono (Wahoo)	50	90	200	90	270	270	200	240
Other[6]	230	320	580	660	10	40	90	50
Total Other Pelagics	1,190	1,990	3,980	6,780	2,230	2,190	2,560	2,330
GRAND TOTAL	3,890	6,740	9,850	13,080	5,300	5,610	4,780	4,450
% Change from Previous Year		+73%	+46%	+33%		+6%	-15%	-7%
No. of Vessels	37[7]	50[7]	80[7]	138[7]	1,856[8]	1,897[8]	1,874[8]	1,879[8]

1 Estimates are based on the shoreside sampling monitoring program of the Honolulu Laboratory of the National Marine Fisheries Service (NMFS). The sample data covers a portion of the entire market ,mainly from Oahu and the Big Island. The sample data are "raised to estimate State-wide quantities. These estimates are considered to be preliminary and should be used with care.

2 Less than 10,000 pounds.

3 Mostly Kawakawa and Keokeo (Frigate Mackerel).

4 Swordfish were lumped into the "Other Billfish" category for 1987 and 1988.

5 Swordfish, Black Marlin, Spearfish, Sailfish.

6 Opah (Moonfish), Barracuda, Pomfret, Walu (Oilfish), etc.

7 NMFS estimates from market monitoring program and dockside counts.

8 Hawaii Division of Aquatic Resources records.

table2.4/jm6

June 5, 1991

TABLE 3

Estimated Species Composition of Commercial Landings (in numbers of fish)[1] of Longliners and Trollers and Handline Fishermen, 1988-1990

Species Category	Longline			Troll & Handline Combined		
Tunas	1988	1989	1990	1988	1989	1990[2]
Bigeye Tuna	33,000	40,700	42,500	10,400	15,200	14,300
Yellowfin Tuna	12,700	20,800	20,500	55,400	13,100	14,600
Albacore Tuna	11,300	8,900	7,000	500	400	100
Skipjack Tuna	800	1,000	500	45,800	29,200	18,700
Total Tunas	57,800	71,400	70,500	112,100	57,900	47,700
Other Pelagics						
Blue Marlin	1,400	4,700	4,200	4,400	4,100	2,100
Striped Marlin	19,500	21,600	20,700	4,000	2,000	1,600
Swordfish	[3]	4,400	24,000	[3]	[3]	1,500
Other Billfish[4]	5,300	5,600	2,200	3,400	1,800	1,000
Mahimahi	2,000	7,700	20,500	30,500	32,000	38,900
Ono (Wahoo)	2,800	5,800	2,500	10,300	6,900	8,300
Total Other Pelagics	31,000	52,800	74,100	52,600	46,800	53,400
GRAND TOTAL	88,800	125,200	144,600	164,700	104,700	101,100
% Change From Previous Year		+41%	+15%		-36%	-3%

[1] Number of fish were derived by dividing the weight of estimated total landings (Table 1) by the average weight of fish caught.

[2] Preliminary estimates. The average weights of pelagic species for the troll and handline sectors are not yet available. Numbers of fish were calculated by using the average weights for 1989.

[3] Swordfish were lumped into the "Other Billfish" for longline landings in 1988 and for troll and handline landings in 1988 and 1989.

[4] Black Marlin, Spearfish, Sailfish.

* During 1989 and 1990, longliners caught twice as much yellowfin tuna than the commercial trollers and tuna handline fishermen did. During previous years, trollers and handliners traditionally have dominated the landings of yellowfin tuna in Hawaii.

* Commercial trollers and handline fishermen caught about 4 to 8 times as much blue marlin as the longliners did during 1987 and 1988 respectively (Table 2). But in 1989 and 1990, the longliners caught more blue marlin (in terms of number of fish) than the commercial trollers and handliners did (Table 3).

* Longliners regularly catch the largest amounts of bigeye tuna in Hawaii since this, traditionally, is their principal target species. The longline fleet has also caught around 20,000 striped marlin per year during recent years, compared to 2,000 - 4,000 striped marlin taken annually by handliners and trollers (Table 2).

* Prior to 1989, total swordfish landings of longliners and handline fishermen in Hawaii were usually less than 50,000 pounds per year. In 1989, ten Hawaii-based longliners began targeting this resource on a part time basis and they landed an estimated 620,000 pounds of swordfish. In 1990, swordfish landings exceeded 3.4 million pounds, a sixfold increase from 1989. The average 1990 catch of swordfish per trip was 2,200 pounds. The species composition of the catch of swordfish-directed trips was 60% swordfish, 30% tuna, and 10% other pelagic species. Landings of swordfish by handline fishermen also increase substantially in 1990 relative to previous years.

* Longliner landings of mahimahi more than doubled in 1990 relative to 1989 landing. Mahimahi landings of commercial trollers and handliners also increased substantially in 1990, and exceeded longliner landings of this species by a factor of about 2.5.

* In 1989, longliners "produced" more revenues ($21.3 million) from ex-vessel fish sales than all of Hawaii's other major commercial fisheries combined: [lobster $6.2 million; troll and handline fisheries $6.9 million; bottomfish $4.6 million; and aku (skipjack tuna) $3.0 million). In 1990, the ex-vessel revenue for the longline fleet was estimated at $28.7 million, while the ex-vessel revenue for the commercial troll and handline sectors was less than $7.0 million in 1990.

* In 1989, for the first time, Hawaii-based longliners caught more fish (9.8 million pounds) in the EEZ and beyond than were previously taken in

any year by foreign longliners in the EEZ surrounding the Hawaiian islands. Catches of foreign longliners in the EEZ of Hawaii peaked in 1976 when 8.6 million pounds were taken. Of these, 87 percent by weight were tuna, and 13 percent were billfish and miscellaneous fish. In contrast, 40 and 48 percent of the landings of Hawaii longliners in 1989 and 1990 were billfish and other non-tuna species. Sales of marlin, swordfish, mahimahi, wahoo, oceanic sharks, and moonfish accounted for 25 and 35 percent of the gross sales revenues of the Hawaii longline fleet in 1989 and 1990 respectively.

The extremely rapid growth in the longline fishery in Hawaii prompted a flood of concerns from small-boat fishermen and "established" longliners who feel "victimized" by this unprecedented growth (Section 1.4). It also raised the "consciousness" of the majority of the Council's Pelagic Plan Monitoring team members and the Scientific and Statistical Committee regarding adverse impacts on segments of the "traditional", coastal fisheries (Section 4.3) and on the prospects of local overfishing of pelagic resources (Section 4.4). When the FMP was implemented in 1987, the Council believed that the Hawaii domestic fisheries for pelagic species would grow slowly and eventually approach the historical harvest capacity of the foreign longline fleet which used to operate in the EEZ of Hawaii, thus allowing time for evaluating the impact of the development of the domestic fishery. The historical foreign longline catch made in the EEZ of Hawaii was thought to adversely impact the development of the then existing domestic longline, troll, and handline fisheries. It is now the Council's responsibility to determine whether the unchecked, recent growth in the domestic longline fishery (which was one of the FMP's objectives) is itself adversely impacting segments of the domestic fisheries, and, indeed, some of the stocks themselves.

Because of all of these reasons, the Council called for an emergency moratorium on additional entry of longliners. The emergency moratorium is effective from April 23, 1991 through July 11, 1991 with a probable extension through October 9, 1991. The Council is following up this emergency action with this amendment to the FMP to extend the moratorium period for a total of three years (April 23, 1994). The intent is to provide a period of stability to allow the Council and the NMFS to develop and evaluate alternative management options for choosing a long term regime for managing the pelagic fisheries of Hawaii.

4.2 Gear Conflicts Between the Longline and Small-Boat Fleets

Gear conflicts between longliners and troll/handline fishermen (commercial and recreational) began in early 1989 (particularly off the island of Oahu) when recently arrived longliners began setting their gear nearshore and in close proximity to fish aggregating devices (FADs). Soon after, the conflicts intensified and spread to the other islands of Hawaii. State officials met with longliners and negotiated a voluntary

"gentlemen's agreement" wherein longline fishermen would stay at least 20 miles from shore and 10 miles away from FADs. The agreement was frequently breached as more longliners continued to come to Hawaii. Tensions continued to mount throughout 1990 and concern increased that continued conflicts might lead to bodily harm or even death. Specific instances of conflicts which have been reported include: crossing and tangling of gear, particularly with handline fishermen; longliners laying lines between FADs, tying off the mainline on the FAD buoys, longline gear wrapped around FADs; crowding; restrictions on vessel movement; willful destruction of fishing gear (destroying longliner floats, cutting lines); verbal threats; longliners attempting to run down small boat fishermen believed to be destroying longline gear; firing of warning shots across the bow of vessels; and threats of bodily harm. Most of these conflicts have occurred within 20 nmi of shore but some have been reported as far as 40-50 nmi from shore. There are also some reports of gear conflicts among longliners themselves involving different strategies by newcomers resulting in lines set perpendicular to the orientation of the mainlines of the "traditional" longliners.

At its February 27 - March 1, 1991 meeting the Council decided to request emergency action establishing a closure to longline fishing within 75 miles of Kauai County and Oahu and within 50 miles of Maui County and the island of Hawaii. If the Council's request is approved by the Secretary of Commerce, this action will essentially eliminate gear conflicts between longline and small boat fishermen. The Council intends to follow the emergency actions with an amendment to incorporate area closure regulations into the pelagics FMP. The moratorium on the additional entry of longliners which became effective April 23, 1991 (through interim emergency rule making procedures) puts a cap on the potential for gear conflicts between longliners and small boat fishermen in Hawaii. While the moratorium does not directly address the gear conflict problem, by limiting the number of longliners, the emergency moratorium lessens the chances of more conflicts occurring in the near future and the probability of longliners violating the proposed area closures. Extending the moratorium period for a total of 3 years (this amendment) would do likewise. It will provide the Council with a much needed period of stability in which to collect data on the impacts of the longline and small boat fisheries on the stocks, examine the interactions between various sectors of the pelagic fisheries, evaluate long-term management alternatives, and to adjust or fine tune area closure regulations.

4.3 Fishery Interaction Between Longliners and Coastal Fishermen

There is a perception widely held among trollers and handliners that longline vessels intercept fish migrating to local waters at the expense of small boat fishermen. Hawaii's troll and handline fisheries are coastal-oriented and mostly limit

their operations to near the main Hawaiian islands[15], while many longline vessels are large and mobile enough to travel large distances in search of concentrations of fish.

It is commonly believed that tuna, billfish, and other pelagic species migrate toward coastal areas fished by small boat fishermen. If many of those fish are caught by longliners before the fish arrive at coastal areas used by small boat fishermen, then those fish would not be available to small boat fishermen. There have been several studies that suggest there was fishery interaction between longliners and troll and handline fishermen in Hawaii during the time when foreign longliners operated in the EEZ (1962-1980), but there are no current, comprehensive studies regarding fishing interactions between small boat fishermen and domestic longliners.

Lovejoy (1977) constructed a simulation model based on estimates of relative abundance of blue and striped marlin derived from Japanese catch and effort data, assumed directions of migration of blue and striped marlin in the EEZ of Hawaii during different seasons of the year, and used available domestic catch data for blue and striped marlin for the longline and troll fisheries. The simulation model was used to investigate the effect of the catch of foreign longliners on the local troll fisheries for blue and striped marlin as well as the effect of the total longline catch (foreign and domestic) on local troll catches of these two species.

The Lovejoy study, and its weaknesses, are discussed in the FMP (July 1986). The principal "predictions" of his study are as follows: Recreational trollers' catches of blue marlin and striped marlin would increase by 2% and 7% respectively if foreign longline fishing were eliminated in the entire EEZ surrounding Hawaii according to the predictions derived in the Lovejoy model. By excluding all longliners from the EEZ (foreign and domestic), trollers could realize a 5% increase in blue marlin catches and a 21% increase in striped marlin catches.

The most relevant aspect of the Lovejoy study is not the predicted magnitudes of the fishery interactions. Rather, it is that the greatest gear competition takes place between local longliners fishing close to shore and trollers, not between trollers and foreign longliners fishing further away from shore[16]. That local, domestic competition should be more intense than competition with foreign longliners makes sense, as many of the newly arrived longliners are fishing the same waters as the trollers and handline fishermen. Fishery interactions should be intensified the closer

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[15] State of Hawaii catch reports show that the majority of trips taken by commercial troll and handline fishermen are within 20 miles of shore. However increasing numbers of trips are reported at distances of 50 - 60 miles off of Kauai, Oahu and the west coast of the island of Hawaii and 40 miles off of Maui, Molokai, and Lanai.

[16] Foreign longliners now fish exclusively in international waters beyond the EEZ surrounding Hawaii.

different fisheries are conducted to each other. In the extreme, if there were only one marlin in an area shared by a longliner and a troller, at least one of the boats would have to go home empty-handed.

A more recent study by Wetherall and Yong (1983) also attempted to investigate the effect of foreign longline fishing on the catch rate for blue marlin in Hawaii's pre-expansion longline fishery. They found that the catch rate (CPUE) during the third quarter (July - September) [the peak blue marlin season in Hawaii] was very highly correlated with the Japanese longline blue marlin CPUE at the beginning of the year on the mid-Pacific grounds south and southwest of the EEZ of Hawaii. While blue marlin are found in Hawaiian waters throughout the year, they apparently migrate into local waters in largest numbers during the summer months from the equatorial waters to the south and southwest of Hawaii.

The Wetherall and Yong study suggests that the success rate of catching blue marlin in local waters was influenced more heavily by events occurring outside of the EEZ than by foreign longline fishing within the EEZ[17]. Year-to-year changes in blue marlin catch rates on domestic longline gear tended to reflect similar changes in the catch rates of blue marlin on foreign longline gear in the mid-Pacific. The implication here is that blue marlin taken in local waters originate elsewhere and are a part of a common, wide-ranging stock since local catch rates for blue marlin follow the same basic trends as those beyond the EEZ in the mid-Pacific. It was suggested that the expulsion of foreign longliners would not necessarily lead to higher local abundance of blue marlin <u>if</u> the displaced vessels were redeployed in other regions of the blue marlin's range. Foreign longliners could still affect local abundance by reducing the number of blue marlin migrating from those regions to local waters. Nonetheless, the Wetherall and Yong analysis did show that there were negative relationships between Japanese longline fishing effort in international waters of the mid-Pacific and waters surrounding the Hawaii EEZ and the abundance of blue marlin in the EEZ. As foreign longline fishing effort in these areas increased, the blue marlin catch rate in the EEZ decreased.

The Wetherall and Yong longline fishery interaction study of blue marlin was extended by Skillman and Kamer (1985) to include striped marlin, and to cover domestic trolling and handline gears in addition to both foreign and domestic longline gears. Data on catch and fishing effort for each of these four fisheries were assembled for a 17-year period (1962 through 1978). Catch rates or estimates of abundance were calculated for both blue and striped marlin for each of these fisheries by month, quarter and year. The degree of the relationship with respect to catch rates for blue and striped marlin between the Japanese longline fishery and the domestic fisheries for the species was then evaluated using correlation analyses.

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[17] Wetherall and Yong determined that the abundance of blue marlin in the mid-Pacific area accounted for 80 percent of the variation in abundance of blue marlin within the EEZ.

The results with respect to blue marlin were similar to those of Wetherall and Yong. Since the catch estimates based on CPUEs for both the domestic longline and troll fisheries and the Japanese longline fishery vary from year-to-year in a similar fashion (were positively correlated), these results indicate that both local and Japanese fishermen fish a common stock of blue marlin. Changes occurring in the mid-Pacific stock as a whole are also reflected in changes in the portion of the blue marlin stock fished by local fishermen in local waters.

The situation for striped marlin was similar to that of blue marlin. Estimates of annual catch for striped marlin on domestic longline gear, with time lags behind Japanese CPUE data in areas adjacent to the EEZ, were all positively correlated. That is, CPUE data for both fisheries changed in a similar fashion. These results again suggest that the domestic and Japanese longline fisheries operate on a common stock and that changes in abundance of striped marlin to the local fishery are a reflection of comparable changes for the whole stock.

Skillman and Kamer also examined the relationship between Japanese longline fishing effort and the catch rate estimates for blue and striped marlin derived from domestic gears. They tested in effect whether marlin fishing mortality caused by foreign longline gear in the EEZ, in waters adjacent to the EEZ, and in the mid-Pacific waters influenced by domestic marlin catch rates in local waters. They found that the abundance of blue marlin in Hawaii (as derived from catch and effort statistics from the local troll and longline fisheries) was negatively correlated with Japanese longline effort expended in the EEZ and adjacent areas during the same quarter of the year and in the local area one quarter previously. Thus, increases in the amount of foreign longline fishing in waters close to where the domestic fisheries operate were associated with decreases in the abundance of blue marlin available to the domestic fishermen. Likewise, decreases in the amount of foreign longline fishing in the EEZ were associated with increases in the abundance of blue marlin available to domestic fishermen. There was an apparent fishery interaction between the foreign and domestic fisheries operating in the EEZ. The catch of the foreign longline fishery in the EEZ apparently affected the catch of blue marlin of domestic fishermen.

The abundance estimates of striped marlin calculated from domestic longline data were also negatively correlated with Japanese longline fishing effort expended in the EEZ and in waters adjacent to the EEZ during the same quarter and in the adjacent area one to four quarters earlier. As with blue marlin, the correlation analysis for striped marlin also suggests that increase in Japanese fishing effort in the EEZ and in adjacent areas around Hawaii were associated with decreases in the abundance of striped marlin available to the domestic fishery. A fishery interaction between the foreign longline fishery and the domestic longline fishery apparently also existed with respect to striped marlin. These results provide confirmation that Japanese longline fishing effort in local waters and in waters adjacent to the EEZ was associated with reduced abundance of both blue and striped marlin available to the

domestic fleets. While fishery interactions do exist between the foreign and domestic fisheries for the two principal species in the management unit, Skillman and Kamer's study did not estimate the magnitude of the fishery interaction that Wetherall and Yong did. Also, it was not possible to test for interactions between foreign and domestic fisheries which take mahimahi, wahoo and sharks because catch statistics for these species are only available for domestic gear types. Nor was it possible to test for foreign/domestic fisheries interaction with respect to black marlin, sailfish, and shortbill spearfish because it was not possible to derive statistically valid estimates of abundance (catch rates) for these species for either domestic and foreign fisheries that take these species.

