

# Prohibition of fishing for pelagic management unit species within closed areas around the islands of American Samoa by vessels more than 50 feet in length

Management Plan for Pelagic Fisheries of the Western Pacific Region Includes Environmental Assessment and Initial Regulatory Flexibility Analysis Western Pacific Regional Fishery Management Council 1164 Bishop Street, Suite 1400, Honolulu, Hawaii 96813

#### **1.0 Introduction**

The entry of large boats into the pelagics fishery in the EEZ around American Samoa could conflict with objectives of the Council's FMP for pelagic fisheries by 1) causing local overfishing in a portion of the EEZ; 2) creating gear conflicts, particularly in areas of concentrated fishing; and 3) reducing the opportunities for profitable fishing operations; traditional fishing practices for non-market personal consumption and cultural benefits; and satisfying recreational fishing experiences. This management measure addresses these concerns by allocating fishing privileges to small-boat fishermen harvesting pelagic management unit species (PMUS) in the EEZ surrounding American Samoa. Specifically, the measure prohibits the taking of PMUS by domestic fishing vessels larger than 50 ft (length overall) from waters within an area that is approximately 50-nm of the baselines of Tutuila Island, Rose Atoll and the Manu'a Islands, and approximately 30 nm of the baseline of Swain's Island. Any vessel that is greater than 50 ft in length, held a NMFS longline permit on or prior to November 13, 1997 and made a landing of PMUS in American Samoa on or prior to that date is exempt from the prohibition to take PMUS within the closed area. The size of the area closure may be changed under the FMP framework process if information presented in an annual review indicates that an adjustment is justified. 1.0 Introduction ii

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The Council was established by the Magnuson Fishery Conservation and Management Act to develop Fishery Management Plans for fisheries operating in the US EEZ around American Samoa, Guam, Hawaii, the Northern Mariana Islands and the US possessions in the Pacific.1. Howland Island, Baker Island, Jarvis Island, Johnston Atoll, Midway Island, Kingman Reef, and Palmyra Atoll, and Wake Island. Once an FMP is approved by the Secretary of Commerce, it is implemented by federal regulations which are enforced by the National Marine Fisheries Service and the US Coast Guard, in cooperation with state, territorial and commonwealth agencies. For further information, contact:

Kitty M. Simonds Executive Director Western Pacific Regional Fishery Management Council

Charles Karnella Administrator NMFS Southwest Region, Pacific Islands Area 1164 Bishop Street, Suite 1400 2570 Dole St.

Honolulu, HI 96813 Honolulu, HI 96822-2396

Telephone: (808) 522-8220 Telephone: (808) 973-2935

This document was prepared by:

#### Western Pacific Regional Fishery Management Council:

Donald Schug, Paul Dalzell

#### National Marine Fisheries Service Honolulu Laboratory:

Russell Ito, Robert Skillman

The economic performance of the small-boat fleet in American Samoa has improved dramatically in recent years. Despite a slight decrease in the price of tuna and other PMUS, revenues from harvests of PMUS and other pelagic species doubled between 1996 and 1997. However, fishermen in American Samoa are concerned about the long-

term sustainability of the local small-boat pelagic fishery. In particular, there is apprehension that large US longline vessels will seek new fishing opportunities in the EEZ around American Samoa as fisheries in other areas of the US EEZ become increasingly restricted. Such an influx of longline vessels occurred in Hawaii during the late 1980s. The rapid expansion of the longline fleet in Hawaii led to extensive gear conflicts with troll and handline vessels and fear of a possible decline in the landings of small-boat fishermen. American Samoa fishermen are also concerned that the purse seine vessels supplying fish to the tuna canneries in the Territory already occasionally fish in the EEZ. A widely held perception among small-scale troll and longline fishermen in American Samoa is that the purse seine vessels intercept fish migrating to local waters and reduce the supply of tuna and other pelagic species available for capture by artisanal, subsistence and recreational fishermen.

The Council previously established a closed area in American Samoa to minimize interactions between domestic and foreign fisheries for pelagic species. In 1986, the FMP prohibited foreign longline fishing within a rectangle around the principal islands of American Samoa bounded by 14 and 15 S and 168 and 171 W, and in a one degree square surrounding Swain's Island bounded by 10 33' and 11 33' S and 170 34' W and 171 34" W. This management measure was not intended to address possible fisheries interactions between large and small domestic vessels.

#### 2.2 Initial actions

The Council was asked at the 92<sup>nd</sup> meeting in April, 1997 to assist in forming a fishermen's working group to consider various management options to ensure the long term sustainability of the small-boat fishery. Various meetings of the working group and other fishermen were convened by the Council and the American Samoa Department of Marine and Wildlife Resources between June and October 1997. The consensus among fishermen was that the most effective management action would be to establish a 100-nm closed area around the islands of American Samoa that prevented entry into the fishery by additional pelagic fishing vessels larger than 50 ft in length. A 100-nm area closure would encompass the major off-shore banks, seamounts and pinnacles around which pelagic fish species aggregate as well as create a "buffer zone" to further minimize potential fishery interactions. Fishermen stated that as the pelagics fishery develops, they may acquire larger vessels up to 50 ft in length. These larger boats would have a greater fishing range, be capable of landing more fish of a higher quality and provide a safer fishing platform. According to fishermen, a 100-nm area closure would help ensure that adequate pelagic resources were available to support this increase in fishing capacity within the artisanal fishing fleet.

During the meetings in American Samoa fishermen also noted that local depletion and gear conflict could occur if the size of the small-boat fleet becomes excessive. Currently, the number of boats in American Samoa harvesting pelagic species in the EEZ is relatively small. However, if a significant increase in fishing effort occurs, measures to control effort such as a license limitation system may be required. In anticipation of possibly creating an area closure and limited access system, NMFS established a control date of November 13, 1997, after which vessels larger than 50 ft entering the fishery will not be assured of being allowed to use longline gear to fish for pelagic management unit species within 100-nm of the coastlines of American Samoa. The control date placed the owners of large longline vessels on notice that they might be excluded if they entered the fishery after this date.

At the 95<sup>th</sup> meeting in April 1998, the Council recommended that all domestic fishing vessels, including purse seiners and albacore trollers, greater than 50 ft in length be prohibited from fishing for pelagic management unit species within 100-nm of the coastlines of American Samoa. However, the Council noted that such an area closure could impose an economic hardship on three large longline vessels that acquired permits prior to the control date. All of the fishing activity of these boats inside the US EEZ has occurred within 100 nm of the shoreline of Tutuila. When the owners of these vessels purchased their boats they had no expectation that there would be area restrictions on their fishing activity around the islands of American Samoa. Therefore, the Council recommended that any vessel that is greater than 50 ft in length, held a NMFS longline permit on or prior to November 13, 1997 and made a landing of pelagic management unit species in American Samoa on or prior to that date be exempt from the prohibition to take PMUS within the closed area.

Other large vessels, including a number of purse seiners, have also fished for pelagic species within 100 nm of the islands of American Samoa. However, the Council did not consider it appropriate to grant these vessels exemptions, as the amount of fish caught by the vessels within the 100-nm area has historically been a negligible fraction of their total catch.

In late April 1998, a document describing the problem raised by fishermen in American Samoa and alternative ways to resolve the problem was distributed to interested persons and organizations with a request for comments. Among the individuals and groups that received a copy of the document were all holders of NMFS longline vessel permits in the western Pacific, the United States Tuna Foundation and the Western Fishboat Owners Association.

The following objectives of the FMP are relevant to this management measure:

1) To manage fisheries for management unit species in the Western Pacific to achieve optimum yield. The FMP defines optimum yield as the amount of each management unit species or species complex that can be harvested by domestic and foreign fishing vessels in the EEZ and adjacent waters to the extent regulated by the FMP without causing "local overfishing" or "economic overfishing" within the EEZ of each island area, and without causing or significantly contributing to "growth overfishing" or "recruitment overfishing" on a stock-wide basis.

2) To diminish gear conflicts in the EEZ, particularly in areas of concentrated domestic fishing.

3) To promote, within the limits of managing at OY, domestic harvest of the management unit species in the Western Pacific EEZ and domestic fishery values associated with these species, for example, by enhancing the opportunities for a) satisfying recreational fishing experience; b) continuation of traditional fishing practices for non-market personal consumption and cultural benefits; and c) domestic commercial fishermen, including charter boat operations, to engage in profitable fishing operations. The management unit is defined as the pelagic species complex harvested in the EEZ around American Samoa. The principal species in this complex are listed in Section 4.1.1.

The management alternatives considered by the Council included 1) prohibiting vessels more than 50 ft in length from fishing for pelagic management species within an area encompassed by the existing area closure; 2) prohibiting such vessels from fishing for PMUS within an area approximately 50 nm around the islands of American Samoa; and 3) prohibiting such vessels from fishing for PMUS within an area approximately 50 nm around the islands of American Samoa; and around the islands of American Samoa. The Council also considered the alternative of taking no action. These alternatives are described in detail in section 3.0.