The 1977 Lovejoy simulation study is the only one which attempted to quantify possible magnitudes of a transfer effect stemming from alternative area closures of the EEZ surrounding Hawaii to foreign longline fishing. Over the years, the model has been subject to a variety of criticisms common to simulation modeling. The results are only as good as the assumptions upon which the model was based. The results are not unique and cannot be statistically tested, and can only be verified with further research. Nevertheless, the 1977 Lovejoy study has been helpful in understanding qualitative or directional catch effects of area closures of the EEZ to foreign longline fishing, and in a follow-up study (1981) Lovejoy altered some of the assumptions of his earlier simulation model and once more tested the model's predictions. He assumed half the rate of migration of blue marlin and striped marlin into the EEZ of Hawaii (no one knows the real migration rates for these species). By eliminating all longline fishing effort (foreign and domestic) under the new assumption, his model predicted an increase in troll catches of blue and striped marlin by 13% and 45% respectively. The implication here is that decreasing the number of fish in the EEZ increases the interaction between fishing gears.

The inferences drawn from the Lovejoy simulation models are more pertinent today than when the models were initially developed. Lovejoy used available data from the 1960's and 1970's when there were only between 20 and 30 small sampan-type longliners operating in Hawaii (Table 1). On average, these small longliners each set only about 300 hooks per day. Today, there are as many as 150 longliners operating in Hawaii, each setting an average of over 1,000 hooks per day or more. It seems quite plausible that longliners can significantly affect the catches of small boat fishermen by filtering the migrating fish on their way to coastal areas where trollers and handline fishermen operate. This hypothesis still needs to be tested using current data, and the Council has plans to test it during the 3-year moratorium period. This hypothesis could not be statistically tested before in any meaningful sense since domestic longliners, by and large, began to grossly underreport their catches to the State beginning in the late 1970's. Reporting of fishing effort and the location of catches has been equally bad. The federal permit and daily logbook requirement which became effective on November 27, 1990, should improve the record of reporting in the future.

The catch competition studies done by Lovejoy, Wetherall and Yong, and Skillman and Kamer did not include species of tuna since, at that time, tuna were excluded from the Magnuson Act. Yellowfin and big-eye tuna, however, have traditionally been and at present constitute the largest share of the catch of domestic longliners in Hawaii. The proportion of landings of yellowfin tuna by trollers and handliners declined drastically during 1989-90 while the longline proportion of yellowfin tuna landings has increased consistently during 1987 - 1990 (Table 2). It appears that fishery interactions between domestic longliners and small boat fishermen are most evident for yellowfin tuna since this species is a major species for both gear-type categories (Table 2). Blue marlin is the second most important species to examine for catch competition effects between longliners and small boat fishermen since the longline catch of this highly prized gamefish increased during 1987-90. On the other hand, the troll and handline catch of blue marlin dropped dramatically during 1990 relative to previous years (Table 2).

The previously discussed fishery interaction studies are outdated, with the latest year of date examined being 1979, twelve years ago. The Council, therefore, requested the Honolulu Laboratory of the NMFS to undertake a quick analysis to see if there was any current evidence of interaction between the expanding longline fishery and Hawaii's commercial troll and handline fisheries. Although stocks of pelagic species have ocean-wide distributions, it is a reasonable hypothesis that localized fishing could temporarily reduce fish abundance in coastal areas. If fishing pressure in Hawaii is sufficiently large to reduce local fish abundance, it should be evident in reduced catch rates.

The catch rate analysis undertaken by Boggs (1991) at the Council's request, used data provided by the Hawaii Division of Aquatic Resources (HDAR) as summaries of pounds of fish landed by the commercial troll and handline fisheries by year for 1983 - 1989 and by month in January 1987 - June 1990 along with corresponding data on the number of fishing trips per year and month, respectively. The catch rate index used was catch (in pounds) per trip. Time and the quality of data did not permit standardizing of fishing trips as a unit of fishing effort in the troll and handline fisheries, estimating or correcting for under-reporting of catches, estimating or correcting changes in reporting over time, or estimating changes in the number of zero catch trips over time. The HDAR data do not actually contain reports of trips. Rather, the landings recorded for each date and vessel in State catch records was counted as a trip if any pelagic species was reported as being caught. Longline catch per trip was not examined in this study since longliner fishing activity has been grossly under-reported to the State and because the length of longline trips represent a measure of fishing effort that has changed very much over a short time. However, the troll and handline catch rates were examined in relation to Hawaii longline catches as estimated by the NMFS fish market sample data for January 1987 through June 1990 to see if there was any recent evidence of fishery interaction.

Boggs' analysis did not to reveal any clear relationships between longline catch and the troll and handline catch rates for blue and striped marlin, swordfish, bigeye tuna, mahimahi, or ono. The most interesting results were the apparent reductions in the catch rates for yellowfin tuna by commercial trollers and handliners beginning with the spring of 1987. However, there was a lot of scatter in the data, and low troller and handline catch rates occurred regardless of the level of longliner catches. While the absence of high troll and handline catch rates for yellowfin tuna in months of high longline catches could be attributed to the removal of fish by the longliners, this did not explain why troll and handline catches were low at the times when the longline catches were also low. Some other factors might be at work here. Whatever the causes, the decline in yellowfin tuna catch rates over the last few years seems very real, being reflected in data from many gear types. While the results of Boggs' analysis are generally inconclusive concerning the impact of longline fishing on the local abundance of pelagic fish, the data available for the study only went through June 1990. Since then, domestic longline fishing in Hawaii has grown from about 100 vessels to 172 vessels, so future data are more likely to show evidence of fishery interaction. It is especially important to note that the impact of present longline fishing pressure was not addressed by the data available to Boggs which did not extend beyond early 1990. However, blue marlin catch per trip data for Oahu from the NMFS market sample of troll and handline landings have just recently been compiled by Pooley and Yoshimoto (1991), and these indicate a drastic decline in the blue marlin catch per trip during what should have been the greatest period of blue marlin abundance. The Council has plans to regularly update the analyses initially undertaken by Boggs and Pooley. Although available data provide no clear-cut evidence that longline catches (prior to 1990) have had a significant impact on troll and handline catch rates, new data collected over the next three years may do so.

4.4 Prevention of Local Overfishing

The stock structure of the principle species of pelagic fish caught in Hawaii is poorly understood (see Section 5.1). In the absence of such knowledge, a working hypothesis is that these stocks occupy a broad range extending well beyond the EEZ of Hawaii. The harvest of pelagic species by Hawaii-based fishermen is a small fraction of the total Pacific-wide harvest of any one species. If this hypothesis is correct, regulatory action controlling domestic harvest would not likely prevent growth or recruitment overfishing. This would not be the case if a significant portion of the entire stock, or spawning stock, resides in the local area. Although it may be true that locally caught pelagic fishes make up a small fraction of stocks that extend beyond the range of Hawaii's fisheries, the rate of replacement of fish within the area in reach of the local fisheries is finite. When fish are being removed at a faster rate than the rate of the fish moving into local waters, then this constitutes local overfishing.

The Council's 3-year research plan (Appendix A) is designed to quantify the effect of total local fishing effort (all gear) on yield, and what contribution each gear

type (troll, handline, and longline) makes to the total yield. There may be no level of fishing effort that results in the optimal yield for all fishing sectors (e.g., a successful charter fishery for blue marlin may require catch rates to be higher than at the point where the local rate of fish replacement is being fully exploited). The Council may decide to limit fishing effort in total, or by gear or area, to achieve particular benefits for certain pelagic fishery sectors. One of the goals of the 3 year research plan is to determine the effect of local longline fishing effort on the catch of pelagic fish by Hawaii's different pelagic fisheries so that selection of a target number of longline fishing vessels (a limited entry plan) is possible.

A characteristic of many pelagic fisheries is large fluctuations in stock-wide CPUE due either to stock-wide fishery independent variations in population size or anomalies in environmental factors, conditions that affect availability. These factors may mimic local overfishing when in fact that may not be the case. Likewise, low prices may curtail fishing effort, mimicking conditions of local overfishing. Attempts will be made to account for these effects, and to adjust or correct the local overfishing models accordingly.

4.5 Fishery Interaction with Protected Species

There is compelling evidence that longline fishing around the Northwestern Hawaiian Islands (NWHI) has resulted in the take of Hawaiian monk seals, an endangered species. As a result of evidence of interactions, the Secretary of Commerce, at the Council's request, prohibited longline fishing within 50 of each of the NWHI including the channel waters between the islands. Limiting the number of longliners during a three year period (this amendment) lessens the probability of longliners violating the monk seal closure areas and this is beneficial to the protection of these endangered species.

4.6 Crowding of Shoreside Facilities

On September 27, 1990, the Council hosted a Fishermen's Forum. Honolulu Harbormaster Captain Don Gately addressed the fishermen at the Forum on the Subject of Fishing Vessel Berthing and Honolulu Waterfront Development. Captain Gately said that several mainland longliners were arriving virtually every week and he expressed dismay because most of the new arrivals were large boats quite a bit larger than the berths available at the already overcrowded Kewalo Basin where most of Honolulu's fishing fleet is berthed. The only way that these vessels can be accommodated is on straight piers which are in very short supply both at Kewalo Basin and at Honolulu Harbor. The main purpose of Honolulu Harbor is to handle cargo, not fish, and the newly arrived fishing vessels were impinging on normal cargo handling operations. On one weekend alone, Captain Gately received a report of 58 longline vessels stacked up in Piers 16, 17, and 18 nested alongside each other, much like pigeons in a crowded cage. He was astounded how the longliners managed to

pack themselves in that way and still keep a semblance of order. The influx of longliners has not only caused a major berthing problem but cargo and fish unloading scheduling problems as well. The situation in Kewalo Basin and Honolulu Harbor has gotten to be so bad that the situation is analogous to "musical boats" instead of "musical chairs."

There were about 120 longliners in Hawaii when Captain Gately gave his report. Now there are over 150 longliners in Hawaii. The State of Hawaii has not taken action to put a cap on the number of longliners. Instead, the State is relying on the Council to help clear the logjam of longliners in Hawaii.

4.7 Regaining a Semblance of Stability

The great expansion of the longline fishery in Hawaii in a very short period of time has upset whatever equilibrium had previously prevailed. Longliners caught three times more fish in 1990 than the commercial trollers and handliners did (estimated 13.1 million pounds for the longline fleet compared to 4.4 million pounds for the commercial troll and handline fisheries combined). In 1987, on the other hand, the landings of commercial trollers and handliners were 33 percent greater than longliner landings.

The gains in longliner landings may have been made at the expense of troll and handline landings of yellowfin tuna and blue marlin. During 1989 and 1990, the years of the most rapid growth in the longline fleet, troll and handline landings of yellowfin tuna were but half of their landings of yellowfin in 1987 and 1988 (Table 2). In 1990, troll and handline landings of blue marlin were half of the landings of blue marlin the previous year. In contrast, the landings of yellowfin tuna and blue marlin have risen consistently over the past four years for the longline fleet (Table 2).

Yellowfin tuna and blue marlin are the most important species for commercial trollers and handliners in that these two species are traditionally the largest component of their catches and these two species provide the most money for commercial trollers and handliners. These two species are also considered to be the premier gamefish for Hawaii's charter fleet and the multitudes of recreational fishermen in Hawaii. The small-boat fishermen blame the longliners for their apparent lack of fishing success in recent years, and their widespread disenchantment has triggered numerous, highly publicized skirmishes between them and the longliners.

The emergency moratorium on the additional entry of vessels in the Hawaii longline fishery will expire on July 22, 1991 (with a possible extension of an additional 90 days), and this amendment is intended to extend the moratorium period for a total of three years. This amendment, if approved, will stabilize Hawaii's fisheries for pelagic species and prevent an already bad situation from getting any worse.

4.8 Summary of Need

As indicated, establishing a three year moratorium on the entry of additional vessels into the Hawaii longline fishery is needed for several reasons.

The size of the domestic longline fleet has grown extremely rapidly to a size and fishing capacity never experienced before due to restrictions placed on longline fishing for marlins and swordfish in the Atlantic; the decline of swordfish stocks in the Atlantic; problems in the domestic longline fishery for yellowfin tuna in the Gulf of Mexico; and discussion of a blanket moratorium on entry into the fisheries under the jurisdiction of the North Pacific Council. Competition in catches between longline vessels and trolling and handline boats is very likely to increase (unless the emergency moratorium is extended) and intensify concerns of longliner interception of fish and local overfishing which were motivations in initially developing the FMP for restricting foreign longline operations in the EEZ.

The harvest of the domestic longline fleet exceeded the highest EEZ catch level of foreign longliners for any year in 1989 by 14%. In 1990, landings of domestic longliners increased to an estimated record high of 13 million pounds. The Council's initial impetus for developing the FMP for pelagic species was to curtail foreign longline fishery in the EEZ which was accomplished. Regulating domestic longline fishing is now needed.

The swordfish segment of the domestic longline fishery is growing most rapidly due to overfishing of swordfish stocks in the Atlantic and continuation of a strong market demand for this species. Prior to the mid 1980's, swordfish landings in Hawaii were generally less than 50,000 pounds annually. In 1990, the longline fleet landed an estimated 3.4 million pounds of swordfish. Hawaii has become the principal supplier of fresh swordfish to the U.S. market virtually overnight.

Five years ago, scientists concluded that swordfish stocks in the western Atlantic were growth overfished, but no management action was taken due to stock assessment uncertainties. Now there is a general consensus that the western Atlantic swordfish stock(s) continued to decline as longline fishing increased for this species, and the stock may be approaching recruitment overfishing. Because of this, scientists have recommended drastic reductions in fishing effort to prevent the collapse of the western Atlantic swordfish resource and the destruction of the industry. If this recommendation is implemented, an additional 400-500 longline fishing vessels may seek to come to Hawaii, absent positive action on this amendment to extend the moratorium for a total of 3 years. The fairly rapid decline of swordfish stocks in the Atlantic during a relatively short period is an example of what could conceivably happen in Hawaii.

Swordfish are not uniformly distributed throughout their range. They appear to be oriented to bottom structure at least as much as they are to surface features such as sharp gradients in water temperature. Swordfish seem to accumulate in such areas when they are unfished. Initial sizes and catch rates are very high, but the fish can be removed very quickly. Mean size of fish declines rapidly as the larger, sexually mature fish are removed. Moving to new areas will bring about increased mean size and high catch rates, but the previously fished areas do not recover for a long time (maybe never if fishing pressure continues). Eventually one runs out of banks and seamounts to fish for swordfish for the fresh fish market since the length of fishing trips is limited to the shelf life of a perishable product.[18]

The present status of tuna and billfish stocks (including swordfish) on a stock-wide basis is poorly known because of the lack of comprehensive catch and effort data from the distant-water foreign longline fisheries during most of the past decade. The status of the resources within the EEZ of Hawaii is even more poorly understood because many segments of the domestic longline fleet essentially stopped submitting catch reports to the State of Hawaii during the last decade and the quality and quantity of the catch and effort data from the State of Hawaii for the other components of the State-pelagic fishery are insufficient for stock assessment purposes. Also no legal foreign longline fishing has occurred in the EEZ of Hawaii since 1980, thus there are no foreign longline fishery data available.

It is prudent to halt the unregulated expansion of the longline fleet and postpone extraction of possible additional harvests until it can be shown that additional harvests are sustainable. This strategy contrasts with waiting until sufficient evidence exists to show that the expanding fishery reached the points of economic or local overfishing, or worse yet biological overfishing, some years prior and then reacting with management measures to rebuild the stocks to acceptable levels.

The Council's 3-year plan for quantifying the effects of local longline fishing effort on the yield of Hawaii's pelagic fisheries is described in Appendix A-1. During this time, the Council, the NMFS, and the fishing industry will continue with data collection and analysis, evaluation of long term management alternatives, including limited entry, and a selection of a long-term management program. In undertaking the 3-year plan, reliance will be placed on the new, high-quality data being collected using the newly instigated (Nov. 27, 1991) longline logbooks over the next three years.

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[18] Letter from Steven Berkeley, Fishery Biologist for the South Atlantic Fishery Management Council, to Kitty Simonds, Executive Director of the Western Pacific Fishery Management Council, April 23, 1991

5.0 EFFECTS OF THE PROPOSED ACTIONS

5.1 Impacts on Living Marine Resources

The species composition of Hawaii commercial landings of pelagic species is given in Tables 2 and 3. Bigeye and yellowfin tuna, striped and blue marlin, and swordfish are the major components of the longliner catch. Yellowfin tuna, blue marlin, and mahimahi normally account for between two-thirds and three-quarters of the catches of commercial small boat fishermen in any given year.

Each of these principal species can be found in Hawaiian waters year round, but each of these species also exhibits distinct seasonal periods of abundance. The peak periods of abundance for the principal pelagic species in the main Hawaiian islands are as follows based on averages of 30 years of State of Hawaii catch records (Pooley, 1983) and catch rate data covering 17 years (Skillman and Kamer, 1985).

Yellowfin tuna:	May - September (July peak)
Blue marlin:	June - October (August peak)
Swordfish:	April - July (May peak)
Striped marlin:	November - June (December peak)
Bigeye tuna:	October - May (December peak)
Mahimahi:	Bimodal distribution with seasonal peaks in April and October

It is apparent that these species are "recruited" into local waters seasonally -- most presumably come from elsewhere, stay a while, and eventually leave with some of the surviving fish returning the following year. This is an apparent natural cycle playing out every year.

There appears to be much order and symmetry in the seasonality patterns between the "summer" fish (yellowfin tuna, blue marlin, and swordfish) and the winter fish (bigeye tuna and striped marlin). It almost seems that there are two ecosystems of pelagic fish which make their presence known in Hawaii during opposite times of the year. When the "summer" fish are moving into Hawaii waters (main islands), the winter fish are moving out and vice versa. Blue marlin and yellowfin tuna seem to be responding to the same set of environmental conditions (possibly seasonal changes in water masses, availability of preferred prey species or breeding "needs"), while bigeye tuna and striped marlin also seem to "run" together but at opposite times of the year compared to blue marlin and yellowfin tuna. Swordfish seems to be a different animal altogether and could be in a class by itself. Mahimahi is a "transition season" species with peak abundance split between the spring and fall months.

It is not known exactly where these fish come from and where they go when their apparent abundance declines in Hawaii waters. It is known that each of these

species has a Pacific-wide distribution, but no one really understands the actual stock structure of these fish (whether single or multiple breeding stocks exist) and how the stocks interact with each other. However, certain inferences or hypotheses can be drawn from the historical distribution of foreign longline catches, larval distribution and other biological data.

Blue Marlin

The most recent and best available information on the stock structure and status of Pacific billfish stocks is in the Proceedings of the Second International Billfish Symposium held on Kailua-Kona, August 1-5, 1988 (Stroud, ed. 1989).

In the Pacific Ocean, blue marlin appear to consist of a single stock centered about the equator, with the northern and southern extent of its distribution varying seasonally (Skillman, 1989). The longline fishery for blue marlin has gone through a developmental phase initially passing the MSY level during the mid 1960's. The blue marlin stock still appears to be overfished, with more effort expended than is needed to take the MSY (Skillman, 1989). The situation improved somewhat during the late 1970's, and further improvement should occur if the international longline fleet continues to use more deep-set longline gear targeting on bigeye tuna. The blue marlin fishery is still, however, considered to be growth overfished with effort greater than required to harvest the MSY. Increase of longline fishing effort beyond 1975 (or 1985) levels would not be favorable to the Pacific blue marlin stock (Suzuki, 1989). Therefore, the local availability or the abundance of blue marlin in Hawaii waters should not be expected to increase, on average, during upcoming years if the results of the above assessments are still valid.

Swordfish

Swordfish occur mainly from California to Chile in the eastern Pacific, throughout the central Pacific and from Japan to Australia and New Zealand in the western Pacific. There is uncertainty whether there is a single stock of swordfish in the Pacific with a population sufficiently mobile to make the concept of local overfishing a non-issue. A alternative hypothesis envisions three separate stocks as evidenced by areas of apparent high abundance: northwestern Pacific, southwestern Pacific, and eastern Pacific (Bartoo and Coan, 1989). Sosa-Nishizake and Shimizu (1990) have hypothesized the occurrence of four subpopulations of swordfish in the Pacific on the basis of seasonal concentrations of mature specimens: central north Pacific (waters around Hawaii), the Coral Sea, the area between 10° and 30° S and west of 110° W, and equatorial Pacific waters where spawning apparently occurs year round.

The most recently published appraisal on the status of the Pacific swordfish fisheries was done by Sakagawa (1989) and on the status of the stocks by Bartoo and Coan (1989). Approximately 70% of the Pacific swordfish catch is taken with longline

gear which is directed at catching tunas, while 30% is taken by surface gears, such as harpoons, drift gillnets, and handlines, directed at catching large pelagic species (Sakagawa, 1989). These fisheries are both coastal and high-seas in nature.

Bartoo and Coan reviewed all the available Pacific swordfish data and concluded that only the Japanese longline fishery data are suitable in their detail and time period covered (1952 to 1980) to provide a basis for a CPUE assessment of Pacific swordfish stock(s). The conclusion reached is that none of the data examined indicates that the stock(s) have been exploited heavily enough to cause a noticeable decline in CPUE through 1980[19]. This general conclusion can be tempered by the present lack of data on swordfish catches in both the large and small-mesh drift gillnet fisheries operating north of Hawaii and the lack of Japanese longline data for most of the past decade. Both driftnet fisheries take swordfish, but the amounts taken are still unknown.

Overfishing of swordfish could occur if the stock or stocks of swordfish in reach of Hawaii-based longline vessels are sufficiently localized as to contain a significant portion of the spawning stock.

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[19] Sketchy data for Taiwan and Korean longline fleets covering the 1975 to 1985 period are available, but detailed Japanese data most useful for extending CPUE time trends are not available beyond 1980.

Striped Marlin

Striped marlin may be comprised either of separate north and south Pacific stocks with possible intermixing of stocks in the eastern Pacific, or a single Pacific-wide stock. Consistent with either view is the distribution of catch rates, which are consistently high in the northern central Pacific (near Hawaii), often in the south central Pacific (frequently during the same quarters of the year), and also in eastern tropical Pacific waters on both sides of the equator (Skillman, 1989).

The fishery (assuming a single Pacific-wide stock) reached its highest development during the late 1960's and early 1970's. The Pacific-wide fishery for striped marlin apparently has not yet reached the MSY level. However, the north Pacific assessment is suspect due to the lack of data on the large-mesh drift gillnet fishery targeted on tuna (principally albacore) and billfish (mostly striped marlin and swordfish).

The stock assessment for striped marlin done by Skillman used Japanese longline data through 1980. He tried to extend the time series beyond 1980 by using available Korean and Taiwanese data for billfishes, but concluded that the Korean and Taiwanese statistics are not of sufficient quality to extend the published Japanese time series.

Suzuki (1989), on the other hand, reviewed catch and effort statistics in the Japanese longline fishery for striped marlin covering a 33-year period (1952-1985). The total catch of striped marlin from the north Pacific stock peaked in 1968, at about 21,000 tons, then showed a decreasing trend up to the end of the 1970's despite the increased total fishing intensity during the same period. In the 1980's, the total catch showed a slight decreasing trend. CPUE measured through the Japanese longline data showed a wide fluctuation without a clearly increasing or decreasing trend during the 1952-1985 period. Judging from the wide fluctuation in CPUE, without any trend, Suzuki (1989) inferred that the longline fishing impact on the North Pacific stock of striped marlin may not be high enough to be a dominant factor in changing stock size. However, Suzuki noted, as inferred in a previous billfish stock assessment workshop (Shomura, 1980), that increased fishing effort beyond the 1975 level resulted in no further increase in catch.

Presently there are around 500 Japanese and Taiwanese large-mesh drift gillnet vessels operating in the north Pacific. There are no published data available yet on the volume of striped marlin catches made in this fishery during recent years, but the catches are likely to be substantial. Striped marlin are also taken incidentally in the small-mesh driftnet fishery (around 650 vessels) for squid which operates north of the large-mesh driftnet fishery. Therefore, the conclusion that striped marlin in the north Pacific are underfished should be taken with a grain of salt.

Mahimahi

In the Pacific Ocean, mahimahi are distributed in tropical and subtropical waters with the greatest concentrations occurring along the eastern and western margins. Mahimahi are common in Hawaiian waters and some are found year round, but pronounced seasonal variations in abundance of mahimahi are very evident in Hawaii and elsewhere in the Pacific. Very little information is available for postulating possible stock structures for mahimahi. However, because the seasonal migrations of the common mahimahi in the northern hemisphere of the Pacific show a reverse tendency to that in the southern hemisphere, there may be at least two stocks of mahimahi in the Pacific Ocean separated by the equator.

Nothing is known about the status of stocks of mahimahi in the Pacific Ocean. However, there are established, fairly large-scale surface fisheries for mahimahi off Japan and Taiwan in the western Pacific and off Ecuador in the eastern Pacific, as well as numerous small-scale fisheries throughout the Pacific Basin. Also, incidental catches of mahimahi occur in the well-developed tuna purse seine fishery in the central and western tropical Pacific as well as in the large mesh drift gillnet fishery in the north Pacific.

Yellowfin Tuna

The most currently available information on the Pacific stock structure and status of this species is in a report published by the Food and Agricultural Organization (FAO) of the United Nations (1980). The Japanese quit publishing their tuna longline catch statistics in 1979 so this FAO report is the best and latest information available.

The Pacific yellowfin tuna resource was assumed to have separate eastern Pacific and western Pacific stocks, and possibly a third stock in the central Pacific where Hawaii is located. An analysis of the entire Pacific longline fishery (which is possibly indicative of the situation in the longline fishery in the central Pacific) suggests that the total longline fishing effort for yellowfin tuna is at or approaching the level producing the maximum sustainable yield (MSY) and that an increase in longline fishing effort is unlikely to result in a significant increase in sustained catch if the "current" (pre-1979 level) pattern of fishing is maintained. While "recruitment" of yellowfin tuna to local waters might not increase, this does not, however, necessarily mean that a greater yield could not be sustained locally. Hawaii-based fishermen could possibly catch more yellowfin tuna than they are catching now by expanding their area of operations. However, since the longline fishery for yellowfin tuna is apparently at MSY, it should not be expected that the high seas will "feed" local waters to any greater extent in years to come, unless Pacific-wide fishing effort declines.

With the development of a large purse seine fishery in the western and central tropical Pacific south of the equator, no one knows what the MSY for yellowfin tuna is. Previous estimates based only on longline catch and effort are now no longer valid. The catch of yellowfin tuna from all fisheries, including the Philippines and Indonesia, was about 250,000 mt in 1989, and has been over 200,000 mt for most of the 1980's. There is no evidence that catches of this magnitude are resulting in over-exploitation. The resource may be able to sustain catches of around 300,000 mt, but this can only be clarified if and when actual catches reach this level and beyond. Lack of key data continues to hamper efforts to predict potential yields of yellowfin in the western Pacific. (John Hampton, SPC, personal communication [1990]).

Bigeye Tuna

According to a FAO report (1980), the stock structure of Pacific bigeye tuna is not clear. The occurrence of major spawning activity in the eastern Pacific and the simultaneous appearance of a dominant year class over a wide area support a single stock hypothesis. However, the occurrence of at least some localized spawning activity and the presence of morphological (body shape) differences in the north Pacific suggest multiple stocks. A production model analysis based on the single stock hypothesis and using total longline catch and Japanese catch and effort data has been carried out (FAO, 1980). The FAO report concluded that the "present" (pre-1978) state of exploitation of bigeye tuna cannot be accurately assessed. It appears that further increases in the effective longline fishing effort could still increase the total catch but at the expense of further declines in CPUE.

Bigeye is thought to have an MSY of 130,000-300,000 mt Pacific-wide, although there are many gaps in biological information that could drastically alter these figures (John Hampton, SPC, personal communication [1990]). There is much that is unknown about bigeye tuna, so there is a need to tread carefully. In 1990, Japanese longline CPUE for bigeye tuna in the major longline fishing grounds of the central Pacific was below average (Christofer Boggs, NMFS Honolulu Laboratory, personal communication).

Summary of Stock Structure and Condition of the Principal Pelagic Fishes

The Pacific-wide blue marlin stock remains growth overfished with fishing effort greater than required to harvest the MSY. Yellowfin tuna, bigeye tuna, and striped marlin stocks might be near or at MSY judging from dated stock assessments studies which only examined longline fishing data, and could not account for the effects of the drift gillnet and purse seine fisheries. None of the longline data examined with regard to swordfish indicate that the stock(s) in the Pacific have been exploited heavily enough to cause a noticeable decline in CPUE through 1980, but the effects of drift-gillnet fishing on this species are unknown. There is also some data to suggest the existence of multiple stocks of swordfish in the Pacific with two of the hypothesized stocks occurring north and south of the EEZ of Hawaii. No information is available at present for judging the status of swordfish and subpopulations in the Pacific, if swordfish subpopulations do indeed exist. The same is true for mahimahi.

Establishing a three-year moratorium on the additional entry of longliners in Hawaii will prevent further growth in the longline fleet and reduce the overall potential harvest of the management unit species and tuna by U.S. vessels in Hawaii. However, the harvest of these species by Hawaii-based fishermen still makes up a small portion of the total harvest of these species throughout the Pacific Ocean, and thus the overall effect of this amendment in preventing stock-wide overfishing would be relatively low unless the major portion of the spawning stock biomass of any one of

these species was in the EEZ of Hawaii and in nearby areas on the high seas. However, the proposed action would likely have a beneficial effect in terms of maintaining a higher rate of abundance of these species in the EEZ and thus preventing localized overfishing from occurring, or keep it from getting worse if localized overfishing is already occurring.

5.2 Impacts on Fisheries

The growth of the longline fleet has resulted in record landings by domestic fishermen in Hawaii. Landings during this same period for other pelagic fishermen employing gear have declined. The magnitude of the impacts, both positive and negative, on the various pelagic fisheries is difficult to predict. However, one of the primary motivations for the 3 year moratorium at this time is to minimize the risk of economic and social disruption resulting from unchecked fleet expansion and overcapitalization. The 3 years study period provides an opportunity to take a conservative approach and examine the impacts of fisheries interactions and effort levels before the costs of overcapitalization and overfishing have already accrued.

As of May 16, 1991, the NMFS had issued 172 general longline permits to vessel owners, although some of these vessels will not be able to fish in the EEZ of Hawaii nor land their fish in Hawaii under the requirements of the interim rule (effective as of April 23, 1991) which established the emergency moratorium. On April 3, 1991, the NMFS notified owners of vessels with federal longline fishery permits in Hawaii that beginning with April 23, 1991, they would have to secure a special "limited entry" permit in order to be able to continue their longline operations based out of Hawaii. (See Section 1.2 for the eligibility criteria for continuation of participation in the Hawaii longline fishery during the interim emergency period [April 23, 1991 to July 22, 1991] with a possible 90-day extension.)

So far (June 13, 1991), 118 special "limited entry" permits have been issued (having clearly met the eligibility criteria) and an additional 26 "limited entry" permit applications are still under review. The remaining pool of general longline permit holders have not yet applied for a special limited entry permit for unknown reasons. It may be that some of the general longline permit holders are still unaware of the rules of the emergency moratorium; some may feel that they do not meet the eligibility criteria and thus have not bothered to apply for special limited entry permits; and others may simply not care. Whatever the reasons may be for the low rate of applications for special limited entry permits, there will be fewer vessels fishing with longline gear during the emergency moratorium period. At present, it is impossible to predict just how many vessels will eventually qualify to fish with longline gear and land their fish in Hawaii.

The overall effect on the size of the longline fleet of this amendment (extend the moratorium for a total of three years) would be relatively low since the initial issuance

of permits process will hopefully be finished soon under the interim emergency rules. However, a few more vessels would be eligible to enter the Hawaii longline fishery since the eligibility criteria for the three-year moratorium period have been somewhat liberalized (see Section 2.0). The overall effect of this amendment on the harvests of the longline fleet is to stabilize the longline fleet (but not necessary harvest) at the 1990 level or at lower levels of preceding years (Table 2). The vessels which will not qualify for the special limited entry longline permits could switch their fishing operations to beyond the EEZ of Hawaii, but they would have to land their catches elsewhere. Some of them could, perhaps, qualify for the lobster and bottomfish fisheries in the Northwestern Hawaiian Islands. However, the fishery for bottomfish is also subject to limited entry conditions and the lobster fishery is now closed temporarily. So it appears that the ineligible longliners will leave Hawaii to fish exclusively beyond the EEZ and land their fish elsewhere or fish in other areas.

A qualitative analysis of the impacts on various included and excluded segments of the longline fleet is explored in more detail in the Regulatory Impact Review (Section 8.3) presented as part of this amendment.

During 1990, there were 1,879 troll and handline vessel owners/operators (including charterboats) commercially licensed by the State of Hawaii to sell their catches. [(2,319 troll and handline vessel operators (including crew member) have State commercial licenses at present.] The number of licensed small-boat commercial fishing vessels has not changed much since 1987 (Table 1). Between 1987 and 1990, the catches of the small boat fishermen decreased by 19 percent, from 5.3 million pounds to 4.5 million pounds (Table 2). Total ex-vessel revenue for the small boat fleet in 1990 was estimated (by the market monitoring program of the Honolulu Laboratory of the NMFS) at $7 million with the top contributors being mahimahi ($2.2 million), yellowfin tuna ($1.6 million), bigeye tuna ($1.1 million), ono ($0.6 million), and blue marlin ($0.4 million).

The commercial troll/handline fleet is comprised of both full-time fishermen and many part-time fishermen. For some of the part-time fishermen, revenue derived from fish sales is an important source of income. For others, selling a portion of their catch helps defray fishing trip expenses for what would otherwise be principally a recreational fishery.

In addition to vessels holding commercial licenses, there are many non-licensed recreational fishing boats in Hawaii. It is estimated that there are between 5,000 and 6,000 vessels which are engaged in recreational/subsistence fisheries for pelagic species in Hawaii. At present there is no information available on the amount of fish harvested by the non-licensed fishermen since they are not subject to licensing or reporting requirements.

The overall effect of this amendment on troll and handline fishermen is expected to be favorable but the magnitude of the effect is impossible to predict on the basis of the available information. While the rate of replacement (in-migration) of fish within the areas fished by small-boat fishermen is finite, local catches can vary significantly as the stock-wide abundance of pelagic species changes, and this local variation can be independent of local fishing effort. For example, Wetherall and Yong (1983) and Skillman and Kamer (1985) have shown that stock-wide variations in abundance of blue marlin have a major influence on the availability of blue marlin in local waters and that stock-wide variations can mask the effects of competition between domestic longliners and small boat fisherman. Nonetheless, it has also been demonstrated that increases in the amount of fishing effort due to foreign or domestic longline vessels in areas of the Hawaii EEZ or nearby the EEZ would be expected to decrease the abundance of pelagic resources available to small boat fishermen. Such effects, however, are very difficult to prove and it is even more difficult to quantify the actual magnitude of such fishery interactions.

If the abundance of pelagic species in the EEZ is relatively fixed at any time, then it is likely that fishing by additional longliners would simply mean distributing the available fish among more users, and lower the average catch rates in the process (i.e. local overfishing). In turn, this could mean economic overfishing if there is a decline in catch per dollar invested. (It is not growth overfishing or recruitment overfishing unless a significant portion of the entire stock, or spawning stock, resides in the local area.) There is too little information available on the stock structure of the pelagic species to make a case for the existence of localized stocks. In any event, the proposed actions would have the effect of increasing the probability of small boat fishermen not suffering catch rate declines or, perhaps, having their catch rates increase during the three-year moratorium period.

5.3 Impacts on Related Industries

For years, Hawaii has enjoyed the reputation as the blue marlin capital of the world and home of trophy-size yellowfin tuna. Commercial small-boat fishermen (including charter boats) caught about 4 to 8 times as much blue marlin during 1987 and 1988 as the longliner fleet during these years. But in 1990, longliners caught more blue marlin than the small boat fishermen did (Tables 2 and 3). Likewise, during 1989 and 1990, longliners caught twice as much yellowfin tuna as the commercial small boat fishermen did. During previous years, handliners and commercial trollers have dominated the landings of yellowfin tuna in Hawaii. The charter fishery is a commercial troll fishery since patrons pay a fee for the service, and it is the usual custom for the fish caught on charterboats to be retained and sold by the charterboat operators.

As fish become less available and harder to catch, fewer people will be inclined to come to Hawaii to participate in big-game fishing tournaments and fewer local,

longtime fishermen (whether recreational or commercial) will want to continue fishing. This amendment would establish a three-year moratorium in which the Council and the NMFS would develop long-term management alternatives and select a long-term management program for the fishery (possibly including limited entry) to balance fishing power against available resources. The overall effect of this amendment is to prevent the demise of Hawaii's multi-million dollar sport and recreational fisheries and to maintain the incomes of small-boat commercial fishermen. The amendment also would protect the earnings of fishing supply wholesalers and retailers, hotel employees, tour operators and many others who make a living off of fishing-related endeavors.

By limiting the number of longliners for a period of 3 years, some short term revenue will be foregone by suppliers of longliners and to fish processors and marketers who would benefit from increased supply of fish.

However, the amendment would also reduce the likelihood of the fishery being one of "boom" and then "bust" as has happened in the fisheries for swordfish in the Atlantic and for yellowfin tuna in the Gulf of Mexico. The demise of the fishery would mean disruption of fish in the market channels in which longline and small boat catches now enter. This could give Hawaii a reputation as an unreliable source of fish, which could stifle future demand for catches from Hawaii. In turn, the expenditures of longliners and small-boat fisherman and their attendant economic benefits would diminish.