The FMP defines optimum yield as the amount of each management unit species or species complex that can be harvested by domestic and foreign fishing vessels in the EEZ and adjacent waters to the extent regulated by the FMP without causing "local overfishing" or "economic overfishing" within the EEZ of each island area, and without causing or significantly contributing to "growth overfishing" or "recruitment overfishing" on a stock-wide basis.

Notwithstanding the non-numeric definition of optimum yield, the Council estimates the annual harvest associated with optimum yield to be less than or equal to MSY. The estimates of MSY and optimum yield are not to be construed as quotas for the fishery, but as revised yield estimates.

The preferred management measure prohibits the taking of PMUS by domestic fishing vessels larger than 50 ft (length overall) from waters within an area that is approximately 50 nm of the baselines of Tutuila Island, Rose Atoll and the Manu'a Islands, and approximately 30 nm of the baseline of Swain's Island. To facilitate enforcement of the management measure the closed areas are configured using straight lines as much as possible. The area closure boundaries around Tutuila Island, Rose Atoll and the Manu'a Islands are identified by lines connecting the following coordinates:

170 49' 42" W and 13 30' S

167 30' W and 13 30' S

167 30' W and 15 30' S

171 51' W and 15 30' S

and the EEZ boundary connecting the points

170 349' 42" W and 13 30' S

171 51' W and 15 30' S

The area closure around Swain's Island is identified by a one degree square bounded by 10 33' and 11 33' S and 170 34' W and 171 34" W.

Any vessel that is greater than 50 ft in length and held a NMFS longline permit on or prior to November 13, 1997 and made a landing of pelagic management unit species in American Samoa on or prior to November 13, 1997 would be exempt from the prohibition to take PMUS within the closed area. Documentation of a qualifying landing must be from a properly submitted NMFS Western Pacific Daily Longline Fishing Log. The permit of a vessel that qualifies for an exemption may be transferred, but only to another vessel of equal or smaller length. An application for a permit transfer must be submitted to the NMFS Pacific Island Area Office, as specified in Section 660.13 of Title 50 of the Code of Federal Regulations. The applicant must provide satisfactory documentation of vessel ownership and the size of the vessel to which the transferred permit will be registered.

Any vessel less than 50 ft in length that is "upgraded" to a size larger than 50 ft, or replaced by a vessel longer than 50 ft, is prohibited from taking PMUS within the closed area.

An evaluation of the ecological, economic and social impacts of the closed areas will be made each year as part of the annual status report prepared by the Council for the pelagic fisheries managed in the Western Pacific region. During the evaluation the views and opinions of representatives of all sectors of the fishing industry in American Samoa will be solicited. The size of the closed areas may be adjusted upward or downward as new information becomes available.

During the annual evaluation the Council will also consider the need to restrict fishing effort or catches within the closed areas. Reference points for the need to take action will consider changes in catch per unit of effort. A decline in annual CPUE exceeding 20% of the 1996 value will be adopted as a precautionary threshold. If this threshold is exceeded, options to limit the number of longline permits will be considered. A decline in annual CPUE of between 30 and 50% of the 1996 value will trigger a temporary moratorium on the issuance of longline permits until it can be determined if the decline is related to environmental factors or a result of excessive fishing effort.

Any person who receives a permit to fish for pelagic management unit species using longline gear in the EEZ around American Samoa, Guam, the Northern Mariana Islands or other Pacific Insular Areas must comply with reporting and record keeping requirements as described in Section 660.14 of Title 50 of the Code of Federal Regulations. This reporting provision also applies to pelagic fish caught outside the US EEZ in the Pacific by domestic longline vessels.

Preparation of a regulatory impact review is necessary to satisfy the requirements of the national standards, other parts of the Magnuson-Stevens Act and Executive Order 12866. The purpose of this section is to assist in understanding the relative biological, economic and social consequences of alternative management measures identified in this document. Limitations on available information concerning the potential physical effects of management alternatives on fishing activities p recludes a detailed quantitative analysis of beneficial and adverse impacts. However, the analysis presented provides an adequate basis for making a management decision.

The harvest of pelagic fish has long been an important source of food and cultural identity for the indigenous inhabitants of American Samoa. In recent years, its importance as a source of income and employment has increased with the expansion of the local artisanal fishing fleet (Section 4.3.1). Artisanal fishing in American Samoa involves small-scale commercial ventures employing small vessels and relatively simple fishing technology. In addition to selling their catch, artisanal fishermen consume and give away part of it. Sharing a portion of the catch with family and friends is a customary social obligation that is an integral part of Samoan culture (Section 4.5). Small-boat fishermen in American Samoa are becoming increasingly concerned about the long-term sustainability of the local pelagic fishery. In particular, there is apprehension that large US longline vessels will seek new fishing opportunities in the EEZ around American Samoa. In addition, there is concern that the large vessels supplying fish to American Samoa's tuna canneries already occasionally fish in the

EEZ. A widely held perception among small-scale trollers and longliners in the Territory is that these larger vessels intercept fish migrating to local waters and reduce the supply

of tuna and other pelagic species available for capture by artisanal, subsistence and recreational fishermen.

A related problem, but one that will not be directly addressed by the Council at this time, is the dramatic increase in the number of small vessels in neighboring Western Samoa that are targeting pelagic species. Between 1990 and 1996, the Western Samoa fleet grew from 40 to 140 boats, and, at present, more than 200 vessels are active in the fishery. In 1997, about 3,450 metric tons of albacore were exported to the Pago Pago canneries from Western Samoa (Chapman 1998). Western Samoa's EEZ is the smallest of any Pacific island nation, and the EEZ boundary it shares with the US lies only 20 miles from Tutuila. American Samoa fishermen report that Western Samoa vessels fish close to the boundary and, increasingly, inside the US EEZ. The entry of large commercial operators into the American Samoa fishery would further increase the competition for pelagic fishery resources around the Samoa archipelago. It should also be noted that the success of small longliners in Western Samoa and American Samoa has attracted the attention of fishermen in other nearby island countries. For example, Niue, with an EEZ boundary about 200 nm south of Tutuila, is planning to develop its tuna industry by expanding the local small-boat fleet.

The objectives of the FMP that are relevant to this management measure are presented in Section 2.3.

The management alternatives considered by the Council are as follows:

Alternative 1 - Taking no action

<u>Alternative 2</u> - Vessels more than 50 ft in length are prohibited from fishing for pelagic management species within the area presently closed to foreign longline vessels (Figure 3.1). The closed area constitutes about 12.5 percent of the total EEZ area. The area closure would encompass most of the area where small boats using longline gear currently fish (Figure 3.4). However, it may not encompass all of the offshore banks and seamounts that are important fishing grounds to small trolling vessels, some of which regularly fish 45 nm from shore.

Alternative 3 - Vessels more than 50 ft in length are prohibited from fishing for pelagic management species within an area approximately 50 nm of the baselines of Tutuila Island, Rose Atoll and the Manu'a Islands, and approximately 30 nm of the baseline of Swain's Island (Figure 3.2). The closed area constitutes about 26 percent of the total EEZ area. A 50/30-nm area closure would enclose all the bank and seamount areas where small boats currently fish. However, it does not provide a "buffer zone" that takes into account the interest by American Samoa fishermen in acquiring larger (35-40 ft) boats and fishing further off-shore. In Western Samoa fishermen who have purchased larger (10.5 m/34 ft) alia catamarans fish 50 nm from shore (Stanley and Toloa 1998). Alternative 4 - Vessels more than 50 ft in length are prohibited from fishing for pelagic management species within an area approximately 100 nm of the baselines of Tutuila Island. Rose Atoll, the Manu'a Islands and Swain's Island (Figure 3.3). The closed area constitutes about 77 percent of the total EEZ area. The closed area is a continuous band from Swain's Island to Rose Atoll and extends beyond the islands and off-shore banks and seamounts that are currently used by the small-boat fleet or are likely to be used in the near future.

Under Alternatives 2 through 4, any vessel that is greater than 50 ft in length and held a NMFS longline permit on or prior to November 13, 1997 and made a landing of pelagic

management unit species in American Samoa on or prior to November 13, 1997 would be exempt from the prohibition to take PMUS within the closed area.

#### 3.4 Analysis of alternatives

This section draws on the best available information to examine 1) the likelihood that an increased number of vessels larger than 50 ft will enter the pelagic fishery around American Samoa if no management action is taken and 2) the likely effects if such an increase occurs.

The domestic longline fleet based in Hawaii and the mainland US is highly mobile. The dozens of longline vessels that arrived in Hawaii during the late 1980s were from Alaska, California, the Gulf of Mexico and the east coast. Some of these vessels have since returned to the continental US or moved on to new areas such as Fiji. Quotas, limited access programs, commercial trip limits, incidental catch restrictions, prohibitions on sale, minimum size limits and time and area closures are among the array of measures that have been implemented or are being discussed by federal and state entities to manage pelagic stocks in the Atlantic and Gulf of Mexico. It is likely that these measures will restrict longline fishing and will cause some longline vessels currently operating in these areas to seek alternative fishing grounds. In addition, restrictions in other fisheries, such as the Gulf of Mexico shrimp fishery, may cause some fishermen to equip their vessels with longline gear and move to areas with productive fishing grounds for pelagic species.