Further information on the impacts on related industries can be found in Section 8.3.

5.4 Other Effects

The impacts of the proposed action on protecting the endangered Hawaiian monk seal would likely be beneficial but not significantly so since longline fishing has already been prohibited within 50 miles of the Northwestern Hawaiian Islands including the channel waters between the islands. However, by limiting the number of longliners during the three-year moratorium period, the probability of violations of the monk seal area closures would be reduced and thus be beneficial to the protection of these endangered animals. The same can be said with regard to albatrosses which are incidentally taken in conjunction with longline fishing operations.

The proposed action should also be beneficial by promoting long-term fishery management planning with participation by the affected fishery interests. Should this amendment be disapproved, the emergency moratorium will expire, and this will surely result in more and more longliners coming to Hawaii. Competition and conflicts will again erupt and intensify, bringing back a crisis atmosphere in the fishery. There would be a sharp loss of confidence in the ability of the Council and the NMFS to carry out their responsibilities. Approval and implementation of this amendment

should reassure fishery interests that the Council and the NMFS are jointly committed to maintaining control and seeking long-term solutions to the management problems facing the pelagic fisheries.

6.0 ALTERNATIVES TO THE PROPOSED ACTIONS AND REASONS FOR REJECTION

The Council considered but rejected a number of alternatives to the proposed action.

6.1 No Action

The Council concluded that the "No Action" alternative was not acceptable. Under this alternative, the emergency moratorium would automatically expire on July 22, 1991 or 90 days thereafter if an extension is granted. More and more longliners would arrive in Hawaii as vessels continue to leave the stressed fishery for swordfish in the Atlantic, and the over-capitalized yellowfin tuna longline fishery on the Gulf of Mexico. Between 1983 and 1987, longline landings of yellowfin tuna in the Gulf of Mexico increased from nearly nothing to 12 million pounds. The fishery peaked in 1988 at 17 million pounds. In 1989, yellowfin tuna landings dropped to 12 million pounds and, in 1990, landings of yellowfin tuna in the Gulf of Mexico were only 7 to 8 million pounds.

Excess fishing effort in other mainland fisheries would continue to spur rapid entry of additional vessels into the Hawaii longline fishery. For example, the North Pacific Fishery Management Council, concerned about continued over-capitalization of the Alaska groundfish fleet, announced a September 15, 1990 control date on further entrance into all fisheries (except for salmon) under its jurisdiction. Some Alaskan vessels have already joined Hawaii's longline fleet and the Council continues to receive inquiries from Alaskan, Californian, and Pacific Northwest fishermen about the prospects of coming south to join Hawaii's already burgeoning fleet. Fisheries-specific and blanket moratoriums for many mainland fisheries can only mean one thing: displaced vessels from mainland fisheries will continue to seek out Hawaii in ever increasing numbers as a base for their operations unless a three-year moratorium on longline fishing in Hawaii is established.

Under the "No Action" alternative, the unabated growth in the fishery could soon turn into a "bust." If the fishery collapsed, long-time participants (such as handliners, trollers, and traditional longliners) as well as newcomers would all face increased risk of financial losses. As important, most fishery participants in Hawaii view the entire situation with a sense of crisis and fear that if something is not done to curtail the explosive growth in the longline fishery, the situation can never get better, and the Council and the NMFS will be judged as being incapable of exercising prudent management of the fisheries.

6.2 Only Implement Area Closures to Longliners Around the Main Hawaiian Islands

On April 17, 1991, the Council requested the Secretary of Commerce to implement an interim emergency rule to establish closures to longline fishing of 50 miles around the islands of Maui and Hawaii Counties and 75 miles around Oahu and the islands of Kauai County. This action is intended to minimize gear conflicts between the longline and troll/handline fisheries for pelagic species in the waters off of the main Hawaiian islands. This action will not, however, be sufficient to maintain availability of pelagic fishes for the small boat fishermen. Changes in fishing effort in waters adjacent to where the small-boat fishermen operate are negatively correlated with catch rates within nearshore areas. Thus, increases in the amount of longline fishing effort in areas adjacent to the proposed area closure would be expected to decrease the abundance of pelagic resources within the proposed area closures to longliners where fishing is carried out by thousands of small-boat fishermen. The Council, therefore, cannot rely solely on the proposed area closures to longliners to better their fishing success or to prevent their catch rates from declining.

6.3 Moratorium Period Longer/Shorter than Three Years

Much of the concern about expansion of Hawaii's longline fleet centers around the issue of "localized" overfishing, although stock-wide assessment is not being neglected. The Council has proposed a 3-year moratorium on new entry into Hawaii's longline fishery (this amendment) to assess the effect of expanded longline fishing on fishery yields. The Council's Pelagic Plan Monitoring Team designed a research program (Appendix A) that will help define localized overfishing from a biological perspective. This will provide a valuable reference point for future Council decisions about what fleet size and fishing effort are optimal.

The hypothesized mechanism for fishery interaction in Hawaii is that local fisheries impact one another (and themselves) when they remove fish from the local area more rapidly than fish are displaced by in-migration and recruitment. Although such localized depletion would not be expected to significantly affect the overall population dynamics of far-ranging pelagic species, it could still negatively effect local fisheries as suggested by several studies (Lovejoy 1977, 1981, Wetherall and Yong 1984, Skillman and Kamer 1985, Squire and Au 1990.)

The 3-year research plan is designed to quantify the effect of local effort on yield and the geographic distribution of those effects. Such a study could be accomplished in less than 3 years if there were sufficient funding and personnel (there are not), and if quality catch and effort data were available covering the domestic longline fishery. Unfortunately, this is not the case. Location-specific, quality catch and effort data covering the longline fleet have become available only since November of 1990 when the new federal permit and logbook system were implemented

(Amendment 2). Previous State of Hawaii data from the domestic longline fishery is virtually useless for stock assessment purposes.

It will take at least three years of data collection and analysis to determine if a local overfishing threshold exists and the level of fishing effort (area specific) which does not result in an increased catch, assuming that new resources are committed to accomplish this task, which is not currently funded. A time series of quality catch and effort data extending beyond three years would increase the precision of the threshold estimates, but it would also mean delaying the design and implementation of a limited entry program. The Council decided to accept the three-year research program as designed as being the best tradeoff between research precision and management action.

6.4 Alternatives Regarding the Applicability of the Moratorium

6.4.1 Moratorium Applied Throughout the Range of Pelagic Species Within Reach of Hawaii-Based Longline Vessels

Under the emergency moratorium which came into effect on April 23, 1991, vessels not having a special limited entry permit are prohibited to fish for, possess, retain, transship, or land longline-caught fish in Hawaii which were taken on longline gear regardless of whether the fish were caught in the EEZ of Hawaii or in international waters beyond the EEZ. The Council decided on this course of action for the emergency moratorium period for fisheries enforcement reasons. Under present funding levels and coverage of fisheries enforcement patrols undertaken by the U.S. Coast Guard and the NMFS, it would be impossible to verify the claims of vessels that they were indeed fishing in international waters and not in the EEZ of Hawaii. The Council, therefore, chose to freeze the number of vessels fishing in the Hawaii-based longline fishery regardless of the location of fishing, whether inside the EEZ or beyond.

6.4.2 Moratorium Applied Solely to the EEZ of Hawaii and Not to Vessels Fishing Exclusively Outside the EEZ

An alternative to the emergency action would be to allow longline vessels fishing exclusively outside of the EEZ of Hawaii to land their catches in Hawaii subject to the following conditions:

1. Vessels would be required to carry position fixing devices to verify that they are indeed fishing outside of the EEZ of Hawaii.

2. Vessel operators would have to report to the NMFS Enforcement Office upon entry and exit of the EEZ of Hawaii; and

3. Owners of vessels would be required to possess a federal permit and provide complete logbooks to the NMFS after each fishing trip containing information on catch, effort, fishing location, and encounters with protected species, just like the vessels having limited entry permits.

6.4.3 Pros and Cons of the Above Two Alternatives

There are arguments for both alternatives.

Some Arguments Against Limiting the Moratorium Just to the Hawaii EEZ:

1. Increasing high seas longline activity by U.S. fishermen may have an effect on the catch rates of trollers and handliners and qualified longliners operating within the EEZ. Less fish will be available to existing fishermen if the migrating fish are first "thinned out" on the high seas. Declining catch rates are of most concern with regard to blue marlin and yellowfin tuna since these species are of most importance to trollers, tournament sponsors, and charter boat captains. While the preferred target species of longliners are big-eye tuna, swordfish, and striped marlin, yellowfin tuna could become a directed fishery when the preferred target species are in low abundance. Blue marlin is an inevitable by-catch in a targeted yellowfin fishery since these two species have similar ecological requirements.

2. High seas longlining activity has been directed at the fresh fish market. The length of a fishing trip for fresh fish is limited by the shelf life of a highly perishable product. Thus, much of the high seas fishery will be conducted in waters adjacent to the EEZ of Hawaii. Changes in fishing effort in waters adjacent to the EEZ are negatively correlated with catch rates within the EEZ. Thus, increases in the amount of fishing effort in areas adjacent to the EEZ would be expected to decrease the abundance of pelagic resources within the EEZ, and less fish will be available to existing fishermen.

3. Fewer blue marlin and yellowfin tuna would negatively impact the demand for charterboat and tournament fishing opportunities and decrease the income generated from the troll and handline fisheries in general. This, in turn, would negatively impact support services and reduce income to business sectors dependent upon expenditures by recreational and commercial troll fishermen and handline fishermen.

4. While much of the longline fish (particularly big-eye tuna and swordfish) currently caught beyond 200 miles is exported, a portion of the catch enters the local market. Small boat fishermen compete in the same local market with longliners in the sale of their fish. Increased availability of longline-caught fish

marketed locally could have a depressing effect on the prices received by the small boat fishermen because of supply increases.

5. Only the larger, more adept vessels have the capacity and know-how to fish on the high seas -- they are the highliners. Initially allowing highliners to fish exclusively on the high seas would inevitably attract other highliners. The eventual result could render the moratorium ineffective unless a cap was put on the number of longliners allowed to fish in the high seas and/or restrictions placed on the catch of yellowfin tuna and blue marlin.

Some Arguments For Limiting the Moratorium Just to the Hawaii EEZ:

1. Knowledge of stock conditions and seasonal geographic patterns of abundance of large pelagic fish has been gained almost exclusively from Japanese longline statistics. These data have not been available since 1980. Korean and Taiwanese longline data are still available but are of poor quality and limited geographic coverage. Allowing domestic longliners the opportunity to fish in international waters would help fill the data void and increase our knowledge of the status of the stocks of billfish and large tunas.

2. A large number of foreign longliners fish beyond the EEZ of Hawaii. (On average during recent years, there have been about 800 ports of call by foreign longliners in Hawaii for fueling, reprovisions, and R&R for crew.) Prohibiting domestic longliners fishing on the high seas from landing their fish in the nearest U.S. port hinders the U.S. fleet ability to effectively fish in this area and compete in the world market.

   In fact, current emergency moratorium language restricts domestic longliners even more than foreign longliners since domestic vessels which do not meet eligibility criteria are not allowed to possess billfish and associated species while in the EEZ or Hawaiian ports. Foreign longliners may have pelagic species on board when they are in Hawaiian ports provided the fish are not off-loaded. Unlike domestic longliners, foreign longliners that visit Hawaii ports fish for the frozen fish market.

3. The per vessel economic benefits from domestic longliner expenditures for reprovisions and shoreside service are probably, on average, larger than those derived from foreign vessels because of the economic benefits stemming from transshipment and marketing of fresh fish by a Honolulu home based domestic fleet. These economic benefits would be foregone by prohibiting the landing of high seas-caught fish by American longliners.

4. Eventually international management of pelagic stocks throughout their range may become a reality. Unilateral actions by the U.S. to restrict the fishing

activities of the U.S. fleet could reduce the government's ability to negotiate effectively for a national allocation based on past participation. However, securing a greater national allocation could come at the expense of Hawaii's small boat fishermen.

A public hearing was held on May 13, 1991 on this amendment. Almost all of the testimony focused on whether or not vessels who do not qualify under the longline moratorium and fish exclusively beyond the U.S. EEZ surrounding Hawaii should be allowed to land their catch in Hawaii. About 160 people attended the hearing and 21 people presented testimony. One person spoke in favor of allowing the landings of fish caught beyond 200 miles. The rest of the speakers were strongly opposed to allowing such landings. In addition to the testimonies at the public hearing, the Council received three written responses on the issue. Of the written responses, two were in favor of allowing high seas-caught fish to be landed in Hawaii, while one was against it.

The Council's Scientific and Statistical Committee (SSC) and the Advisory Panel (AP) were also polled on this issue. Of those responding, the results are as follows: SSC -- 6 against landings, 5 in favor; AP -- 9 against landings, 4 in favor. A clear majority of Plan Monitoring Team members also recommended that the Council should not allow special provisions under the moratorium that would allow expansion of the longline fleet beyond the EEZ until the area of operation of the vessels can be monitored accurately by automated vessel tracking systems.

In the end, the Council voted 7 to 3 not to allow landing of high-seas caught fish in Hawaii. The Council, however, decided to open up this issue again once an automated vessel tracking system becomes operational.

6.5 Permit Transferability

The emergency moratorium and this amendment proposing to extend the moratorium for a total of three years are not intended to be a limited entry program in and of themselves. It is important to keep the program as simple as possible, recognizing that over the 3-year period the detailed provisions and conditions for entry to and exit from the fishery will be developed.

6.5.1 No Transferability

Permits are not transferable from one vessel owner to another during the interim moratorium period except in cases of extreme hardship such as death or terminal illness preventing the vessel owner from participating in the fishery. A permit holder could, however, replace the original qualifying vessel with another vessel provided that the replacement vessel did not have a greater harvesting capacity. In either of these instances, a permit holder could request the Regional Director of the

NMFS, in consultation with the Council, to consider a transfer of a permit (given either of these two situations) on a case-by-case basis. Prohibiting the transfer of permits with the sale of a vessel would most rapidly decrease the harvesting capacity of the qualifying vessels in the longline fleet. The reasons for allowing permit transfer to new replacement vessels include safety considerations, a reluctance to restrict a fisherman's ability to increase his fishing efficiency, and the negative impact of permit non-transferability on the resale value of the vessel.

6.5.2 Liberalized Transferability

On January 31, 1991, the Council sponsored a workshop on the transferability of permits. Workshop participants explored such issues as individual versus vessel permits, nontransferability of permits as a mechanism for attrition (fishing effort reduction), price trends in permits in other fisheries, trends in the residency of permit holders (locals versus out-of-staters), and other issues.

At its February 27 - March 1, 1991 meeting, the Council revisited the many issues related to permit transferability. There were arguments presented on why permits should not be transferable (Council relying on vessel attrition during the moratorium to decrease total longline fishing effort) as well as why permits should be transferable with the sale of a vessel (market value of vessels would decline considerably without permit transferability). In the end the Council voted 7 to 3 to allow qualifying longline vessel owners to transfer permits but only once during the 3-year moratorium period (Section 2.0).

The Council qualified its decision by stressing that the moratorium was a period of study after which limited entry might or might not be imposed, and that all permit transfer alternatives will be explored during the study period. The Individual Transferable Quota (ITQ) system is one such possibility. Under the ITQ system, fishermen are granted ownership of a percentage of a species Total Allowable Catch (TAC) based on their catch history, and the fishermen are free to buy, sell and trade their share. They are also free to harvest their share of the TAC when it makes the most economic sense for them to do so.

6.6 Exemptions from Moratorium Rules for Harvests of Selected Species

The species composition of landings of longliners and trollers and handliners is shown in Tables 2 and 3. The catch of most species are shared among the longliners and small boat fishermen with only two exceptions. Skipjack tuna are quite significant in the catch of small-boat fishermen while this species is a very minor component of longliner catches. The situation with swordfish is just the reverse. Swordfish have become a major component of longliner landings, while small boat fishermen catch relatively small amounts of this species. (Trollers almost never catch swordfish while

some handline fishermen are beginning to use lightsticks and as a result are now catching more swordfish than before.)

There would not be much interaction between longliners and coastal fishermen if it were possible for the longliners to catch mostly swordfish with insignificant by-catches of the species taken by the small-boat fishermen. This is a big if and it will be explored during the 3-year moratorium period. Likewise, it is possible (but not necessarily probable) that longline gear and fishing techniques could be developed to specifically target on bigeye tuna and striped marlin and not catch yellowfin tuna and blue marlin in the process. This possibility will also be closely examined during the 3-year moratorium period. The Council rejected the immediate application of this alternative until it can be shown that longline fishing can reasonably avoid catching significant amounts of blue marlin and yellowfin tuna which are species of great importance to Hawaii's small boat fishermen.

6.7 Limit Longliner Berthing Space in Hawaii Harbors

The great influx of large longline vessels has caused major berthing problems in Honolulu, vessel safety problems, as well as cargo scheduling and fish unloading problems (Section 4.6). These problems and the other problems discussed in Section 4.0 would be alleviated by limiting berthing space to large fishing vessels.

The State of Hawaii has not taken action in this regard (probably for legal reasons). Instead, the State is apparently relying on the Council to take action to keep the problems discussed in Section 4.0 from getting worse.

7.0 DETERMINATIONS

7.1 Required Provisions of FMPs

The proposed actions of this amendment (Section 2.0) do not change the determinations for maximum sustainable yield, optimum yield, domestic harvest, and other factors initially established by the FMP and changed by Amendment 1 (definition of recruitment overfishing per the revised 602 guidelines).

7.1.1 National Standards

The national standards are principles of the Magnuson Act that must be followed in developing any FMP and amendments.

(a) **Standard 1. Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States Fishing industry.** This amendment will arrest the growth in the longline fleet in Hawaii and will support improved assessments of pelagic fish stocks and will provide a factual basis for preventing local overfishing (Section 4.4).

(b) **Standard 2. Conservation and Management shall be based upon the best scientific information available.** This amendment is based on the best available scientific information (Tables 1, 2, and 3; Appendix A.1; and Section 10.0 References).

(c) **Standard 3. To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.** The purpose of this standard is to induce a comprehensive approach to fishery management. The geographic scope of the fishery should cover the entire range of the stock(s) of fish, and not be constrained by political boundaries. Reporting of catch and effort information during the moratorium period by qualifying longline vessels will be required regardless of whether the vessels fish in the EEZ or beyond the EEZ in international waters.

(d) **Standard 4. Conservation and management measures shall not discriminate between residents of different states.** This amendment applies equally to all domestic longliners regardless of their state of origin.

(e) **Standard 5. Conservation and management measures shall, where practicable, promote efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole**

purpose. This amendment will have the effect of allocating more pelagic resources to the troll and handline fisheries but that is not the sole purpose of the amendment. Prevention of local overfishing and equity concerns are also major factors. A balance needs to be restored between the longline and small boat fleets. This amendment will not affect efficiency in the harvesting and transshipping of longline-caught fish. Vessel owners will be allowed to transfer their permit to new replacement vessels for safety reasons and to increase fishing efficiency, provided that the replacement vessel does not have a greater harvesting capacity (Sections 6.5.1 and 6.5.2).

(f) **Standard 6. Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.** Large variations in catches, resources, and fisheries are inherent in fisheries for migratory species. This amendment allows for such variations and contingencies (Appendix A.1).

(g) **Standard 7. Conservation and Management measures shall, where practicable, minimize costs and avoid unnecessary duplication.** This amendment does not duplicate any State or Territorial requirements, nor are there any new data collection requirements being proposed.

7.2 Discretionary Provisions

7.2.1 Establishing a System for Limiting Access

Extending the moratorium period for a total of 3 years (this amendment) is not intended to be a limited entry program in and of itself. Instead, the intent of this amendment is to put a cap on the explosive growth of the longline fishery in Hawaii in order to provide the Council and the NMFS with sufficient time to collect and analyze information for designing a rational, long-term limited entry system (Appendix A).

Nonetheless, this amendment and the preceding emergency action by the Secretary of Commerce will limit access to new longline vessels in the Hawaii longline fishery during the interim planning period. Recognizing this, the Council examined and took into account the following factors:

(A) participation in the fishery (Sections 4.1, 5.2);

(B) historical fishing practices in, and dependence on, the fishery

(C) the economics of the fishery (three annual reports published so far [Section 10.1 References] and fourth annual report is in preparation);

(D) the capability of fishing vessels used in the fishery to engage in other fisheries (Section 5.2);

(E) the cultural and social framework relevant to the fishery (see footnote); and

(F) other relevant considerations (Section 4.0, 5.0, 6.0).

7.3 Habitat Concerns

The habitat of the pelagic species covered by the FMP and the conditions of the habitat are discussed in Section 6.8 of the FMP and in the annual reports on the fishery. Offshore waters are essentially pristine. This amendment will not affect the habitat of pelagic fish. Habitat conditions are expected to remain favorable well into the future.

7.4 Vessel Safety

The proposed actions are not expected to affect fishing vessel safety concerns. Vessel owners will be able to transfer permits to new replacement vessels for safety considerations (Section 6.5.1). The U.S. Coast Guard will be requested to review this amendment within the statutory guidelines of the Magnuson Act regarding fishing vessel safety.

7.5 Indigenous Peoples' Fishing Rights

The cultural and fishing practices of native Hawaiians, Samoans, or Chamorros are not expected to be affected by the proposed action. At its February 27-March 1, 1991 meeting, the Council voted to establish a committee to develop a preferential rights system for native Hawaiian fishermen possibly exempting them from the longline moratorium (Section 2.0).

8.0 RELATIONSHIP OF THE PROPOSED ACTIONS TO OTHER APPLICABLE LAWS AND POLICIES

8.1 National Environmental Policy Act

The NMFS prepared an environmental assessment (EA) for the interim regulations which established the emergency moratorium which went into effect on April 23, 1991 (Sections 1.1 and 1.2). This moratorium will be in effect for 90 days with a possible extension for a second 90-day period. In the EA, the NMFS concluded that the direct effects of the moratorium will be generally beneficial. Catches of pelagic species will probably be somewhat lower in the short run than if no actions were taken and the growth in longline fishing was unabated. The moratorium should reduce the risk of localized overfishing of migratory pelagic fishes and prevent long-term disruption of supplies of pelagic fish for fresh fish markets. Because of these and other reasons, the NMFS issued a finding of no significant environmental impact on the quality of either the marine or the human environment, and that the preparation of an environmental impact statement (EIS) was not required by the National Environmental Policy Act or its implementing regulations.

The vessel owner qualifying criteria for the emergency moratorium are somewhat more restrictive than the qualifying criteria for this amendment to extend the moratorium period for a total of 3 years (Section 2.0) and create a climate for a long-term fishery management planning program for the fisheries for pelagic species in Hawaii. As such, the effects of this amendment on the quality of the marine or human environment are more benign compared to the effects of the emergency action.

The actions proposed in the amendment:

1. Are expected to support development of management measures to ensure the long-term productivity of pelagic species stocks in the EEZ and beyond (Appendix A-1).

2. Will have no impact on the habitat of pelagic species or the habitat of other animals in the EEZ or beyond.

3. Are not expected to have any impact on public health or safety, although information obtained as a result of the amendment may result in better consideration of health and safety concerns in selection of fishery conservation and management measures.

4. Will not directly affect any endangered or threatened species; however, the information obtained under this amendment will provide a better basis than

now exists for determining if additional conservation and management measures are needed to give full protection to these species (Section 4.4).

5. Will not result in cumulative adverse impacts that could substantially affect pelagic species or any related stocks. The information obtained should provide a better basis for determining management measures that will maintain the long-term productivity of these stocks.

6. Are not expected to generate more controversy since the vessel-owner qualifying criteria are more liberal than the qualifying criteria under the emergency moratorium which was implemented on April 23, 1991.

7. Will not have any effect upon floodplains or wetlands, nor upon any trails and rivers listed, or eligible for listing on the National Rails and Nationwide Inventory of Rivers.

Based on the information provided in the EA for the emergency action and in this amendment, the Council concludes that the proposed actions will not have a significant impact upon the marine or human environment. In the Council's view, an EIS is not required under the National Environmental Policy Act.

8.2 Paperwork Reduction Act

This amendment is subject to provisions of the Paperwork Reduction Act because it contains additional collection-of-information requirements.

Under the existing FMP and emergency moratorium rule, information is obtained using approved permit application form (OMB 0648-0204). The permit application process, however, does not require documentation demonstrating eligibility for limited entry permits; instead, it relies on certification by the applicant that he or she meets the participation or investment criteria for eligibility. Although certification is sufficient under the emergency action, the Council believes that documentation should be required for limited entry permit issuance to facilitate timely review and verification by NMFS.

The implementing rule under this amendment requires the submission of documentation establishing permit eligibility by longline vessel owners. Information on vessel ownership include documents such as U.S. Coast Guard Certificate of Documentation, and Articles of Incorporation, Partnership Registration Statement, or Certificate for Limited Partnerships issued by a state regulatory agency. As appropriate, applicants must also provide documents demonstrating substantial financial commitment or investment made by the owner for longline gear or the construction or purchase of a new vessel, or for refitting an existing vessel along with

written evidence of intent to use the vessel in the longline fishery in Hawaii at the same time the financial commitment or investment was made.

A request for approval to collect this information has been submitted to the Office of Management and Budget by the NMFS.

No modification is required for the current permit application form.

8.3 Regulatory Flexibility Act and Executive Order 12291

The economic impacts of the proposed actions would be substantially less than $100 million. The ex-vessel revenue generated from fish sales from the longline fleet as a whole based in Hawaii in 1990 amounted to $29 million. For this reason, the proposed actions are not deemed to be "major" under the definition of "major" economic impacts of Executive Order 12291.

8.3.1 Regulatory Impact Review

The purpose of the Regulatory Impact Review (RIR) is to assist in understanding the economic consequences of alternative management actions. This RIR provides a qualitative evaluation of the management alternatives identified in this amendment (Section 6.0). Because of limitations on information available concerning the potential physical effects of the proposed action (and its alternatives) on fishing vessel performance and shoreside operations, a defensible quantitative approach is not possible. Therefore this RIR approaches the issues qualitatively.

This amendment proposes that the complete moratorium option be initially implemented. When effective automated vessel tracking system for enforcement are available, the Council proposes a procedure for reconsidering whether a partial moratorium might be preferred (see Section 2.0).

The proposed management action contains two main measures: 1) a moratorium on entry into the Hawaii EEZ longline fishery; and 2) restricted transferability of longline permits. Although there is an economic interrelationship between these two measures, they will be assessed separately. The primary RIR analysis will concentrate on the first measure, the moratorium.

The moratorium was proposed for two central reasons: 1) the potential biological impact of the growing longline fleet on pelagic species, particularly swordfish, and 2) the interaction between the growing longline fleet and the mixed fleet of trollers and handliners. The first reason represented the conservative, conservationist approach to resource management recommended by the plan monitoring team. Because there is essentially no information on the dynamics of swordfish in this fishery, assessment of the impact of the moratorium on the swordfish stocks must be made by reference to other fisheries, particularly the Atlantic swordfish fishery. The second reason is also subject to a companion amendment proposing closure of some main Hawaiian Island waters to longline fishing.

The following sections discuss the potential impacts of the proposed and alternative management measures in terms of two kinds of moratoria: a partial moratorium in which domestic U.S. longline vessels would be able to continue to enter the fishery outside the EEZ, and a complete moratorium, as proposed, in which

longline vessels not currently permitted could not enter the Hawaii-based fishery at all. The material is presented by a) discussing the potential economic effects of the alternative moratoria on different types of fishing vessels, and b) summarizing those effects in a qualitative manner. Supporting quantitative material is appended.

Summary

In order to estimate the impacts of the proposed action, the predicted fishery participation patterns must be compared to those predicted if no action is taken at this time. Under the "no action" option, all vessels currently fishing in Hawaii are assumed to continue to fish. In addition, the fleet would be expected to continue to grow with new entry from both mainland fisheries and local fleets diversifying to include longlining as one of these activities.

Increased fleets might result in overall increased landings of pelagic species in the short term. However, benefits from increased revenue derived from increased landings must be balanced against the long-term costs which could be accrued if the unchecked growth of the fleet leads to overcapitalization, decreased CPUE for either longline or troll fishermen, and potential overfishing. The proposed action favors foregoing some short-term total income in order to provide the opportunity for gathering information on which to base rational long-term management options and minimize the risks of the costs which have been associated with overcapitalization and overfishing in other U.S. fisheries.

With respect to short-term costs and benefits, in brief, the largest impact is felt by a complete moratorium, with the greatest cost being born by the loss of income incurred by current Hawaii longline vessels excluded from the fishery and by Hawaii market and shoreside industries. The largest benefit from the complete moratorium derives from potential improvements in logistics for the included longline vessels. If the parallel track amendment restricting longline fishing within 75/50 miles of the main Hawaiian Islands is not passed, then benefits may also accrue from reduced gear conflicts. It is possible that improved catch rates for trollers and handliners could be a substantial benefit, but the statistical evidence for the relationship between troll-handline catch rates and longline catch is extremely weak. These effects occur whether the moratorium is complete or partial. In the case of a partial moratorium, costs are reduced substantially, with costs limited to increased travel time for longline vessels required to fish outside the EEZ or to sunk costs from smaller longliners unable to fish outside the EEZ. Nonetheless, the benefits for trollers and handliners remain essentially the same as for the complete moratorium.

Potential economic effects

Regulatory impact analysis usually presumes a long-term perspective where costs are allocated over time, discounted appropriately. However conducting such

analysis, accounting for both time and sensitivity of the results to variation in parameters, would imply that the estimates in this section have greater confidence than they do; these estimates should be viewed purely as indicative of the scale of impacts possible under the moratorium and as a source for discussing and evaluating qualitatively the impact of the proposed measures.

There are a number of potential economic effects which might be caused by the moratorium, and their effects may vary by short- and long-term and by the extent to which fishing vessels excluded from the Hawaii longline fishery can find alternatives. We can identify seven types of fishing vessels potentially affected by these management measures (Table 4). We cannot project the number of all vessels which would be excluded from the fishery, but this identification of types of potentially excluded vessels may make evaluation of the potential impact of the proposed management measures and their alternatives easier.[20]

[20] Technical details on each "estimate" are included in footnotes to this section.

Table 4
Types of Fishing Vessels
Potentially Affected by the Longline Moratorium

(number in parenthesis is a rough estimate of the number of vessels in each category)

1. Included Hawaii longline fishing vessels (140)

2. Excluded Hawaii longline fishing vessels (20)

3. Hawaii trollers and handline fishing vessels, full-time equivalent number (475 commercial, of which 75 are full-time charter boats, and 200 frequently active recreational fishers)[21]

4. Excluded Hawaii fishing vessels (e.g., small-scale vessels which might have outfitted for short-set longliners, bottomfish, lobster, and albacore fishing vessels which might have outfitted for longline fishing) (25)[22]

5. Excluded U.S. mainland longline fishing vessels (50)[23]

6. Excluded U.S. mainland non-longline fishing vessels (number unknown)

7. Potential fishing vessels (i.e. those subject to investment) (number unknown)

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[21] Commercial troll and handline vessels are estimated by dividing estimated total landings for 1990 by average catch per vessel (from our cost-earnings statement which uses current average catch per trip and a full-time equivalent number of trips per year).

[22] Excluded Hawaii non-longline vessels are calculated as 5% of the small-boat fleet.

[23] Excluded mainland longline vessels are calculated as 10% of Atlantic longline permit holders.

The potential economic effect of the longline moratorium is discussed below with as much quantitative "simulation" as possible. However, it must be stressed that these "simulations" are not based on a current statistical base.

Effects

1. Loss of income for excluded fishing vessels

A complete moratorium would force excluded fishing vessels to operate elsewhere or in less attractive fisheries in Hawaii. A partial moratorium would force excluded large-sized fishing vessels to operate further offshore (see effect 6 below). However a partial moratorium might have greater effects on smaller-sized Hawaii-based non-longline fishing vessels which otherwise might have entered the Hawaii longline fishery, i.e., they might not be able to operate outside the 200-mile EEZ because of their size.

This section concentrates on the impact of a complete moratorium. Longliners have argued that the cost of gearing up for the Hawaii fishery was substantial and that they have incurred administrative, logistical and transportation costs to move to Hawaii. The cost of gearing up is a sunk cost in light of the various control dates passed by the Council in 1990; the other costs would have to be incurred again to transfer operations to another fishery. We would estimate the administrative and logistical costs of transfer back to mainland U.S. fisheries to be equivalent to one year of such costs ($49,600) from Table B-1 (Appendix B)[24], travel costs to be $2,000 based on transit to the west coast, and opportunity costs of $26,000 based on lost fishing time.[25] Such costs are frequently incurred by a number of vessels of the Hawaii lobster fishery as those vessels often move between Hawaii and west coast fisheries.

If no alternative fisheries existed, then the one-year loss of total income would be $164,000[26] and charges against capital (e.g., loan repayment) of $90,000 per vessel. [Total income is defined as labor income plus/minus net revenue.]

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[24] Longline costs and net income figures based on a Class II longline vessel cost earnings statement. The Class II longline vessel represents a modern full-time longline operation. Within both the included and excluded longline vessel categories are both full-time and part-time operations. Therefore, these figures represent maximum per vessel (Class II) impacts.

[25] Costs are based on Table B-1. Logistical costs are calculated as two fixed cost categories: annual administrative and other; travel costs are fuel costs for 10 days; opportunity costs are the total income lost from 1 trip.

[26] Based on break even accounting version of Table B-1 (Appendix B); total income is labor income plus net revenue.

We have calculated the cost per vessel to mainland U.S. longline vessels as equivalent to the excluded Hawaii longline vessels, and the cost to excluded Hawaii non-longline vessels at half that figure. [The possibility that any of these excluded vessels could not enter another fishery, either in Hawaii or on the U.S. mainland, because of the spread of limited entry in U.S. fisheries is not considered.] At present, the amendment proposes only a three year moratorium, to be reviewed annually; although loss of three year's income would be drastic to any vessel, the proposed action does not preclude the entire stream of future income.

2. Improvement in the trend of catch per unit effort for both permitted longline vessels and for the troll-handline fishing fleet.

No statistically valid relationship between catch rates and expanded fishing effort has been identified in the Hawaii fishery (Pooley and Yoshimoto, 1991; Boggs, 1991), but this relationship may be shielded by natural variability in the pelagic fisheries and by the extremely short time-series of information available. Experience in the Atlantic suggests that substantial increases in fishing effort may diminish catch rates in the long-run (Berkeley, 1989). The potential impact of the exclusion of 30 longliners on catch rates for the remaining longline and troll-handline fishing vessels depends on where they are currently fishing and where they would fish after the moratorium. If they were excluded entirely, this would reduce fishing effort by 18%.

If we assume that fishing effort decreases by 18% [the current fishing effort of excluded Hawaii longliners] and that catch per unit effort increases by 3/10 of 1% (extension of the analysis reported in Pooley and Yoshimoto, 1991[27]) for trollers and handline vessels, the annual impact would be an increase of $150 in gross revenue and $120 in total income per troll-handline vessel, adjusting the figures presented in Table B-2. The annual impact on charter boats is $96 in gross revenue and $86 in total income per vessel, adjusting the figures in Table B-3.

Because these effects were so small, despite a) small-boat operators' beliefs that the effect has been much greater, and b) the actual decline in annual average troll-handline catch rates from 1987 to 1990, we calculated two sensitivity tests for this effect: one based on a 1% relationship between the hypothesized decline in longline fishing effort and increased troll-handline catch rates and another based on the ratio of 1987 troll-handline catch rates to 1990 catch rates. The latter effect is rather substantial (11.1%) and increases annual total income per vessel for the troll-handline fleet by $3,000. These effects are reported in Table B-2.

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[27] This rate, .3%, is statistically insignificantly different from zero, but we use it here in a simulation approach.

The impact on recreational fishing is unpredictable because no clear relationship has been established between catch rates and the recreational experience. However, Meyer (1987) has shown the hedonic value of recreational fishing to be substantial in Hawaii. We evaluate this potential in item 6, reduction of gear conflicts.
The impact on the catch rates of the remaining longline vessels, using the same methodology, is shown to be negative, which is not a logical conclusion.[28] Therefore we estimate the impact to be zero.

3. Improvement in the trend of average size of fish caught by either fleet

No studies have been conducted on changes in the average size of the major target pelagic species (swordfish and blue marlin) since the recent growth of the longline fishery. However, in the Atlantic, there were substantial drops in the average size of swordfish.[29] Current swordfish landings by the Hawaii fleet (3.4 million pounds: 1,500 m.t.) is approximately 11% of the international swordfish catch in the Atlantic in 1974 (13,400 m.t.) when the average size began to decline substantially.[30] It also appears that Pacific catch of swordfish remains substantially below (25-65%) the Pacific-wide maximum sustainable yield (40 million pounds: 18,000 m.t.). Furthermore, evidence from the Atlantic suggests that average size is offset by an increase in the number of fish caught (density dependence); therefore no economic improvement is quantifiable for this effect.

The impact of potentially diminishing sizes on charter boats and recreational fishing is uncertain. If the interaction reduces the size of fish, as shown in the Atlantic, then for blue marlin the impact on the charter boat fleet and sports fishing tournaments might be substantial. Unfortunately we know even less about the impact of the relative size of fish and recreational fishing experiences than we do about catch rates. Therefore we do not evaluate this effect here, except to note that it is probably negative.