On the other hand, those fishermen that feel compelled to leave their traditional fishing areas may be disinclined to relocate in American Samoa. The most lucrative longline fishing operations in the Pacific at present are those producing high-grade, fresh tuna. These operations are hindered from locating in American Samoa by a shortage of cold storage facilities in the Territory and infrequent air links to Hawaii and other large export markets.

It is also possible that American Samoans may wish to purchase large longline vessels and operate these boats from Pago Pago. In the last five years four large longline vessels have been acquired by businesses located in the Territory. These boats are similar in length Check lengths of 4 large vessels

(65-109 ft) to domestic Hawaii-based longline vessels. However, a shortage of private sector capital in the Territory may restrict the ability of residents to construct or purchase additional vessels of this size.

The domestic purse seine and albacore trolling fleets, both of which consist of boats larger than 50 feet, are as mobile as the longline fleet. Most of the fishing activity by the purse seine vessels occurs in the EEZ waters of Papua New Guinea, Federated States of Micronesia and other Pacific island nations far to the west of American Samoa. However, during an ENSO event these vessels may shift their fishing activity to areas in the central Pacific, including the upper portion of the EEZ around American Samoa (Section 4.2.2.3). The South Pacific albacore vessels operate on dense concentrations of albacore that form along the sub-tropical convergence zone that lies 35-47 S and 170-130 W. These boats seldom, if ever, fish in the EEZ around American Samoa, and the likelihood that they ever will is small.

Finally, it is possible that large foreign fishing vessels may seek permission to fish in the EEZ around American Samoa under a Pacific Insular Area Fishing Agreement (PIAFA). A PIAFA would give foreign vessels access to these EEZ waters in exchange for a

negotiated fee. However, the level of interest of foreign nations in entering into a PIAFA may be low, as a large portion of the EEZ around American Samoa is closed to foreign longline vessels. Furthermore, a PIAFA may not be entered into if it is determined by the Governor of American Samoa that such an agreement will adversely affect the fishing activities of the indigenous people of the Territory.

In summary, it is difficult to predict the behavior of highly mobile vessels such as large longliners. These vessels certainly have the capability of fishing in the EEZ around American Samoa, and the historically high catches of albacore by longliners in this portion of the US EEZ may induce some vessels to fish in the area. However, longline vessel operators may be discouraged from relocating in American Samoa because the distance and other logistics hamper access to fresh tuna markets.

There is insufficient data collection, analysis and modeling to quantify existing or potential interactions between large and small vessels fishing for pelagic species in the EEZ around American Samoa. An absence of data to support an analysis of potential fisheries interactions is not unique to the case of American Samoa. The 1991 FAO Expert Consultation on Interaction of Pacific Tuna Fisheries noted that evidence for interactions is available for only a few tuna fisheries in the Pacific, and these interactions have been quantified for even fewer fisheries (Shomura et al. 1994). Efforts to document interactions are hampered by inadequate fishery data, insufficient knowledge of the biology and population dynamics of the resource and a lack of understanding of the influence of the environment on tuna resources (Shomura 1996). However, information is available that indicates the type and direction of expected effects of an increase in the number of large vessels on the resource and the American Samoa fishing industry.

Evidence suggests that competition between vessels using the same type and size of gear may have contributed to a decline in catch rates in the waters around American Samoa as the Asian longline fleet expanded rapidly during the 1950s. Analysis of longline fishing by Asian longline vessels from the 1950s to the 1970s by Otsu and Sumida (1968) and Yoshida (1975) indicates that the large build up of longline fishing effort around American Samoa had an effect on the South Pacific albacore stock. That the apparent overall effect was not greater was due to the fact that the fishing grounds expanded, especially into areas south of latitude 20 S where good catch rates were obtained. The mean catch per day and catch per 1000 hooks of longline vessels based in Pago Pago declined steadily between 1959 and 1971. To compensate for the reduced CPUE, the longline vessels fished more days per trip and traveled up to 2,500 nm from American Samoa seeking new fishing grounds.

Competition may also occur among different gear types if the same species are harvested. For example, interaction has been observed between purse seine and artisanal troll fisheries catching yellowfin tuna in the waters around Kiribati. Hampton et al. (1996), showed that over large areas, e.g., within 300-600 nm of Kiribati, artisanal and purse seine catch rates of yellowfin tuna are generally positively correlated, suggesting that at this scale, variations in abundance or catchability of yellowfin affect both purse seine and artisanal harvests in the same way. However, some negative impacts of purse seine fishing on artisanal catches were found by Hampton et al. at finer spatial scales when purse seiners fished within 60 nm or less from Kiribati shorelines. In American Samoa large longline or purse seine vessels could similarly compete with small vessels using troll gear to catch species such as mahimahi, yellowfin tuna, wahoo and blue marlin.

A more intensive form of competition may occur if fishing gear is dispersed unequally over the population. In Western Samoa the entry of large numbers of small *alia* catamarans fishing in only a limited area of the EEZ led to competition and gear conflict between vessels (Chapman 1998). Western Samoa has the smallest EEZ of any Pacific island nation, and the effort of the longline fishery is concentrated in less than 40 percent of this area. In 1994, when 20-30 small boats were using longline gear, catch rates averaged 1.65 lbs/hook (Mulipola 1998). By 1997, 170 vessels were active and catches had declined to 0.497 lbs/hook.

The problems created by a small-boat fleet fishing intensely within a limited area may be exacerbated by the entry of larger fishing vessels with greater fishing capacity. The fishing power of small *alia* catamarans is limited due to the relatively small number (200-300) of hooks deployed, short trip duration and limited on-board storage capacity. By comparison, longline vessels similar in size to those in the Hawaii fishery can make trips of several weeks duration and deploy longlines with 1200-1500 hooks.

Local overfishing may also occur when fish are not distributed homogeneously throughout a fishing ground, but are concentrated in certain areas. Juvenile tuna and other pelagic fish are known to aggregate in specific locations, including banks and seamounts that rise from the ocean to within a few hundred meters of the surface. These "core areas" are particularly important from a management perspective, since local overfishing or depletion may occur if these areas are fished intensively. Such an effect was observed on the Pacific coast of Mexico, where an increase of longline fishing effort in two areas of striped marlin abundance led to marked overall decreases of both longline and troll gear CPUE. Japanese longline fleets began to expand fishing operations in the eastern tropical Pacific during the early 1960s with effort concentrated around the Baja coast of Mexico, rising from near zero levels in 1960 to the deployment of 85 million hooks in 1976 (Muhlia-Melo 1996). Over this same time period, longline tuna and billfish catch rates declined as effort increased, and a parallel decline, particularly for striped marlin was also experienced by recreational troll fishers operating from coastal ports in Mexico.

The declaration of Mexico's 200-mile EEZ in 1976 and the subsequent enforcement of this zone between 1977 and 1980 produced a rapid recovery of overall gamefishing catch rates, most notably for striped marlin and swordfish. However, entry of a limited number of longliners after 1980 was marked by another period of declining catch rates among both longline and recreational troll fishermen. In 1983, Mexico established a sport-fishery preserve which extended from the coastline to 50 nm offshore along the Pacific coast. Fishing by longline vessels were completely banned within this area, and in 1987 the prohibited fishing area was extended further offshore (Squire and Au 1990; Muhlia-Melo 1996). Squire and Au (1990) noted that the decline and recovery of the striped marlin catch rates reflected the fishing down and rebuilding of two localized near-shore areas where fish are attracted and regularly linger during their life cycle. Large vessels fishing for pelagic species in other areas of the Pacific and in the Atlantic have also tended to concentrate their fishing effort in areas where off-shore banks or seamounts are located (Fonteneau 1991). Research indicates that features such as seamounts exert a strong influence over the super-adjacent water column. An example

of this type of influence is the doming of the thermocline that has been observed over seamounts.

The banks and seamounts around American Samoa have long been important fishing grounds for artisanal and recreational fishermen participating in both pelagic and bottomfish fisheries. Even distant banks, such as South Bank, which is located about 45 nm from Tutuila, are frequently visited by small boats using troll gear (Section 4.2.2.1). In addition, the concentrations of juvenile tuna on these banks and seamounts may represent a reservoir of fish that over time move into nearshore waters and come within range of the troll and longline vessels operating nearer the islands. While most of these banks and seamounts are within the range of the small-boat fleet, the fishing power of these boats is limited. In contrast, large longline vessels can fish intensively on bank and seamount areas, which could lead to local overfishing and general declines in CPUE throughout the fishery.