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[28] The impact is "negative" because of the statistical insignificance of the relationship, with the coefficient on the trips variable being positive; presumably an unexamined influence, such as changes in the composition of the longline fleet during the three year period or unidentified seasonal and annual variability in the catchability of pelagics, "explains" this anomaly.

[29] Stroud (1989) is the source of our information on the world's swordfish fisheries. Berkeley (1989) is the source of specific information on the Atlantic fishery.

[30] Effort as proportional to catch: Atlantic swordfish catch in 1974 was 35,000 m.t. (Berkeley, 1989, p. 48); Hawaii swordfish landings in 1990 were estimated at 1,500 m.t.

4. Increases in the distance traveled by longliners allowed to fish only outside the EEZ

If the excluded longline vessels were allowed to fish outside the EEZ (i.e., the partial moratorium), then there might be a travel cost component to the economic impact. There is insufficient quantitative information on where longline fishing vessels currently fish; if we assume they fish throughout the EEZ such that the average distance from the 200-mile baseline is 100 miles, then the moratorium will require the excluded vessels to travel 100 additional miles to and from the fishing grounds. From adjustments to the data presented in Table B-1, this amounts to an increase in operating costs of $4,300 per year with an equivalent decrease in total income. These vessels would also land an older "fresh" product, also diminishing its value. However we have not quantified this effect.

5. Improvements in dockside queuing by longline vessels waiting to unload or to be serviced

Honolulu has limited dock space. Queuing problems, in terms of waiting for loading and off-loading space along the wharf, already exist. An increased longline fishing fleet would increase these problems, perhaps reducing the number of fishing days available to a vessel over a year. If we assume that one day would be lost per trip due to queuing in the absence of a complete moratorium, thus reducing the number of trips per year, then the annual gain per vessel in lost fishing time would be $27,000 in gross revenue and $11,000 in total income.

6. Reduced gear conflicts in near-shore waters

If a separate FMP amendment is approved to limit longline fishing to waters outside of 50-75 miles, then the moratorium would have no impact on gear conflicts. In the absence of that amendment, then a complete moratorium would reduce the presence of longliners in near-shore waters. There is no quantitative information on the impact of these gear conflicts on trollers and handliners. However, if we assume that one day per troll-handline vessel is currently lost every month to gear conflicts, then the gain per troll-handline vessel in recovery of lost fishing time is $2,800 in gross revenue and $2,500 in total income. To mimic the impact of the partial moratorium on the recreational fishery, we evaluate the recreational impact as equivalent to the gain of one charter trip per month for a typical charter fishing vessel. The impact would be $2,500 in gross revenue and $2,300 in total income.

Ironically, it may well be that the greatest gear loss in the current conflict is by longline vessels having their lines cut and separated from the floats. There is no quantitative evidence on the extent to which this has occurred, but reduced gear conflicts could reduce longline gear costs. We do not believe that this amendment will have a substantial impact on this dispute, however.

7. Improvements in market prices

The hypothesis is that the increased landings of longline caught fish have, and will, depress troll-handline prices for similar species. Pooley (1991) could not find a statistically valid relationship using recent data for yellowfin tuna (the primary target species), but evaluating troll-handline catch for all species combined, there is a small (although still statistically insignificant) effect: an 18% decrease in fishing effort and catch by the longline vessels excluded by the moratorium could increase market price by 1% for troller and handliners.[31] This amounts to $95 in gross revenue per year, a negligible quantity. The impact on consumers, in terms of reduced availability of fresh fish and higher prices, is unpredictable because a) retail mark-ups are not known and b) substantial volumes of the longline caught fish are exported to markets where there is sufficient competition to make the Hawaii component marginal at most. Given the small effect, consumer are not likely to experience any substantial change in prices.

Many local trollers and handliners believe that there has been a substantial reduction in their market price. From monthly average data, this effect is not supported. However, changes in species composition and intra-monthly factors may be masking the impact. However, since most of the increased longline catch has been exported to the mainland U.S. and to Japan, it is not surprising that evidence of a price effect is not easily determined. However more study is required on this effect, as proposed as part of the three-year research plan of the plan monitoring team.

8. Reductions in total market revenue and reduced value-added to Hawaii seafood dealers

Based on average annual ex-vessel revenue per vessel in 1990 of $100,000, a complete moratorium would reduce total market revenue and a income to Hawaii seafood dealers by $2 million (independent of price effects) based on the loss of landings from the excluded vessels.[32] The loss to the seafood dealers would be $500,000 in value-added.

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[31] Small-boat fishers in Hawaii are convinced that the longline fleet has had a substantially negative impact on their average prices. Although our data cannot reveal that impact, it is possible that a more refined analysis could untangle the relationship.

[32] Value-added is calculated as 25% of the ex-vessel revenue.

9. Reductions in the volume of shoreside provisioning

The same impacts would be felt on shoreside provisioning. If we view this as the annual cost of repairs and operating expenses for a longline fishing vessel, then the net loss per excluded longline vessel would be $81,000 (based on 25% value-added income).

10. Reduced risk of over-fishing

The plan monitoring team's philosophy behind proposing a moratorium was to avoid the possibility of a collapse of the fishery. From a regulatory impact perspective, reducing this risk should be considered a major benefit of the proposed moratorium. The benefits to avoiding such a collapse are obviously substantial. Unfortunately there is essentially no realistic way to evaluate this risk at the moment. In Table 5 these benefits are identified as [+ + +], indicating mid-to-high level positive effects, but this is a purely subjective evaluation.

Fleet-wide impacts

This section applies estimates of per vessel costs or benefits (Table 5) to estimates of total fleet size (Table 1). The relative impacts of the three moratorium alternatives (no moratorium, partial moratorium, and complete moratorium, as proposed), evaluated by the 10 possible effects on the economy, are displayed in Table 2. The impacts are presented qualitatively to indicate which types of effects are likely to have the greatest and least impact and which types of vessels and segments of the industry are likely to be affected the most and the least.

The relative impacts of the three moratorium alternatives (no moratorium, partial moratorium, and complete moratorium, as proposed), on the seven classes of fishing vessels and the three segments of the industry are summarized in Table 6.

Table 5
Relative Effects
Longline Moratorium Alternatives

Impacts scaled from [-----] for relatively substantial costs to [0] for no apparent impacts to [+ + + + +] for relatively positive benefits, as evaluated for each type of impact. Costs and benefits figured in <u>total</u> income, i.e., the sum of labor income and net revenue (profit).

1. Loss of total income for excluded Hawaii longline fishing vessels

-- No moratorium	0
-- Partial moratorium	0
-- Complete moratorium	
-- Transfer to mainland	--
-- One-year lay-off	---

2. Improvement in the trend of catch per unit effort for both

-- No moratorium	0
-- Partial or completed moratorium	
--Baseline effect	+
--1% effect	+ +
-- 1987 effect	+ + +

3. Improvement in the trend of average size of fish caught by either fleet

-- No moratorium	0
-- Partial moratorium	+ ?
-- Complete moratorium	+ ?

4. Increases in the distance traveled by longliners allowed to fish only outside the EEZ

-- No moratorium	0
-- Partial moratorium	-
-- Complete moratorium	-

5. Improvements in dockside queuing by longline vessels waiting to unload or to be serviced

-- No moratorium	0
-- Partial moratorium	0
-- Complete moratorium	+ +

6. Reduced gear conflicts in near-shore waters

-- No moratorium	0
-- Partial moratorium	+ +
-- Complete moratorium	+ +

7. Improvements in market prices

-- No moratorium	0
-- Partial moratorium	0
-- Complete moratorium	0

8. Reductions in total market revenue and reduced value-added to Hawaii seafood dealers

-- No moratorium	0
-- Partial moratorium	0
-- Complete moratorium	--

9. Reductions in the volume of shoreside provisioning

-- No moratorium	0
-- Partial moratorium	0
-- Complete moratorium	--

10. Reduced risk of over-fishing [subjective evaluation]

-- No moratorium	--- ?
-- Partial moratorium	+ ?
-- Complete moratorium	+ + + ?

Table 6
Relative Fleet Impacts
Longline Moratorium Alternatives

Impacts scaled from [-----] for relatively substantial costs to [0] for no apparent impacts to [+ + + + +] for relatively positive benefits, evaluated for each type of fishing vessel, seafood markets, and shoreside infrastructure. Costs and benefits figured in <u>total</u> income, i.e., the sum of labor income and net revenue (profit).

1.	Included Hawaii longline fishing vessels	
	-- No moratorium	0
	-- Partial moratorium	0
	-- Complete moratorium	+ +
2.	Excluded Hawaii longline fishing vessels	
	-- No moratorium	0
	-- Partial moratorium	-
	-- Complete moratorium	--
3.	Hawaii trollers and handline fishing vessels	
	-- No moratorium	0
	-- Partial or complete moratorium	
	-- Baseline effect	0
	-- 1% effect	+
	-- 1987 effect	+ +
	-- Complete moratorium	+ +
4.	Excluded Hawaii non-longline fishing vessels	
	-- No moratorium	0
	-- Partial moratorium	-
	-- Complete moratorium	---
5.	Excluded U.S. mainland longline fishing vessels	
	-- No moratorium	0
	-- Partial moratorium	-
	-- Complete moratorium	--

6. Excluded U.S. mainland non-longline fishing vessels

-- No moratorium	?
-- Partial moratorium	?
-- Complete moratorium	?

7. Potential fishing vessels

-- No moratorium	?
-- Partial moratorium	?
-- Complete moratorium	?

8. Hawaii seafood market

-- No moratorium	0
-- Partial moratorium	0
-- Complete moratorium	--

9. Hawaii shoreside provisioners and suppliers

-- No moratorium	0
-- Partial moratorium	0
-- Complete moratorium	--

10. U.S. mainland markets and infrastructure

-- No moratorium	?
-- Partial moratorium	?
-- Complete moratorium	?

Separable Issues

Transferability of Permits

The amendment proposes that permits be transferable only once during the three years of the moratorium. Alternatives would be 1) for permits to be freely transferable; or 2) for permits not to be transferable at all. The economic essence of the transferability issue is whether a permitted longline fishing vessel has an equivalent asset value outside the Hawaii longline fishery. Restricting transferability of the longline permit may have other impacts, such as reducing the fleet size by attrition and redistributing income and wealth, but these impacts are directly related to the asset value issue.

A longline fishing vessel should be viewed as an asset whose income is based on the ability of the vessel to go fishing. Any limitation on the flexibility of use of the vessel diminishes the value of the vessel as an asset. With the two main alternative fisheries in Hawaii under limited entry regimes (NWHI lobster and bottomfish), the primary alternative under a restricted permit transfer system is the mainland U.S., but many mainland U.S. fisheries are also under limited entry regimes. Although the first sale of a Hawaii longline fishing vessel under the proposed regulation would not be restricted, the buyer would have to discount the value of the vessel since his/her options for re-sale are limited. Either the vessel would have to leave the fishery after a second sale or the new owner would have to expect that the permit transfer restriction would be lifted at the end of the moratorium. There is no precise way to evaluate this risk; for discussion purposes, however, we might consider the risk equivalent to the difference between the prime interest rate charged by banks to their best commercial customers (10.0%) and the consumer interest rate (18% in Hawaii). The difference, 6%, applied to the value of the average Hawaii longline fishing vessel would be $40,000.

Experience has shown that some 10% of fishing vessels in Hawaii change hands annually; using a sequential probability, 30% of the current fleet might change hands once and 3% more than once during the three years of the moratorium. The potential fleet-wide effect of the restriction on permit transfer would be $168,000 under the single-transfer proposal and $1.7 million under the no transfer alternative, compared to the free transfer alternative.

Socio-Political Considerations

Independent of the direct economic effects of the alternative moratoria, several sociological and political considerations should be discussed which are peculiar to the Hawaii fishery. We have not attempted to evaluate these considerations even in the positive-negative qualitative manner of the first section, but their potential effects are highlighted in terms of whether they support the benefits or costs of the moratoria alternatives.

Native Hawaiian Rights

The circumstance by which the United States gained control of Hawaii (1898), formerly an independent nation, and the current socio-economic status of native Hawaiians, suggest that the moratoria alternatives should be evaluated in terms of differential impacts on native Hawaiians.

First, reservation of longline permits for current or future native Hawaiian fishers (or corporations) could be considered as an appropriate "remedy" for past grievances and current socio-cultural deprivation. Reservation of permits suggests that the costs of the moratoria alternatives to other groups of longliners would be greater (since an additional number of permits would have to be held) or that the benefits to the remaining longline and troll-handline vessels would be less (because more permits in total would be issued), both corresponding to a relatively higher level of benefits for native Hawaiian fishers.

Second, there may be a non-pecuniary impact of continued longline fishing on rural native Hawaiian communities. To the extent that longline fishing diminishes the fishing experiences and subsistence values of ika shibi and palu ahi handline fisheries, the impact of the moratorium alternatives on rural native Hawaiians argues for a more liberal approach toward evaluating the benefits of these alternatives.

Traditional Fishing Practices

Independent of the native Hawaiian rights issue is that of traditional fishing practices in Hawaii.

First, longline fishing was introduced to Hawaii by Japanese immigrants shortly after the turn of the century. In the circumstances by which most Japanese came to Hawaii (as contract plantation labor), fishing played an important alternative source of employment, and an early means for developing small businesses. Furthermore, tuna and billfish landed by longline fishing vessels have played a key role in the assimilated Japanese-American culture in Hawaii. Limits on the capability of the ancestors of these immigrants to continue and expand their participation in the longline fishing and seafood marketing have a subtle, but important, socio-political

impact in the community. A similar situation pertains to Korean immigrants who became the mainstay of the traditional sampan longline fleet in the late 1970's and in the 1980's. Consideration of these factors suggests a more conservative evaluation of the benefits of the moratoria alternatives to the extent that the moratoria reduce the ability of these ethnic groups to expand or continue their participation in the longline fishery.

Second, troll and handline fishing has been an intimate part of rural communities in Hawaii for decades, including the role of charter boat and sports fishing. Consideration of the potential effect of increased longline fishing on these communities suggests a more liberal evaluation of the benefits of the moratoria alternatives.

Third, Hawaii fisheries have always been socially heterogeneous, and community-based means of "patrolling" the ocean have been common. The intrusion of a large number of longline fishing vessels into Hawaii has upset the balance by which large-scale commercial fishing operations and small-scale commercial, subsistence and recreational fishers have been traditionally able to mediate their inter-relationship. Consideration of this effect also suggests a more liberal evaluation of the benefits of the moratoria alternatives.

Conclusion

Evaluation of the moratorium alternatives is particularly difficult because neither the short-term nor long-term physical effects on changing levels of longline fishing on the pelagic species are known. This review attempts to pose meaningful scenarios of the possible effects with the view to posing the issues succinctly for the Council. Ultimately, however, it appears that the decision on the moratorium alternatives is likely to be a pragmatic one which is reversible after three years.

8.4. Coastal Zone Management Act

The Council will request the State of Hawaii to concur with a finding that the actions proposed in this amendment are consistent to the maximum extent practicable with its coastal zone management program. This amendment is specific to Hawaii and is not relevant to Guam, the Commonwealth of the Northern Mariana Islands, or American Samoa.

8.5 Endangered Species Act

The Endangered Species Act (ESA) prohibits the taking of endangered species except under limiting circumstances. The FMP and prior relevant amendments were reviewed under Section 7 consultation of the ESA. Biological opinions were issued. No allowable incidental take of endangered Hawaiian monk seals were specified in the Biological Opinions.

On April 15, 1991, the Secretary of Commerce issued an emergency rule (at the Council's request) prohibiting longline fishing within 50 miles of the NWHI, including the channel waters between the islands as a result of evidence of interactions between longline operations and Hawaiian monk seals (Section 3.0). Limiting the number of longliners during a three-year moratorium period lessens the probability of longliners violating the monk seal closure areas (Section 4.5).

The Council has initiated Section 7 consultations with NMFS on this action.

8.6 Marine Mammal Protection Act (MMPA)

The MMPA allows for the incidental take of marine mammals during commercial fishing operations under very limiting circumstances. Hawaiian monk seals, being declared a depleted marine mammal, cannot be taken. The actions proposed in this amendment are beneficial toward protecting the Hawaiian monk seals. (See above section)

8.7 Executive Order 12612

The proposed action does not contain policy with known federalism implications sufficient to warrant preparation of a federalism assessment under Executive Order 12612.

8.8 Fishery Impact Statement

The proposed actions may have an impact on the fisheries in other Regional Councils' areas in that vessels which are displaced from mainland fisheries either because of overfished stocks or imposition of limited access plans in these areas will no

longer have an unrestricted privilege to come to Hawaii and use longline gear to fish for pelagic species (Section 5.2). In addition, a few vessels which were shifted to Hawaii too late to qualify for a permit under the moratorium will be forced to shift to other fisheries.

9.0 DRAFT REGULATIONS

Part 685 - PELAGIC FISHERIES OF THE WESTERN PACIFIC

1. The authority citation for part 685 continues to read as follows:

Authority: 16 U.S.C. 1801 et seq.

2. In §685.2, the following definitions are added in alphabetical order:

* * * * * *

Receiving Vessel means a vessel of the United States that does not have fishing gear on board the vessel.

* * * * * *

Substantial financial investment means documented expenditures of at least $25,000.

3. In § 685.5, new paragraphs (m), (n), (o), (p) and (q) are added to read as follows:

§685.5 Prohibitions.

* * * * * *

(m) Fish for management unit species from a receiving vessel when the receiving vessel is shoreward of the outer boundary of the EEZ around Hawaii;

(n) Receive on board a receiving vessel that is shoreward of the outer boundary of the EEZ around Hawaii management unit species from a longline vessel that does not have a valid limited entry permit;

(o) Shoreward of the outer boundary of the EEZ around Hawaii, fish for, possess, retain, or land Hawaii management unit species which were taken by longline gear without a valid limited entry permit required under §685.15 aboard the vessel;

(p) Transfer any permit issued to a vessel under §685.15 in violation of the provisions contained therein.

(q) Fish for, possess, receive, transship, or land management unit species shoreward of the outer boundary of the EEZ around Hawaii without an operating vessel position fixing device on the vessel as required under section 685.16.

* * * * *

5. New § 685.16 is added to read as follows:

§ 685.16 Vessel Position Fixing Device

(a) Any vessel with a limited entry permit issued under section 685.15 must obtain, install and make operational an automatic position fixing device if so required by the Regional Director by Federal Register notice after Council approval to require these devices.

(b) Any vessel which does not have a valid limited entry permit but which intends to transit the EEZ around Hawaii must first obtain, install, and make operational an automatic position fixing device if so required by the Regional Director by Federal Register notice after Council approval to require these devices.