It is uncertain how long the effects of local overfishing would last should it occur. However, given the high mobility and great range of tuna and billfish, the recovery of local stock abundance may occur within a few years if fishing effort decreases. For example, in Mexico the enforcement of the longline exclusion zone between 1977 and 1980 produced a rapid recovery of overall gamefishing catch rates (Squire and Au 1990; Muhlia-Melo 1996).

Another type of fisheries interaction occurs when gear interferes directly with other gear and creates "physical" competition between them, which is independent of population abundance, even locally. This interaction was evident between the small-boat and longline fleets during the rapid expansion of the Hawaii longline fleet in the late 1980s. The fleet increased from 37 vessels in 1987 to 75 in 1989, and then doubled again to 156 vessels in 1991. Many of these new longline vessels were recent arrivals from the continental US. In addition to straining harbor facilities, the increased fishing effort led to gear conflicts and precipitated heated confrontations between the longliners and the established local fishing fleet consisting mainly of small troll and handline vessels (Pooley 1990). There was also concern that the local availability of certain pelagic species to recreational and part-time commercial fishermen were being negatively impacted upon by the longline boats. These fishermen argued that this impact would increase if swordfish catches declined and the longliners increasingly targeted tuna.

In American Samoa most of the longline fishing occurs to the south of Tutuila within a relatively narrow area. The *alia* catamarans normally set their lines perpendicular to the coast and parallel to each other. Because these vessel use relatively short longlines, they can set their gear within the area where albacore and other pelagic fish are concentrated, while avoiding gear interaction with one another. The four large longline vessels currently based in Pago Pago have so far avoided gear interactions with smaller boats by fishing in more distant areas of the EEZ. If additional large longline vessels enter the fishery, it is possible that they will attempt to maximize catch rates by setting their gear parallel to the coast in order to deploy the maximum number of hooks in the most favorable area. The result could be serious interactions between the gear of the large and small vessels.

In summary, the nature and extent of interactions between large and small vessels fishing for pelagic species in the EEZ around American Samoa is not clearly understood. However, the information available suggests that an increase in the number

of large vessels fishing for tuna and billfish could have a significant negative impact on the small-boat fleet if no management action is taken.

#### 3.4.2 Establishment of an area closure

It is difficult to predict the extent to which the problem will be resolved by implementing the management measure alternatives considered by the Council. The lack of data to support an analysis of potential fisheries interactions also precludes making reliable predictions regarding the outcome of management options. However, it is important to note that in the Pacific basin the establishment of area closures is increasingly becoming the preferred management tool to resolve conflicts associated with stockmediated interactions (harvesting the same resources) and gear competition or interference between fisheries. In March 1998, the Western Samoa government introduced regulations that would establish a 50-nm area around the islands of Western Samoa that is closed to fishing vessels greater than 50 ft in length (Chapman 1998). The Marshall Islands established a 50-nm longline exclusion zone around the atolls of Majuro and Kwajalein in 1996, after sportsfishermen contended that trolling catch rates for game fish species such as blue marlin and yellowfin tuna had declined as a result of fishing by the locally-based longline fleet (Bigelow and Lewis undated). As noted above, Mexico also established a longline exclusion zone to increase gamefishing catch rates. The arrival in the central and western Pacific of purse seine fleets from the US and other distant water fishing nations in the early 1980s generated concern that these vessels would be competing for the same resources harvested by pole-and-line bait boats operating from bases in Papua New Guinea. This concern led to the establishment in 1981 of an area in the northern waters of Papua New Guinea that was closed to purse seining (SPC 1992). More recently, under the Treaty on Fisheries Between the Governments of Certain Pacific Island States and the Government of the United States implemented in 1989, several Pacific island nations established closed areas to restrict the fishing area of US purse seine vessels that have acquired access to fish in the region (Table 1).

### Table 3.1. Areas in various Pacific island EEZs that are closed to US purse seine vessels

Australia Entire EEZ

Cook Islands 12 nm territorial waters

FSM 12 nm territorial waters

Fiji Internal and archipelagic waters of main island group and 12 nm territorial waters from archipelagic boundary around main islands and Rotuma

Kiribati Archipelagic waters between islands, 12 nm territorial waters and 2 nm from anchored fish FADs Marshall Islands 12 nm territorial waters and 2 nm from anchored FADs

#### Table 3.1 contd.

Nauru 12 nm territorial waters

New Zealand Entire EEZ except northern part above 39 S west of main islands and above 40 S east of main islands. Within permitted area, 12 nm territorial waters and a further 6 nm are closed.

Niue 12 nm territorial waters around Niue and 3 nm around Beveridge, Antiope and Harans reefs

Palau 12 nm territorial waters around Palua and an area encompassed in an arc with a radius of 50 nm centered on reef entrance to Malakal Pass

Papua New Guinea 12 nm territorial waters and an area between 0 30' S–3 30' S and 149 E–153 E around New Ireland

Solomon Islands Entire EEZ except for area between 4 20' S-8 S and 161 E-169 55' E

Tonga All waters less than 1000 m in depth within coordinates 15 S–23 30'S and 173 W–177 55' W and 12 nm from islands of Teleki Tonga and Teleki Tokelau

Tuvalu 12 nm territorial waters and 2 nmi from Macau, Kosciusko, Rose, Bayonnaise and Hera banks Vanuatu 12 nm territorial waters and archipelagic and internal waters

Western Samoa 12 nm territorial waters, various banks and sea mounts and 2 nm from anchored FADs

The Western Pacific Council has also previously established closed areas to reduce fishery interactions. The FMP prepared in 1986 for pelagic fisheries prohibited foreign longline fishing in the following areas of the EEZ to encourage the expansion of the domestic fishery: within 150 nm of Guam and the main Hawaiian Islands, 100 nm of the Northwestern Hawaiian Islands and 12 nm of US Pacific island possessions except for Midway Island; and within a rectangle around the principal islands of American Samoa bounded by 14 and 15 S and 168 and 171 W, and in a one degree square surrounding Swain's Island bounded by 10 33' and 11 33' S and 170 34' W and 171 34" W.

In 1991, the Council established a domestic longline vessel exclusion zone around the main Hawaiian Islands ranging from 50 to 75 nm to prevent the aforementioned gear conflicts between domestic longliners and smaller fishing boats. Certain small longline vessels in Hawaii are exempted from the area restriction and all longliners are allowed in otherwise closed areas when bigeye tuna are seasonally closer to shore and small boat activity is relatively low.

Area closures intended to reduce interactions between tuna and billfish fisheries have also been established or are being considered in Australia, the Solomon Islands and elsewhere around the Pacific islands region. Many, if not most, of the area closures in the region were established in the absence of quantitative data that could be used to document the existence and level of interactions or make reliable scientific predictions regarding the outcome of alternate management measures.

The alternative of no action would maintain fishing opportunities for large vessels throughout the EEZ around American Samoa. However, an increase in the number of large vessels could have substantial economic and social effects on American Samoa's small-boat fleet. Small vessels would compete with large vessels over common resources and would likely lose against vessels with greater fishing power and range. If fishing pressure by large vessels results in local overfishing and a fall in catch per unit of effort the economic impact on the small-boat fleet could be severe, even if the effects of local overfishing do not last more than a few seasons. Poor catch rates would result in decreases in income, possible defaulting on boat loans, loss of employment opportunities and other economic hardships. Furthermore, residents of American Samoa would suffer from a discontinuation of traditional fishing practices for non-market personal consumption and cultural benefits. Large vessels, on the other hand, have the capability of mitigating the costs of a decrease in catch rates due to competitive interaction by traveling to more distant fishing grounds.

The establishment of a closed area reserved for use by small boats will have little direct effect on the domestic purse seine or albacore troll fleets irregardless of the size of the closed area. The most productive fishing grounds for purse seiners and albacore trollers lie outside the EEZ around American Samoa (Section 4.2.1.2). Only six US purse seine vessels reported making sets within the EEZ around American Samoa between 1988 and 1997 (Section 4.2.2.3). Albacore trollers seldom, if ever, fish in the EEZ around the Territory (Wayne Heikkila, Western Fishboat Owners Association, pers. comm.). Consequently, the total catches and revenues of purse seiners and albacore trollers could be maintained if effort is directed beyond an area closure.

However, a large closed area could potentially result in lost fishing opportunities for large longline vessels currently based in Hawaii or the continental US. Furthermore,

although large longline vessels that landed PMUS in American Samoa prior to the control date will be allowed to fish within the area closure, the establishment of a closed area may discourage residents of American Samoa from purchasing or constructing additional large longline vessels. Such vessels may be profitable investments; a larger vessel is faster than a small one, has a greater fishing range and can fish year round. However, in American Samoa there is a shortage of private sector capital to purchase large fishing vessels and an excess of labor. In these circumstances it is likely that American Samoans can benefit more from local ownership of less-expensive boats that provide greater employment opportunities. The outboard powered vessels that fishermen in the Territory favor are easily built and maintained and capable of harvesting multiple target species utilizing a variety of gear types. This flexibility is important given the varying abundance of pelagic species from year to year due to environmental factors (Section 4.1.3.2). Table 4.4 in Section 4.3.1 indicates that a fishing enterprise using a typical 28 ft alia catamaran is a viable economic alternative for American Samoa. This data, coupled with estimates of local per capita income, suggest that the capital investment required to enter the small-boat fishery is within the financial reach of the typical American Samoan household.