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APPENDIX A.--A 3-year plan for quantifying the effect of longline effort on Hawaii's pelagic fisheries by the Western Pacific Regional Fishery Management Council's (WPRFMC's) Plan Monitoring Team (PMT) for the Pelagic Fisheries Management Plan (FMP).

A temporary freeze on the number of vessels participating in Hawaii's pelagic longline fishery will provide the opportunity to analyze catch per unit effort (CPUE) in this fishery at a new, high, but relatively stable level of fishing effort. In comparison with historical data at lower levels of effort, a 2- or 3-year average of CPUE at a relatively stable level of fishing effort will provide a useful indicator of the dynamics of local fish availability. Data to be obtained through the Pelagic FMP's new logbook program will provide the first high-quality catch and effort data for the area around Hawaii since foreign fishing ceased in 1980. The most important objective of the work outlined in this plan will be to seek evidence of an effort threshold beyond which pelagic catches do not increase. It will be essential to describe thresholds by area, since local concentration of effort may impact competing sectors of the local fishery. This information may suggest target levels of fishing effort for regulation to prevent local overfishing.

Although it may be true that locally caught pelagic fishes constitute a small fraction of stocks that extend beyond the range of Hawaii's fisheries, the rate of replacement of fish within the local area is finite. A useful definition of local overfishing would be when the local rate of exploitation approaches the rate of fish replacement. Beyond this threshold, an increase in effort does not result in an increase in catch. This becomes overfishing in the economic sense if the increase in effort comes from increased capitalization, because there is a decline in catch per dollar invested. (It is not growth overfishing or recruitment overfishing unless a significant proportion of the entire stock, or spawning stock, resides in the local area. There remains too little information on the pelagic species to make this case, as discussed in the recently submitted overfishing amendment to the Pelagic FMP).

Before local fishing effort increases to the point of no additional returns (Fig. 1), there should be an interval of diminishing returns, as in a production model (Fig. 2). Some local fisheries (e.g., the trolling charter fishery for marlins) may require catch rates higher than the threshold defined above. The WPRFMC may decide to limit effort in total, or by gear or area, to achieve particular benefits for certain pelagic fishery sectors. There may be no level of fishing effort that optimizes utilization by all sectors. The 3-year research plan is designed only to quantify the effect of local effort on yield, and the distribution of those effects. It will not determine how the resources should be allocated. The latter should be the subject of WPRFMC discussion and action in the interim, so that selection of a target number of longline fishing vessels (a limited entry plan) is possible.

A number of different analytical approaches and data will be required to properly determine the effect of local longline fishing effort on the catch of pelagic

fish by Hawaii's fisheries. Many of the data and research needs have been outlined in the annual reports of the PMT and in other WPRFMC documents. The development of a limited entry program within 3 years accelerates the schedule by which these are required, but does not change the general nature of the work to be done. The following plan to provide information for the development of a limited entry program will also provide information needed to meet other high-priority objectives of the Pelagic FMP.

Work Plan Outline

I. Develop local threshold models from catch and effort data

A. Use historical data to make projections of catch

1. Obtain area summaries of 1956-80 foreign longline data

2. Summarize domestic catch and effort by gear type and area

3. Standardize effort statistics from diverse gear/sources

4. Incorporate seasonal effects on local CPUE dynamics

5. Index catch against stockwide CPUE or other factors

6. Project indexed catch vs. standardized effort by area

a. For each gear type in the domestic fishery

b. For all gear types combined (if possible)

B. Examine 1991-93 data for evidence of thresholds

1. Check if catches differ significantly from projections

2. Check if CPUE by gear declines vs. total effort (all gear)

C. Estimate thresholds for use in limiting entry

1. Based on longline gear alone

2. Based on other gear types (dependent on A6b and B2)

II. Test alternative hypotheses for changes in CPUE

A. Check for stockwide declines in abundance

1. Obtain 1991-1993 catch and effort data for a wider area, or

2. Obtain a substitute measure of stockwide CPUE

B. Check for environmental influences on local availability

1. Look for significant, fishery-independent factors

C. Examine 1987-1993 data for economic factors

1. Check if trip activity is endogenous to CPUE and price

2. Estimate production substitution rates between gear,

3. Employ a search model to examine the economics of vessel movement and vessel interaction

D. Correct or reject threshold estimates

III. Develop simulation models of local overfishing

A. Synthesize information on fish growth, movement, and mortality

B. Model fish turnover and exploitation by each gear type

C. Estimate thresholds from simulated catch and effort data

Catch Projections

Some examples of the use of historical longline data to make projections of expected catch are provided (Figs. 3-7). If at higher levels of fishing effort catches fall below the 95% confidence limits of the projections, this could be evidence that longline fishing effort in local waters has a negative impact on catches in local waters. A threshold model (Fig. 1) could be fit to the data if it shows a decline, and the threshold would provide an estimate of the amount of effort that has an impact on local fish availability.

The examples of catch projections were made using data from Yong and Wetherall (1980), and Wetherall and Yong (1983). In some cases, outliers were deleted to provide better projections. Comparison of CPUE in catch per trip by the domestic longliners with CPUE in catch per hook by the foreign longliners (1959-78)

indicated that a domestic trip was equivalent to 1,140 hooks. This was similar to other estimates based on the number of hooks per basket, number of baskets per set, and number of sets per trip reported by domestic longliners early in the same period. A more thorough job of standardizing effort will be necessary for the development of threshold models. It will be extremely important to account for changes in type of gear and fishing depth, which greatly influences the efficiency of hooks in catching different species.

Effort will be hard to standardize within the troll and handline fisheries, where State of Hawaii catch reports will be the only source of data. It will be more difficult to standardize effort across gear types but this will be needed to demonstrate that total effort has an effect on catch in the local area. For many species the troll and handline catches are larger than the longline catches. It may be possible to use total catch as a proxy for total effort. Instead of projecting catch versus effort, CPUE would be projected as a constant value versus increasing catch levels (although there are statistical problems with this approach).

In the examples, no attempt was made to better represent the dynamics of local abundance by using seasonal peaks in the catches of certain species and in the effort during those seasons. This was shown to be a useful approach by Wetherall and Yong (1983) and should be used to reduce some of the variation in the data. Where catches are less seasonal, months may be a useable time frame for analysis (e.g., Fig. 1), increasing the number and range of the data available.

Projected catch of bigeye tuna as a function of millions of hooks deployed in the two 5° squares adjacent to the main Hawaiian Islands (Fig. 3) is based on foreign and domestic catch and effort in 1959-78, with one outlier (1974) rejected. The inner and outer pair of dashed lines shows 95% confidence and prediction limits, respectively. The testable hypothesis is that catch will go up in proportion to effort, i.e., CPUE will be constant in relation to effort, with a certain amount of independent variation, and no threshold will be reached.

The projection of catch may depend on the area fished. For example, bigeye tuna catch as a function of effort during 1959-78 seems to have been greater in the vicinity of the main Hawaiian Islands (Fig. 3) than in the entire fishing conservation zone (FCZ) around Hawaii during 1965-77 (Fig. 4). This illustrates the importance of having logbook data to test the hypothesis of catch being proportional to effort. The data in years with a new, high level of effort must be segregated by area to test for a deviation from the catch projected for a given area.

Raw data on catch may contain a lot of variation independent of effort. In such cases, the 95% prediction limits will be so broad as to hinder a meaningful test, because even very low catches might not differ significantly from projections. The importance of identifying and accounting for other sources of variation in catch is illustrated with a projections for data on blue marlin by Japanese longliners fishing

adjacent to the main Hawaiian Islands in 1958-80 (Figs. 5 and 6). The domestic data contain so much unexplained variation that they were not used in these examples. Raw catch data (Fig. 5) are much more variable than catch divided by an index (Suzuki 1989) of Pacific blue marlin population size (Fig. 6). Local catches vary as the stockwide abundance of blue marlin changes, and this variation is independent of local effort. The indexed catch projection provides for a better test of whether local catches are lower than expected. The index was normalized to equal 1.0 in 1985, so the projected catch should be multiplied by whatever degree the stockwide abundance of blue marlin has changed in proportion to its 1985 abundance. Similar indexes are recommended to account for variation due to environmental factors, if they can be described.

Figure 7 gives an example of the projected catch of yellowfin tuna.

Evidence of Thresholds

The NMFS estimates of the 1989 catch and effort provide the most recent data available for comparison with the catch projections. The catch estimates are made by expanding the landings observed by NMFS shore-side monitoring program. The effort estimates are guesses based on the number of trips observed per vessel, the number of vessels registered as longliners, the type of gear carried, and scattered observations of the number of hooks per set and the number of sets per trip.

So although the estimate of pelagic longline fishing effort in 1989 is crude, it suggests a total of around 8.3 million hooks. There is no breakdown on the geographic distribution of this fishing effort. An estimated 30% of the effort in 1989 was made up of gear set very close to the surface, which may have had a comparatively low effectiveness in catching bigeye tuna. Thus in considering bigeye tuna catch projections, 6 million hooks might be a crude estimate of standardized effort. Contrarily, the new, shallow longline gear may be even more effective at catching blue marlin or yellowfin tuna. Therefore, the standardized effort might be estimated to be greater than 8 million hooks, but at this time, there is no estimate of how much greater. The comparison of 1989 estimates with the catch projections is summarized in the following table:

Species	Estimated longline effort (in millions of hooks)	95% prediction limits for (t) projected catch	Estimated catch (t)
Bigeye tuna	6	2,000-3,500	1,400
Bigeye tuna	6	1,100-2,900	1,400
Yellowfin tuna	8	750-1,350	980
Blue marlin	8	170-340	346

The second bigeye tuna projection ((ig. 4) assumes effort distributed throughout the FCZ, and the blue marlin projection assumes no change in stockwide abundance since 1985 (Fig. 6). These examples suggest no clear evidence that a catch threshold had been reached by 1989, unless the great majority of the 6 million hooks directed at bigeye tuna represent fishing adjacent to the main Hawaiian Islands.

In 1989, effort may have increased by about 50% over 1989 levels. The main goal of the work plan will be to compare 1991-93 federal longline logbook data against improved projections. More thorough standardization of effort and consideration of other influences will be needed. If the data show evidence that catches are lower than projected at high levels of effort, threshold models (e.g., Fig. 1) will be fit to the data. Together with economic data, these will permit a quantitative assessment of options for limiting fishing effort by limiting entry. Choice among these options will depend on the objectives of the WPRFMC (i.e., different effort levels maximize profits, or catches by different fishery sectors).

Supplemental Analyses

Alternative explanations for changes in local fish availability must be explored. In the example of blue marlin (Figs. 3 and 4), it is clear that stockwide variations in abundance have a major influence. Thus it will be necessary to cooperate with other agencies and governments to obtain statistics on the fisheries outside the WPRFMC's jurisdiction. Also, environmental factors may affect catch, and fishery-dependent factors may bias fishing effort. Low prices or low catch rates may cause a curtailment of effort that tends to obscure reduced catch rates at high levels of effort. Attempts should be made to account for these effects and to correct the threshold models accordingly.

Despite the best efforts to extract usable information from the State of Hawaii Division of Aquatic Resources' (HDAR's) catch reports on the troll and handline fisheries, these data may not be sufficient to demonstrate the relationship effort and catch in these sectors of the local fishery. An alternative approach would be to make a series of rational assumptions about the movement of fish in the local area, rates of recruitment, growth, and natural mortality and to use these to simulate the various fisheries in Hawaii under a wide range of fishing efforts. This would provide the PMT with another way of estimating thresholds and choosing reasonable target levels for fishing effort. However, there is no substitute for accurate fishery data. If the current level of reporting reflected in HDAR data proves to be a major handicap in this analysis, then alternative data collection mechanisms may be required.

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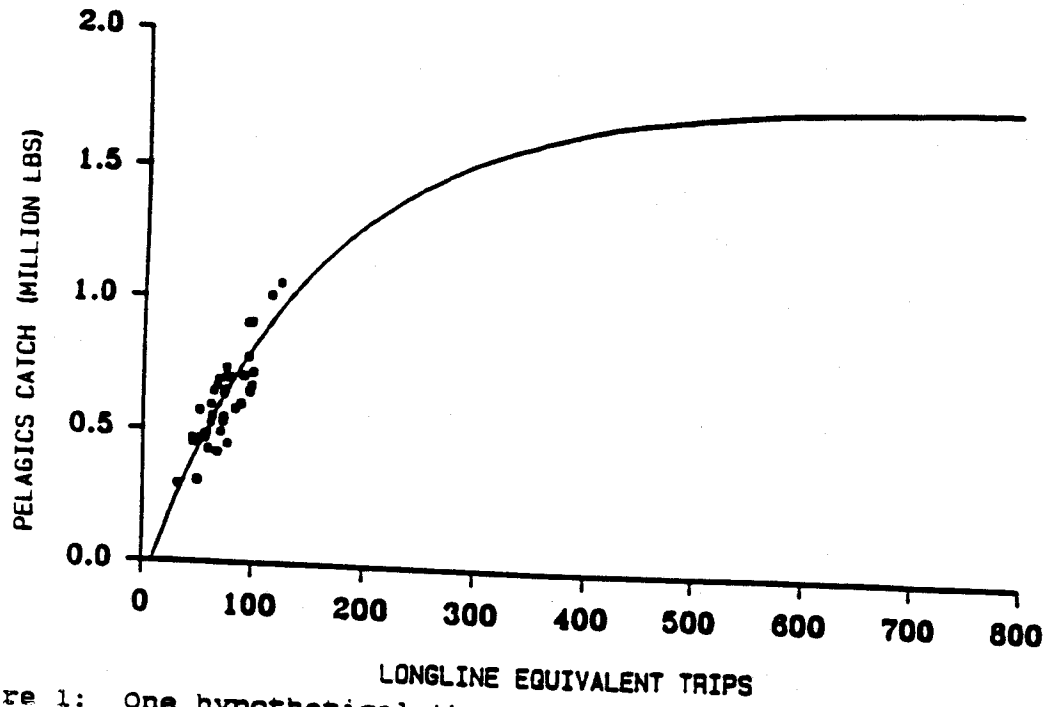

Figure 1: One hypothetical threshold model of Hawaii's pelagic fishery. This model views total fishery catch each month (the vertical axis) as the result of certain levels of total fishing effort (the horizontal axis) by all gears standardized as longline equivalent trips (in each month, 1987-89).

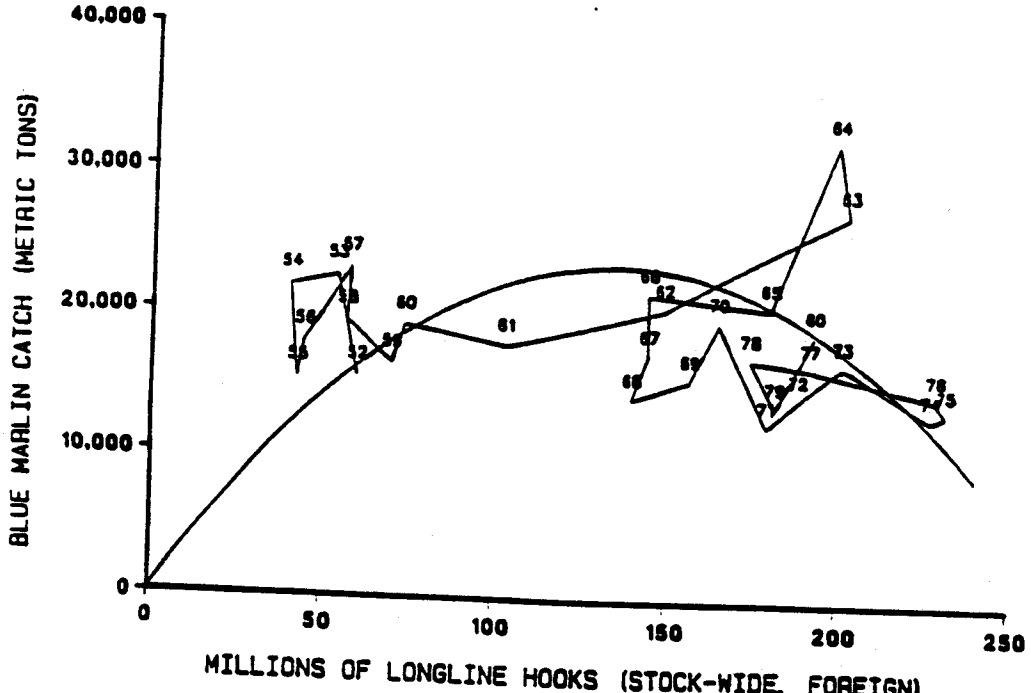

Figure 2: A production model for the entire stock of Pacific blue marlin. This differs from a local threshold model because catches actually decline as increasing effort impacts the ability of the stock to replenish itself.