The economic importance of marine fisheries in the Pacific Insular Areas is recognized in the Magnuson-Stevens Act, which states: "Pacific Insular Areas contain unique historical, cultural, legal, political, and geographical circumstances which make fisheries resources important in sustaining their economic growth." With its very limited economic base, American Samoa, in particular, has a compelling interest to promote development of local fisheries (Section 4.5). As a result of employment cutbacks within the American Samoa Government and the unavailability of appropriate private sector jobs, an increasing number of American Samoans are seeking employment outside of the Territory. Developing fish harvesting capability sufficient to support substantial participation in fisheries will expand and diversify the local economy and help the Territory attain a higher level of economic self-sufficiency. Small-scale commercial fishermen in the Territory have the desire to harvest a larger number of PMUS than are now taken. Some of these fishermen are investing in larger (30-40 ft.) boats that have a greater fishing range and are capable of carrying ice and delivering a higher-value product. By helping maintain the potential for high catch rates by the artisanal fleet, a closed area will contribute to the success of these more ambitious fishing enterprises. At present, the artisanal fishing fleet generates little indirect economic activity because the fuel, gear, bait and other supplies it purchases are almost all imports. However, an expansion of the fleet could lead to the development of a number of linked industries in American Samoa. One 39 ft alia catamaran has recently been constructed by a local firm, and it is likely that increased business activity and employment will occur in the local boat-building industry as the demand for vessels grows. Investment opportunities in forward-linked industries may also be created if additional local and export markets develop for the catches of the artisanal fleet. A growing number of local businesses are purchasing the catches of the artisanal fleet and selling the fish in retail and wholesale outlets, and several entrepreneurs have expressed interest in exporting the fish to Hawaii or the mainland US. Recently, an organization in American Samoa received a grant of \$346,000 from the Administration for Native Americans to develop a small-scale fish processing facility. When completed, the facility is expected to process fresh tuna procured from local fishermen and sell the product in local and export markets. While it is important to recognize the significant role marine fisheries may play in the economy of American Samoa, it is equally important to keep in mind that the value of pelagic fisheries in the Territory extends beyond the creation of employment and generation of exports and income. By providing small-boat fishermen in American Samoa a reasonable opportunity to participate in fisheries, an area closure will also preserve and protect a continuation of traditional fishing practices for non-market personal consumption and cultural benefits. Pelagic fishing has historically had considerable socio-cultural value in Samoan society and continues to contribute to the cultural integrity and social cohesion of American Samoa communities (Section 4.5). For example, tuna are still harvested to meet customary social obligations and age-old ceremonial traditions specifying the distribution of tuna catches within a village endure. These socio-cultural attributes of fishing are at least as important as the contributions made to the nutritional or economic well-being of island residents.

#### 3.5.2 Conservation of PMUS

Establishment of a 50/30-nm area closure is reasonably calculated to promote conservation of the resource. Allocation of a portion of the EEZ around American Samoa to small boats will tend to limit the rate of increase of total fishing effort. Entry by a large (>50ft) vessel represents a much greater increase in fishing pressure and fishing mortality, in comparison with an *alia* catamaran. However, if a significant expansion in the size of the small vessel fleet occurs, measures to restrict the number of participants in the fishery, such as a license limitation system, may be required.

Stocks of pelagic species that occur in the waters around American Samoa offer far greater resource potential than deep-slope bottomfish or inshore fish stocks. Inshore resources are heavily exploited or over-exploited in many areas of American Samoa (Wass 1980). The effects of heavy fishing pressure have been exacerbated by the environmental effects of cyclones, pollution and sedimentation (Saucerman 1995). The exploitation of the slow growing, deep-water snappers in American Samoa is limited by the low standing stock of the resource (Itano 1996). As a result of an increase in effort in the bottomfish fishery during the 1980s, catch rates in the main fishing areas fell from 352 lbs/trip to 120 lbs/trip within three years. Development of off-shore pelagic fisheries for local consumption would constitute a means of relieving the pressure on inshore and deep-slope fisheries.

The establishment of a closed area may reduce overall bycatch levels, as less fishing area would be available to large vessels which tend to have greater amounts of bycatch than do small vessels. In 1997, NMFS logbook data for domestic longline vessels based in American Samoa indicated that discards amounted to 4.5 percent of the total catch of large (>50 ft) longline vessels, while 0.2 percent of the total catch of small vessels using longline gear was discarded. Most of the catch of large longliners that has no market value is discarded. In addition, a fraction of the total catch that could be sold is not retained for economic reasons. For example, marlins are often discarded at the beginning of a trip to leave hold space for more valuable species. Small quantities of tuna and other pelagic species are discarded by purse seine vessels. In comparison, small vessels in American Samoa using longline and troll gear generally discard only

sharks, and this to a decreasing extent as the demand for shark fins increases. Any unsaleable fish are usually taken home by the crew.

The 50-ft restriction on vessel size is not expected to place the safety of fishery participants at risk. Troll and handline vessels averaging 40 ft in length regularly make trips of 150 nm or more to seamounts and weather buoys around Hawaii. No troll and handline vessels have sunk with loss of life within the last several years. The vessels that make voyages as far as 1000 nm to participate in the federally-regulated Northwestern Hawaiian Islands bottomfish fishery have an average size of 54 ft. No replacement vessel larger than 60 ft is allowed into the bottomfish fishery. While vessel size is a significant safety factor, safety training and the acquisition of emergency equipment are also important. The US Coast Guard has recently undertaken a campaign to educate fishermen in American Samoa about US commercial fishing vessel safety regulations and to ensure compliance with these regulations. A closed area of any size will result in monitoring and enforcement costs. Current constraints on US Coast Guard surveillance resources could limit the ability to enforce an area closure in American Samoa. An automated, satellite -based vessel monitoring system has proved to be a useful tool to enforce area closures in Hawaii. The Council has determined that it may not be cost-effective at this time to develop a similar VMS to enforce area closures in American Samoa. However, it is likely that in the near future, international fisheries agreements in the central and western Pacific will require vessels that harvest pelagic species in more than one EEZ or on the high seas to carry VMS units (FFA 1996a).

A large portion of the EEZ around American Samoa is already closed to foreign longline vessels. Increasing the size of the EEZ area closed to foreign boats is likely to reduce the interest of foreign nations in acquiring rights to fish in the open portion of the EEZ. A Pacific Insular Area Fishery Agreement would allow access fees to be deposited in the treasury of the American Samoa Government. However, at this time the American Samoa Government has placed a higher priority on encouraging the development of local domestic fishing enterprises than on collecting revenues from foreign fishing. Particular support is being given to artisanal fisheries because of their importance as a source of food for local consumption, income and employment and a means of preserving Samoan cultural values.

The United States Tuna Foundation and Western Fishboat Owners Association have expressed concern that the establishment of an area closure may set a precedent that will be followed by Pacific island nations that are parties to the Treaty on Fisheries. This treaty sets forth the terms and conditions that US purse seine vessels must adhere to in order to fish in the region. Among the principal issues of the treaty are closed and limited areas (Table 3.1). The Tuna Foundation states that such a precedent could adversely affect efforts by the purse seine fleet to retain vital fisheries access throughout the region. However, a number of Pacific island nations such as Kiribati, Tuvalu and the Federated States of Micronesia depend upon foreign fishing access fees for a significant portion of their government revenue. The access fees paid by the US under the Treaty on Fisheries are the highest of any licensing arrangement in the region (10 percent of the value of fish harvested). Given this economic incentive to accommodate foreign fishing vessels, particularly US purse seiners, it is unlikely that these nations will be induced to enlarge the areas closed to foreign vessels by the implementation of a closed area in the EEZ around American Samoa.

On the other hand, there is a growing interest by most Pacific island nations in developing domestic tuna-based fishing industries in order to increase the economic benefits from their fishery resources. In the 1970s and 1980s, few Pacific island nations (Fiji, Papua New Guinea and Solomon Islands being the principal exceptions) were fishing for cannery-quality skipjack and albacore. However, recently the participation of island states and territories in tuna fishing has increased with the advent of longline fisheries for high-quality fresh yellowfin and bigeye tuna (FAO Fisheries Department 1997). These fisheries operate mainly off the Federated States of Micronesia, Fiji, French Polynesia, Marshall Islands, New Caledonia, Palau and Tonga.

In the future, it is possible that one way in which Pacific island countries encourage the further development of local tuna industries is to reserve a larger portion of their EEZ waters for the exclusive use of domestic vessels. For example, Papua New Guinea has closed its entire EEZ to foreign longline vessels and is considering reducing the EEZ area available to US purse seiners. Such actions by Pacific island nations are likely to continue whether or not an area closure is established in the EEZ around American Samoa.

Don, this paragraph more or less repeats the content of para 1 on page 8. Is this intentional? The Council supports the establishment a 50/30-nm closed area (Alternative 3), but recognizes that the nature of interactions between pelagic fisheries is not well understood. Moreover, there is uncertainty as to the most effective measures for reducing interactions. However, establishing a closed area is consistent with management initiatives undertaken throughout the Pacific islands and previously by the Western Pacific Council to minimize interactions between pelagic fisheries. Establishment of a 50/30-nm area closure contrasts with the strategy of taking no action until sufficient evidence accumulates to demonstrate that fishing by large vessels leads to local overfishing of stocks and/or adversely impacts on small-boat fisheries. The Council is adopting a precautionary approach and encouraging a rational, more easily managed use of the resource by instituting measures before a crisis in the fishery occurs.

The Council recognizes that as information on the economic and social impact of an area closure becomes available, modification of the 50/30-nm closure may be desirable. A comprehensive evaluation of the effectiveness and impacts of the closed area will be made each year after implementation of this management measure. During the evaluation the views and opinions of representatives of all sectors of the fishing industry in American Samoa will be solicited.

This allocation of ocean area to small vessels is consistent with the FMP objective to promote, within the limits of managing at OY, domestic harvest of the management unit species in the Western Pacific EEZ and domestic fishery values associated with these species by enhancing the opportunities for a) satisfying recreational fishing experiences; b) continuation of traditional fishing practices for non-market personal consumption and cultural benefits; and c) domestic commercial fishermen to engage in profitable fishing operations. Limiting the risk of interceptions of PMUS in the EEZ by establishing a 50/30-nm closed area will help maintain artisanal, subsistence and recreational fishing values in the Territory without significantly decreasing the catches of larger vessels

targeting pelagic fish. In addition, if the absence of an area closure results in local overfishing, the economic and social costs are likely to be more severe for the smallboat fleet than for larger vessels. Large vessels have the capability of mitigating the costs of a decrease in catch rates by traveling to more distant fishing grounds where good catch rates can be obtained. In short, the total potential benefits that the smallboat fleet in American Samoa may receive from a 50/30-nm area closure outweigh the potential hardship that may be imposed on those large vessels excluded. Partitioning large and small fishing vessels into appropriate areas reduces the likelihood of conflict, which is consistent with Article 7.6.5 of the Food and Agriculture Organization of the United Nations (FAO) Code of Conduct for Responsible Fisheries:

States and fisheries management organizations and arrangements should regulate fishing in such a way as to avoid the risk of conflict among fishers using different vessels, gear and fishing methods.

Furthermore, the establishment of a closed area will ensure that the fishing grounds that have traditionally been the most important to the small-scale fishing fleets will be reserved for their use. This allocation of fishing space is consistent with Article 6.18 of the Code of Conduct for Responsible Fisheries:

Recognizing the important contributions of artisanal and small-scale fisheries to employment, income and food security, States should appropriately protect the rights of fishers and fish-workers, particularly those engaged in subsistence, small-scale and artisanal fisheries, to a secure and just livelihood, as well as preferential access, where appropriate, to traditional fishing grounds and resources in the waters under their national jurisdiction.

The PMUS commonly caught in pelagic fisheries in the EEZ around American Samoa are listed in Table 4.1. All the PMUS species harvested are part of larger populations which are contiguous throughout most of the tropical and sub-tropical Pacific Ocean. **Table 4.1. Pelagic management unit species in American Samoa fishery** 

English Common Name	Scientific Name	Samoan names	
Albacore	Thunnus alalunga	Apakoa	
Yellowfin tuna	T. albacares	Asiasi, To'uo	
Indo-Pacific blue marlin	Makaira mazara:	Sa'ula	
Bigeye tuna	T. obesus	Asiasi, To'uo	
Oceanic sharks	Alopiidae, Carcharinidae, Lamnidae, Sphynidae	Malie	
Mahimahi (dolphinfish)	Coryphaena spp.	Masimasi	
Wahoo	Acanthocybium solandri	Paala	
Sailfish	Istiophorus platypterus	Sa'ula	
Swordfish	Xiphias gladius	Sa'ula malie	
Other tuna relatives	Auxis spp, Scomber spp; Allothunus spp	(various)	
Skipjack tuna	Katsuwonus pelamis	Atu, Faolua,	

		Ga'oga
Striped marlin	Tetrapturus audax	
Shortbill spearfish	T. angustirostris	Sa'ula
Pomfret	family Bramidae	Manifi moana
Oilfish family	Gempylidae	Palu talatala
Moonfish	<i>Lampris</i> spp	Koko
Kawakawa	Euthynnus affinis	Atualo, Kavalau
Dogtooth tuna	Gymnosarda unicolor	Tagi

#### 4.1.2 Abundance and present condition

There are no obvious signs that fisheries across the Pacific have had a serious negative impact on skipjack or yellowfin stocks (SPC 1997). There is concern over a five year continuous decline in the CPUE of large yellowfin in Japanese purse seine catches, but changes in both targeting and fishing grounds over the same period of time confound interpretations of the change in the CPUE. Studies indicate that there is little, if any, separation of eastern and western Pacific bigeye stocks, but the longline CPUE for the eastern Pacific has been decreasing while that for the western Pacific was stable. Analysis of the eastern Pacific data indicated that catch levels in that region may be nearing full exploitation. Lack of complete information on bigeye mortality and exploitation rates makes it difficult to determine the status of Pacific bigeye stocks. Analyzes conducted by the South Pacific Commission (SPC 1997) on the South Pacific Albacore stock as a whole suggest that total catches have been stable over the past several years, although the success of the troll fishery in the sub-tropical convergence zone has been variable. The CPUE of Asian longline vessels has been stable or increasing in recent years and there is no evidence in the data that current levels of fishing are having an overall adverse affect on the stock. However, SPC (1997) notes that analysis of tagging and length frequency data indicate relatively slow growth and low mortality rates for South Pacific albacore, compared to the tropical tunas such as bigeye and yellowfin. The fisheries potential of albacore is therefore thought to be more restricted by comparison with the tropical tunas.

2		

In the pelagic fisheries occurring in the EEZ around American Samoa the skipjack catch rates of small boats using troll gear has fluctuated widely over the past 15 years, with some suggestion of an overall decline (Figure 4.1). Yellowfin CPUE has remained relatively steady over the same time period. The troll gear CPUE for blue marlin, yellowfin, wahoo and mahimahi has been increasing over the past few years (Figure 4.2), due, in part, to use by fishermen of better fishing gear and larger boats that can go further off-shore to fish around seamounts.

There are only two years of longline CPUE data due to the recent adoption of this gear type by the local artisanal fleet. The longline CPUE for albacore in 1997 was similar to that in 1996. CPUE values for blue marlin, swordfish, bigeye and yellowfin declined overall in 1997, while those of skipjack and mahimahi increased.

Table 4.2. Longline CPUE for targetPMUS in American Samoa pelagicfishery			
Species	CPUE (no/1000 hooks)		
	1996	1997	
Blue marlin	0.90	0.61	
Swordfish	0.03	0.01	
Albacore	30.91	31.18	
Bigeye	1.05	0.14	
Skipjack	0.30	0.60	
Yellowfin	4.09	2.51	
Mahimahi	1.25	2.81	

#### 4.1.3 Probable future condition

The future condition of the component PMUS stocks occurring in the EEZ around American Samoa will be affected by changes in the size and composition of pelagic fishing fleets operating both within and outside the EEZ around the Territory. Predicting what these changes may be is difficult. Perhaps, the source of uncertainty which could have the greatest impact on the pelagic fisheries within the Council's jurisdiction is the international arrangement currently being negotiated to manage highly migratory fish stocks in the central and western Pacific. Participants in the negotiations recognize that in order for a multilateral arrangement to achieve its objective of conserving and managing stocks, it will need to agree on catch limitations, either directly, through quotas, or indirectly through a limit on fishing effort. Decisions have not yet been made regarding the approach to catch and/or effort limitation and where, when and by whom the fish will be caught.

Environmental variables may have a considerable influence on the abundance and condition of pelagic fish stocks. The three tropical tunas, skipjack, yellowfin and bigeye, and billfish such as blue and striped marlin prefer waters ranging in temperature from **18-31 C**, whereas subtropical fish such as albacore and swordfish prefer cooler waters ranging from **10-25 C**. Abundance of these tropical and sub-tropical stocks is predicated

on the abundance of prey items which in turn may be the result of a physical structure such as a seamount, or an oceanographic feature such as a frontal system where two different water masses converge.

The largest and strongest environmental influence on pelagic stocks in the western Pacific are

*El Niño*-Southern Oscillation (ENSO) events (negative values of the Southern Oscillation Index). ENSO events are associated with a weakening of the prevalent easterly trade winds in the tropical Pacific and an eastward shift of the western Pacific warm pool, the warm water mass that lies between New Guinea and the Micronesian islands.