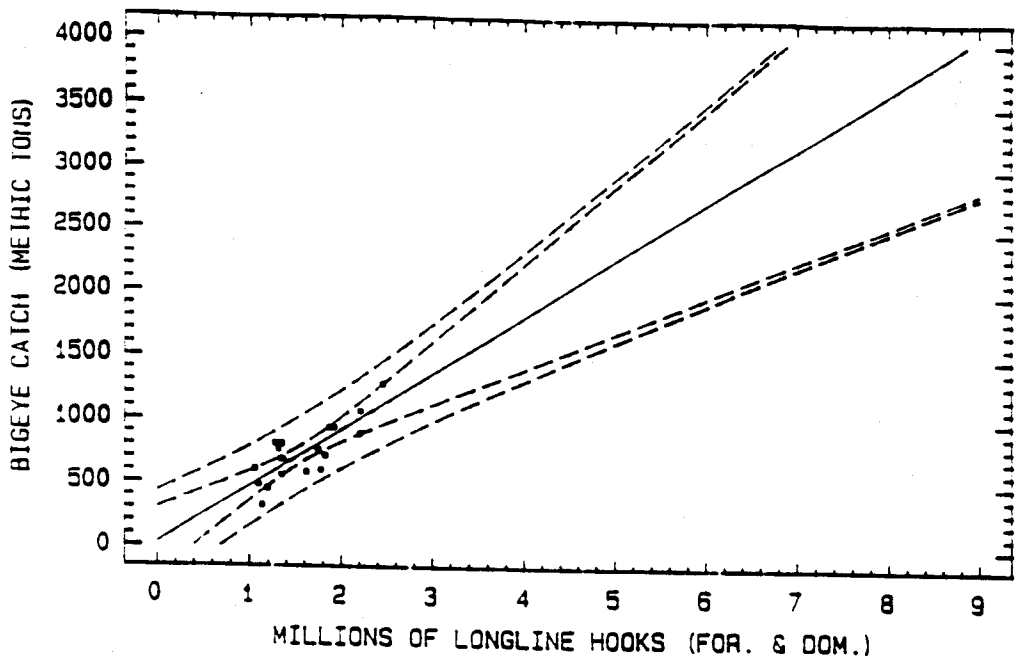

Figure 3: **Projected catch of bigeye tuna in the two 5-degree squares adjacent to the main Hawaiian Islands, assuming that catch remains proportional to effort.**

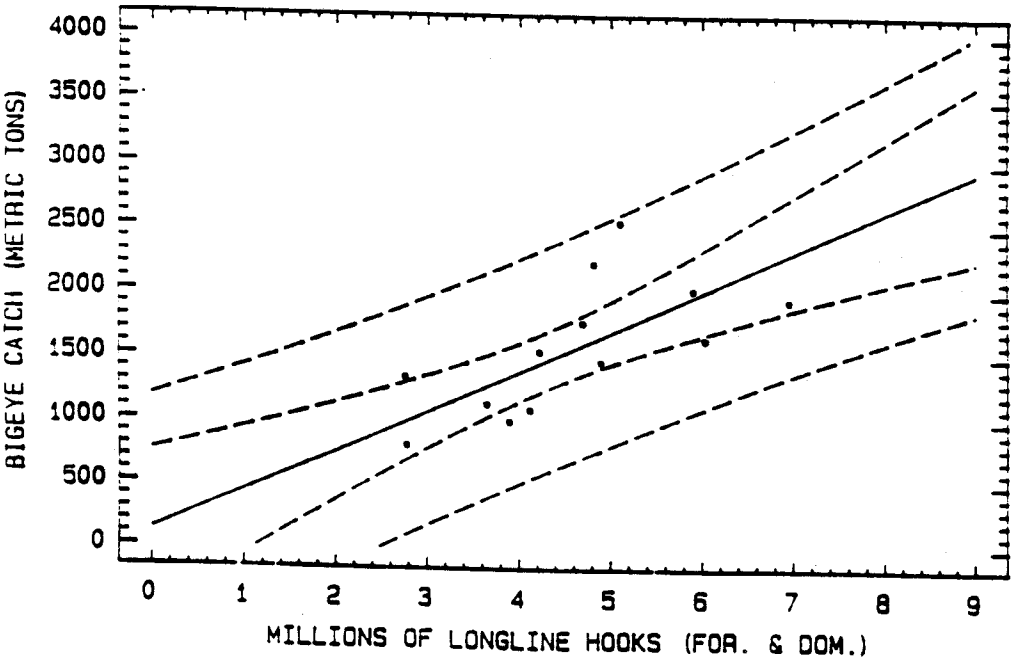

Figure 4: **Projected catch of bigeye tuna in the entire FCZ of the Hawaiian Islands, again assuming that catch remains proportional to effort.**

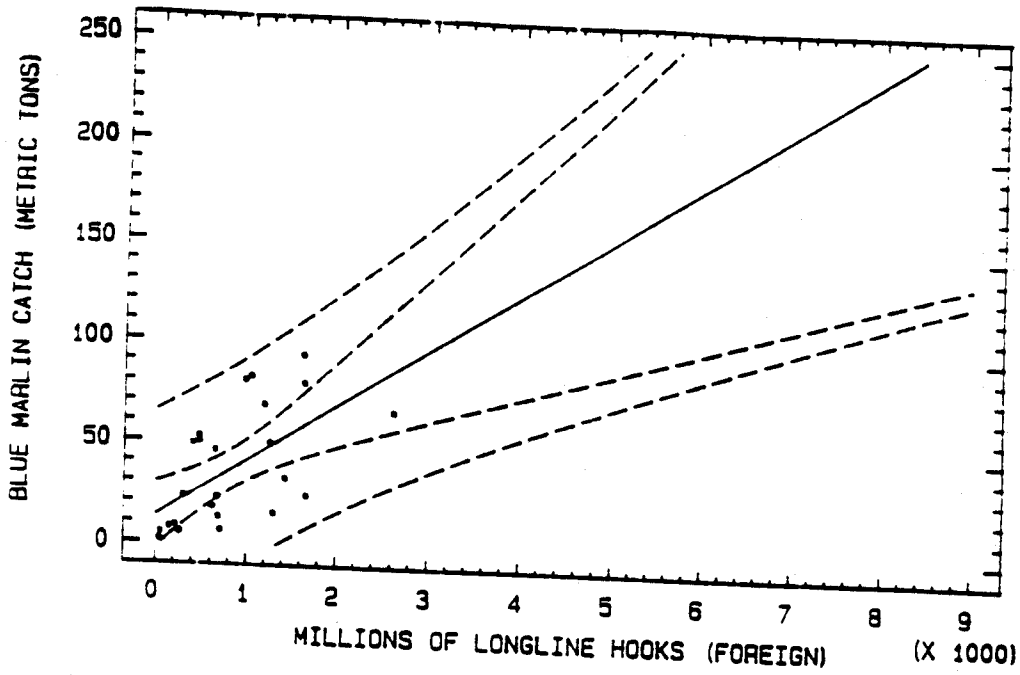

Figure 5: Projected catch of Pacific blue marlin in the main Hawaiian Islands area, assuming catch proportional to effort.

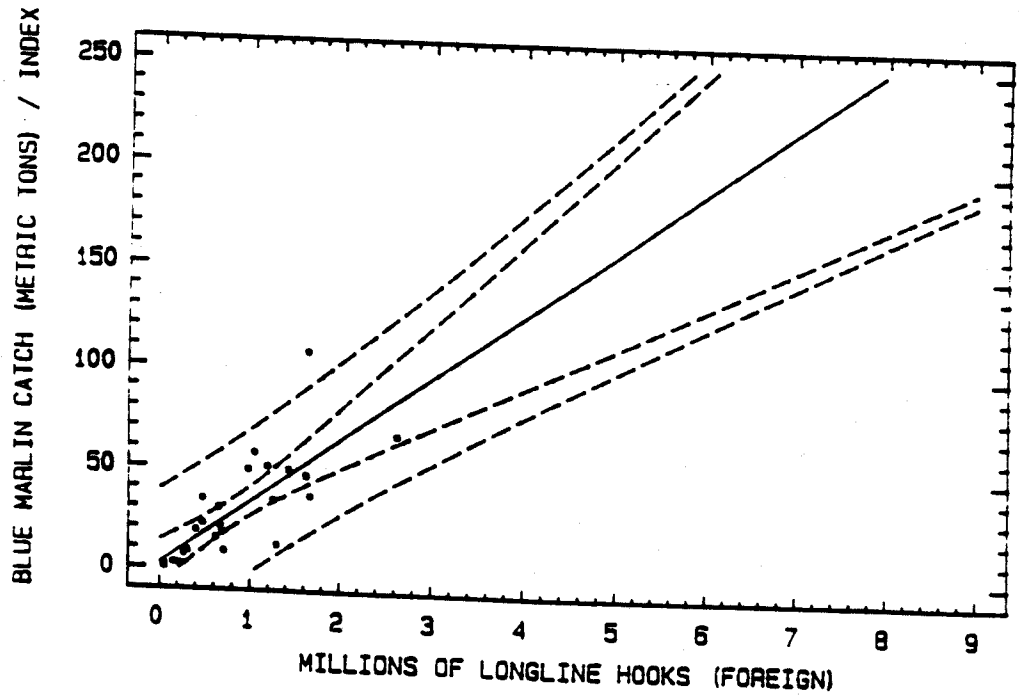

Figure 6: Projected blue marlin catch in the main Hawaiian Islands area indexed to the stock wide abundance in 1985. Assumes catch proportional to effort.

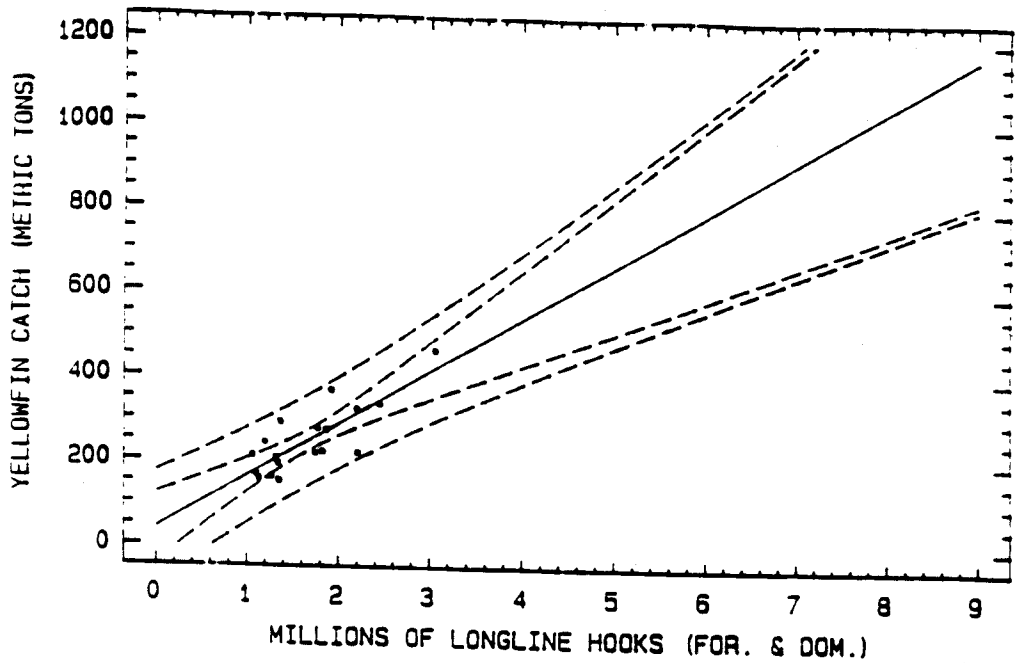

Figure 7: **Projected catch of yellowfin tuna in the two 5-degree squares adjacent to the main Hawaiian Islands, assuming that catch remains proportional to effort.**

APPENDIX B
Economic Baseline Profiles

There are two types of pelagic fishing vessels operating in these fisheries: the longliners and the troll-handliners. The longliners average 66 feet in length overall, ranging from 17 to 113 feet, and in composition from traditional Hawaii wooden sampans over 40 years old to modern large-sized, steel-hulled, multi-purpose fishing vessels (Kawamoto, et.al., 1989). The moratorium will not affect the existing sampans (which are no longer under construction and not available from other U.S. fisheries), except in terms of limited transferable permits, but will affect both the larger, steel-hulled vessels and the conversion to short-set longlines of smaller fishing vessels similar to the trollers and handliners.

Table B-1 provides a hypothetical cost-earnings statement for a mid-sized, modern Hawaii longline fishing vessel, averaging a number of vessel classes and types of fishing together. The methodology behind this approach to cost-earnings is spelled out in Clarke and Pooley (1988).

Trollers and handliners are of even more disparate characteristics. Small commercial handliners tend to be partially closed moored or trailered vessels averaging 25-35 feet in length overall. There are approximately 15,000 vessels in Hawaii, of which approximately 5,000 are in the small-boat troll-handline fishing category. Charter boats tend to be a little larger, with a median length of 40 feet overall.

Table B-2 provides a similar cost-earnings statement for a small-scale commercial troll-handline fishing vessel, and Table B-3 provides a cost-earnings statement for a charter fishing vessel. All three tables are based on old economic information not collected for this purpose. The methodology behind these cost-earnings statements is spelled out in Pooley (1986). Variation within each group of vessels is substantial: these cost-earnings statements simply provide the basis for discussion of qualitative impacts in an explicit manner.

Table B-1: Class II Longline Cost-Earnings Statement (break even values)

Income Statement	CLASS II Longline	
Revenue		$702,084
Fixed Costs		$199,900
Capital	$89,600	
Annual Repair	$20,700	
Vessel Insurance	$40,000	
Administrative	$22,600	
Other	$27,000	
Operating Costs		$502,100
Fuel & Oil	$51,700	
Bait	$67,200	
Ice	$25,200	
Handling	$127,900	
Provisions	$18,100	
Gear and Supplies	$42,000	
Other	$6,300	
Labor income	$145,500	
Captain's Bonus	$18,200	
Total Cost		$702,000
Net Revenue		$84

Operating Characteristics (next page)

Operating Characteristics (Weighted average)

Investment	$500,000	
Trips	14	
Catch per day	1,841	22,092
Trip Days	252	18
Fishing Days	168	12
Shared Operating Costs		$338,400
Crew share	40.0%	
Crew	6.00	
Labor income	$163,700	
Total income		$163,784
Return on Investment	.02%	
Handling rate	10.00%	
		Per Day
Revenue	$702,084	$4,179
Product Price per pound	$2.27	
Total Catch	309,288	
Total Hooks	168,000	1,000
CPUE (weight)	1.84	
Capital factor	11.03%	
Depreciation factor	6.67%	

Table B-2: Hawaii troll-handline cost-earnings statement (break-even values)

Income Statement	Small-scale troll-handline	
Revenue		$45,478
Fixed Costs		$14,603
Capital	$7,555	
Annual Repair	$3,268	
Vessel Insurance	$2,467	
Administrative	$1,312	
Other	$0	
Operating Costs		$30,858
Fuel & Oil	$7,765	
Bait	$2,779	
Ice	$2,140	
Handling	$4,548	
Provisions	$1,709	
Supplies	$4,045	
Other	$0	
Labor income	$6,748	
Owner-operator income	$1,125	
Total Cost		$45,461
Net Revenue		$17

Operating Characteristics (next page)

Operating Characteristics (Weighted average)

Investment	$49,064	
Trips	160	
Catch per day	187	
Trip Days	1	
Fishing Days	1	
Shared Operating Costs		$22,985
Crew share	30.0%	
Crew	2.00	
Labor income	$7,873	
Total income		$7,890
Return on Investment	.04%	
Handling rate	10.00%	
Revenue	$45,478	
Product Price per pound	$1.52	
Total Catch	29,920	
Capital factor	11.03%	
Depreciation factor	6.67%	
Inflation factor	1.26	
Fuel price factor	1.08	

c:\econ\data\rir1b 1987-90 hypothetical
5/21 Annualized break-even

Table B-3: Hawaii charter boat cost-earnings statement
Average, full-time, annualized, operation

Income Statement	Charterboat	
Revenue		$95,100
Fixed Costs		$35,860
Capital	$18,437	
Annual Repair	$7,921	
Vessel Insurance	$3,246	
Administrative	$6,257	
Other	$0	
Operating Costs		$41,460
Fuel & Oil	$9,053	
Bait	$473	
Ice	$1,237	
Handling	$3,203	
Provisions	$2,332	
Gear	$1,296	
Other	$5,546	
Labor income	$12,213	
Owner-operator income	$6,106	
Total Cost		$77,320
Net Revenue		$17,780

Operating Characteristics (next page)

Operating Characteristics (Weighted average)

Investment	$119,482	
Fish/Charter	151	155
Catch per day	139	
Trip Days	1	
Fishing Days	1	
Shared Operating Costs		$23,141
Crew share	50.0%	
Crew	2.00	
Labor income	$18,319	
Total income		$36,099
Return on Investment	14.88%	
Handling rate	10.00%	
Total Revenue	$95,100	
Charter Revenue	$63,070	$407
Fish Revenue	$32,030	
Product Price per pound	$1.52	
Total Catch	21,072	
Capital factor	11.03%	
Depreciation factor	6.67%	
Inflation factor	1.26	
Fuel price factor	1.08	

c:\econ\data\rir1c 1987-90 hypothetical
5/ 9 Annualized

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, Maryland 20910

AUG 29 1991

MEMORANDUM FOR: F/CM2 - Joe P. Clem

FROM: F/CM1 - Peter H. Fricke

SUBJECT: Review of Amendment 4 to the Fishery Management Plan for Pelagic Fisheries of the Western Pacific

As requested I have reviewed the above amendment for adequacy of the social impact assessment.

The amendment, which proposes a moratorium on entry to the pelagic longline fishery, does not have a social impact assessment per se. There is a discussion of the number of vessels participating in the fishery and a brief essay on Hawaiian Native rights and aspirations, but no discussion of the demographics of crews and others associated with the fishery or the impacts on different sectors of the industry and community.

The guidance on social impact assessment provided by Dr. Fox to Regions and Councils on March 20, 1991 is quite clear with respect to the articulation of the factors called for in Section 303(b)(6) of the Magnuson Act. However, the reference on pages 55 and 56 of the Amendment to this Section of the Magnuson Act does not constitute a social impact assessment, and there is insufficient information in the cross-referenced sections of the Amendment to make an assessment of impacts. Indeed, the reference to a footnote, in line E on page 56, dealing with the cultural and social framework of the fishery is misleading since there is no footnote in the Amendment which articulates this information.

I recommend that the Amendment be returned to the Council for further work and, since this is a limited entry proposal, that the factors in Section 303(b)(6), which the Council is required by the Magnuson Act to describe and consider, be researched and assessed.

cc: F/CM-RSchaefer, DCrestin; F/CM1-ABilik, RSurdi; F/CM2-JFlanders

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, Maryland 20910

JUL 31 1991

MEMORANDUM FOR: Distribution*

FROM: for Donald J. Leedy Joe P. Clem
Chief, Plans and Regulations Division

SUBJECT: Review of Amendment 4 to the Fishery Management Plan for Pelagic Fisheries of the Western Pacific Region

Attached is a copy of Amendment 4 to the Fishery Management Plan for Pelagic Fisheries of the Western Pacific Region. The Western Pacific Fishery Management Council (Council) has submitted this amendment for Secretarial review.

Amendment 4 would extend for two and one-half years a moratorium on issuance of permits in the Hawaii pelagic longline fishery. This moratorium was originally implemented by emergency rule on April 23, 1991, (56 FR 14866) and limits permits to those persons who can meet certain eligibility criteria based, in part, on historical participation. The amendment does not propose any changes from the current permit eligibility criteria; however, it would require prospective permit applicants to file applications within 90 days of the effective date of the implementing rule. The amendment also establishes a procedure for future action, which may require longline vessels as a condition of obtaining permits. In addition, amendment 4 would impose additional permit application submission requirements, to enable the National Marine Fisheries Service to process limited entry permit applications more effectively. The Council proposes that the effective date of the amendment coincide with expiration of extended emergency regulations on October 10, 1991.

Please provide your comments on or before September 6, 1991, and direct inquiries to Joanna Flanders at (301) 427-2343.

Attachment

*Distribution

F/CM - Schaefer, Crestin, Hochman
F/CM1 - Fricke, Surdi
F/CM2 - Clem, Leedy, Miller
F/CM3 - Parsons
F/EN - Pallozzi
GCF - Hayes
GCEL - Kuruc
F/MS - Czerwonky
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GC - Johnson
OGC - Malone
OMB - Minsk