Lehodey et al. (1997) note the presence of a permanent convergence of surface-layer water masses at the eastern edge of the western Pacific warm pool. This convergence zone is identified by a well marked salinity front induced by westward advection of cold, saline water from the central-eastern equatorial Pacific encountering a sporadic eastward advection of warm, low-salinity water from the western equatorial Pacific. Convergence zones and fronts are important mechanisms for aggregating plankton and micro-nekton, which, in turn, draw larger predators such as tuna.

The eastward displacement of the warm pool during an ENSO event results in a greater abundance of skipjack and yellowfin tuna in the central Pacific (SPC 1997; Lehodey et al. 1997). Further, ENSO events appear to have a negative impact on recruitment of South Pacific albacore, with poor recruitment following albacore spawning during an ENSO event, and good recruitment following spawnings during *La Niña* periods when the Southern Oscillation Index is strongly positive (SPC 1997).

## 4.2 Description of fishing activities affecting the stock(s) comprising the management unit

For hundreds of years prior to Western contact, and up until the 1950s on the island of Tutuila, and even into the 1970s in the Manu'a Islands, the indigenous residents of these islands pursued skipjack tuna in offshore waters using specialized canoes and gear (Severance and Franco 1989). Other tunas, billfish, wahoo and mahimahi were occasionally caught with baited lines and trolling gear. When the canoes returned from fishing, villagers participated in culturally important ceremonial exchanges involving fish, *kava* and other items.

The advent of outboard motors in the 1950s and 1960s meant that the traditional fishing methods declined in favor of the use of motorized dinghies and skiffs for trolling and handlining. The development of off-shore artisanal fisheries began in earnest during the early 1980s. It was at this time that the FAO-designed *alia* catamaran was introduced into the islands. The number of vessels participating in commercial pelagic and bottomfish fisheries quadrupled between 1980 and 1985. Almost all of the commercial catch of pelagic species was taken by trolling since there were only a few handline vessels and a single 50 ft longliner which targeted albacore and sold its catch to the tuna canneries. Most of the pelagic fishing occurred in coastal waters, near seamounts, where seabird flocks are feeding (thus indicating the presence of baitfish that tuna may also be feeding upon), or at fish aggregating devices (FADs) deployed around Tutuila Island. FADs were introduced to American Samoan coastal waters in 1979 and proved to be a popular way to increase the CPUE of widely dispersed pelagic fish (Craig et al. 1993). FADs attract and retain schools of fish and make it easier for vessels to locate concentrations of tuna.

The extensive use of longline gear by the artisanal fleet in American Samoa is a recent phenomenon, with longline catches rising from zero prior to 1994 to almost 800,000 lbs in 1997. The stimulus for fishermen, who generally used only troll gear or handlines, to shift to longline gear was the fishing success experienced by small longline vessels in Western Samoa. The artisanal longline fleet in American Samoa presently consists mainly of 28-32 ft alia catamarans, although at least one larger (39 ft) alia has been locally constructed and outfitted for longline fishing. The vessels deploy a short monofilament longline with 200-300 hooks from a hand-powered reel. The longlines harvest mainly albacore tuna, which are sold to the local tuna canneries. The use of longline gear requires the acquisition of a federal permit from the NMFS Pacific Islands Area Office, but there no restrictions on the number of permits issued. To date, 40 permits have been issued, although only about 17 vessels are active on a regular basis. Tournament fishing for pelagic species began in the Territory in the 1980s. Most of the boats that participate are *alia* catamarans and small skiffs. Catches from tournaments are often sold, as most of the entrants are local small-scale commercial fishermen. In 1996, three days of tournament fishing contributed about one percent of the total domestic landings. Typically, 7 to 14 local boats carrying 55 to 70 fishermen participate in each tournament, which are held 2 to 5 times per year (Craig et al. 1993). Large-scale commercial longline fishing in what is now the EEZ around American Samoa was initiated by Japanese vessels in the late 1940s. These foreign vessels later supplied albacore tuna to the two canneries established in the Territory by Van Camp Seafood Company and Star-Kist Foods in 1954 and 1963, respectively. From 1950 to 1965 there was a progressive expansion of the area of operations of the longliners from the waters in the immediate vicinity of American Samoa, to more distant waters (Otsu and Sumida 1968; Yoshida 1975). The expansion of fishing area paralleled an increase in fleet size. Between 1954 and 1965 the number of foreign longline vessels off-loading in Pago Pago rose from less than 20 to over 150. In the mid-1960s, the Japanese vessels began to be replaced by Taiwanese and Korean longline vessels as the canneries' major suppliers of albacore. In recent years, the number of foreign longline vessels delivering fish to the canneries has sharply declined, and, presently, only about 40 vessels are based in the Territory. A typical Asian longline vessel is 80-150 ft in length and may set 50-60 nm of mainline with 1,500-2,000 hooks each day (WPRFMC 1995).

Legal fishing by foreign longline vessels in the waters around American Samoa ceased completely in 1980 after the implementation of the pelagic fisheries Preliminary Management Plan for the Western Pacific region, which placed onerous requirements (e.g., permits, fees, observers) on foreign vessels. However, foreign longline vessels occasionally fish illegally in the EEZ around American Samoa. The last incursion documented by the Coast Guard occurred in 1992 and involved a Taiwanese longline vessel fishing near Swain's Island. There is a possibility that legal fishing in the EEZ by foreign vessels may resume under a Pacific Insular Area Fishing Agreement (PIAFA). This agreement would give foreign vessels access to EEZ waters around American Samoa in exchange for a negotiated fee and subject to a variety of permit conditions. As discussed above, the domestic longline fleet based in American Samoa has generally consisted of small vessels. However, during the 1980s one of the largest longliners operating out of Pago Pago was locally-owned. This vessel has since been

scrapped. By 1997, four vessels ranging in length from 65 to 109 ft had located in the Territory and received NMFS longline fishing permits.

US purse seine vessels began exploratory fishing in the central and western Pacific in the late 1970s. The rapid expansion of the fleet during the 1980s coincided with an increase in the volume of skipjack and yellowfin tuna landed at the canneries in American Samoa. The purse seiners commonly measure 200-250 ft in length and are equipped with sophisticated "fish-finding" equipment, including helicopters. The purse seine nets typically capture 15 to 45 metric tons of fish in a single set. Most of the fishing activity by these vessels occurs in the EEZ waters of Papua New Guinea, Federated States of Micronesia and other Pacific island nations far to the west of American Samoa. However, during an ENSO event these vessels may shift their fishing activity to areas in the central Pacific (Section 4.1.3.2), including the upper portion of the EEZ around American Samoa. At present, about 30 purse seiners supply fish to the Pago Pago canneries.

The South Pacific albacore troll fishery, which began in 1986, operates from December through early April, with 20-30 US vessels joining an international fleet (WPRFMC 1995). This high seas fishery operates on dense concentrations of albacore that form along the sub-tropical convergence zone that lies 35-47 S and 170-130 W. Vessels are generally 60-80 ft in length, operating with crews of 3-5, and capable of freezing 45-90 tons of fish.

#### **4.2.2 Domestic Activities**

The artisanal and recreational fishing sector consists of approximately 50 boats. Typically, the boats are double- or single-hulled vessels equipped with outboard engines. Average boat length is 28 ft (Severance et al. 1998). In addition to carrying troll and longline gear to catch pelagic species, many boats are outfitted with wooden handreels that are used for bottomfish fishing as well as for trolling. Approximately 38\* small vessels have received NMFS longline permits, and about 18 of these boats are actively longline fishing.

The technology employed by the artisanal fleet is relatively unsophisticated. Ten percent or less of the boats carry a depth finder, fish finder or global positioning system (Severance et al. 1998). The small vessels equipped for longline fishing store their gear on deck on a hand-powered reel, which can hold as much as 10 nm of monofilament mainline. Typically, the longlines are 3 to 5 nm in length. An average of 214 hooks per vessel per fishing day are set. Most boats leave for the fishing grounds in the early morning and return in the afternoon or early evening. The boats fish up to 25 nm from shore, but effort is mainly concentrated on banks 5 to 10 nm off the southern coast of Tutuila.

Less information is available concerning the locations of troll fishing by the artisanal fleet. Moana (1988) states that trolling is commonly conducted on FADs and seamounts between 3-6 nm from Tutuila. However, he notes that small boats are increasingly traveling to distant off-shore banks and seamounts such as South Bank and Southeast Bank, located about 45 nm from Tutuila. This trend has also been observed by more recent researchers in American Samoa (personal communication Craig Severance, University of Hawaii).

The four large domestic longline vessels now based in Pago Pago are similar in length Check lengths of 4 large vessels (65-109 ft) to domestic Hawaii-based longline vessels and are outfitted with modern electronic equipment for navigation, communications and locating fish. Descriptions of the domestic purse seine vessels and albacore trollers that supply American Samoa's two tuna canneries with fish are provided in Section 4.2.1.2. Between 1992 and 1997, there has been a marked increase in the number of small vessels landing PMUS in American Samoa, although the number is still below the level that existed prior to the 1987 hurricane that damaged or destroyed a large segment of the fleet (Figure 4.3). The level of trolling fishing effort rose markedly between 1993 and 1995 but declined in 1996 (Figure 4.4). The decline in trolling effort coincided with a shift in gear types by small-boat fishermen from trolling to longlining.

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#### 4.2.2.3 Landings

Total landings of PMUS by the small-boat fleet have fluctuated widely due to the effects of hurricanes, entry and exit of highliners and annual variations in fishing effort (Figure

4.5). Catches increased in volume after 1993, initially as a result of an increase in trolling activity and later because of the widespread adoption of longline gear. Harvests of PMUS and other pelagic species doubled between 1996 and 1997. This increase is largely due to increases in the catches of small boats using longline gear. In 1997, the catches of three large domestic longline vessels based in American Samoa accounted for about 16 percent of the total number of pelagic fish caught with longline gear. Most of the longline landings are albacore, with yellowfin tuna, bigeye tuna, blue marlin, mahi mahi and wahoo making up most of the remainder of the catch. In the EEZ around American Samoa albacore is rarely taken by trolling, as it is confined to deeper epipelagic waters at that latitude. The dominant species in the troll catch are skipjack and yellowfin tuna, with smaller but significant quantities of mahi-mahi, blue marlin, wahoo and dogtooth tuna (Figure 4.6).

Domestic purse seine vessels operating in the central and western Pacific are not required to report catches made in the US EEZ. However, these boats often do so, using report forms provided under the Treaty on Fisheries (Section 3.5.7). According to these reports, six US purse seine vessels made seven sets within the EEZ around American Samoa between 1988 and 1997. The total catch from these sets was 46 metric tons of skipjack tuna. Four of these seven sets were made in 1994 by three vessels. All seven sets were made by vessels that recorded "searching" while transiting the EEZ around the Territory. There is no information available on domestic purse seine catches in the EEZ around American Samoa prior to 1988.

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#### 4.3 Description of economic characteristics

The economic performance of the small-boat fleet has improved dramatically in recent years. Despite a slight decrease in the price of tuna and other PMUS, revenues from harvests of PMUS and other pelagic species doubled between 1996 and 1997 (Figure 4.7). The increased catches are largely due to the adoption of longline gear by small boats.

Table 4.4 provides estimates of average gross and net revenue and fixed and variable costs for small boats using longline gear. Estimates of operating costs are based on a 1997 NMFS survey of *alia* vessels in American Samoa, and capital costs were estimated using information provided by Chapman (1998). Average trip revenues are derived from estimates of current effort, catch rates and average ex-vessel prices reported in WPRFMC (1998).

Table 4.4. Average annual gross and net revenue (before labor costs and taxes) and fixed and variable costs for a 28 ft *alia* catamaran using longline gear in American Samoa pelagics fishery

#### Annual Revenue

Number of fishing trips per year: 100 (average trip length is 7.6 hrs)

Number of hooks set per trip: 214

Catch per trip (lbs): Tuna - 300; Other PMUS - 50; Misc. fish - 5

Price per pound (\$): Tuna - 1.06; Other PMUS - 1.40; Misc. fish - 1.44

#### Total Revenue \$39,520

#### **Required Capital**

Vessel <sup>1</sup>	13,000
Engine	7,000
Fishing gear (longline)	3,000
Radio	200
Safety	1,000
Total Required Capital	24,200

Fixed Costs		<u>Variable</u> <u>Costs</u>	
Debt service <sup>2</sup>	3,748	Fuel and oil	3,350
Insurance (5%)	1,210	Provisions	2,400
Maintenance and repair	1,500	Bait	10,300
Depreciation <sup>3</sup>	2,057		
Miscellaneous (permit, etc.)	35		
Subtotal	8,550	Subtotal	16,050
	Total Costs \$	24.600	

#### Net Revenue \$14,920

<sup>1</sup>28-ft alia catamaran constructed in American Samoa or Western Samoa

<sup>2</sup> Debt service assumed to occur over a 10-year period, with a 15% annual interest rate and 20% down payment

<sup>3</sup> Depreciation calculated on a straight line, 15% salvage basis, assuming a vessel life span of 10 years

It is estimated that in 1997 the average *alia* catamaran equipped with longline gear earned a net revenue (before labor costs and taxes) of about \$15,000. Factors such as experience and skill level impact directly both revenues and costs, and there is undoubtedly a high variability across boats in the values of parameters. The costearnings analysis did not include a labor cost or identify how expenses, revenues and profits are shared among crew, captain and owner. Some owners pay each crew member a flat salary, while others pay the crew a percentage of the revenues after certain expenses have been deducted.

Catch composition and marketing strategy have a major influence on vessel earnings in American Samoa where local fresh fish markets and cannery tuna markets operate with different price structures. The most lucrative tuna fishing operations in the Pacific islands at present are those producing high-grade, fresh tuna. The ex-vessel price for premium-quality fresh fish is as high as \$4.75 per pound in American Samoa as compared to the \$1.06 per pound that the canneries pay. There is interest among many American Samoans in producing fish for this market, but limited on-board capacity for properly handling and storing fish, inadequate shore-side cold storage facilities and infrequent air transportation links are restrictive factors. If such constraints can be overcome, the profitability of artisanal fishing operations would increase substantially (Section 4.3.2).

Most of the albacore tuna landed by the artisanal fishery are sold to industrial processing plants, while the other PMUS are sold fresh or fresh on ice in local markets. The development of a cottage export industry would expand market channels. However, a main limitation for fish exports is the shortage of cold storage and freezing facilities. This is a major hindrance because of the difficulty of storing the fish until it can be transported by the infrequent air links to Hawaii or other large export markets. A second constraint is that few fishermen have adopted the proper post-harvest handling and processing techniques that are essential for developing export markets. On-board post-harvest handling is generally poor due to the inability of the 28 ft *alia* catamarans to carry adequate quantities of ice. Local fishermen are interested in acquiring larger boats that have a greater fishing range and chilling capacity. For example, a 39 ft *alia* catamaran has recently been constructed in Pago Pago that can carry sufficient ice to maintain good fish quality.

As noted above, the recent adoption of longline gear by the small-boat fleet has opened up a new lucrative fishery for large yellowfin, bigeye and albacore tuna. The increased harvests of these species has stimulated local entrepreneurial activity in fishing-related businesses, including boat-builders, ice and cold storage facilities, marine supplies and fish brokerages. If the constraints outlined above can be overcome, economic returns and export earnings within the fishing industry in American Samoa can be improved. The Council is currently assisting local fishermen and the Territorial government in identifying and implementing appropriate projects to increase production efficiency (while protecting the natural resource base) and develop new product markets. One source of funding for such projects will be the Western Pacific Fishery Demonstration Projects. This grants program was included in the Magnuson-Stevens Act to address concerns that communities consisting of descendants of indigenous peoples in the Council's area have not been appropriately sharing in the benefits from the region's fisheries. The Act authorizes the Secretary of Commerce and the Secretary of the Interior to make direct grants to "Western Pacific communities," as defined in section 305(i)(2)(A), for the purpose of establishing demonstration projects to foster and promote the involvement of eligible communities in the fisheries of the region. American Samoa is an unincorporated Territory of the US consisting of the islands of Tutuila, Swain's and the Manu'a group (Ofu, Olosega and Ta'u) and Rose Atoll. The total land area is 77 square miles. The Territory's population is about 60,000 and is growing rapidly, with a doubling time of only 20 years. Most of the islands are mountainous with limited flat land suitable for agriculture. The two major employers are the tuna processing industry and the Territorial government, which employ 33 percent and 31 percent of the labor force, respectively. For many years the tuna canneries have been the largest private -sector employers in American Samoa and its leading exporters. However, the majority of cannery employees are individuals from Western Samoa with work permits (Schug and Galea'i 1987). The single largest employer of American Samoans is the Territorial government, which is facing mounting debts and a major budget deficit. In recent years, Federal financial assistance to the government has declined. Consequently, the number of jobs available in the Territorial government is decreasing (Department of Commerce 1998). The shortage of jobs has led to heavy out-migration of American Samoans to the United States.

Like most other Pacific islands, American Samoa views pelagic fish stocks as a resource which is not yet fully exploited, and the pelagic fishing industry is actively promoted by the government as a growth industry. Stocks of pelagic species offer far greater resource potential than deep-slope bottomfish or inshore fish stocks. Inshore resources are heavily exploited or over-exploited in most areas of American Samoa (Wass 1980; Saucerman 1995). The exploitation of the slow growing, deep-water snappers in American Samoa is limited by the low standing stock of the resource (Itano 1996).

Developing tuna harvesting and marketing capability sufficient to support substantial participation in pelagic fisheries will expand and diversify the local economy and help the Territory attain a higher level of economic self-sufficiency. Government projects such as the deployment of FADs have contributed significantly to increased production in these fisheries. However, the development of the local fish harvesting sector has been constrained by a shortage of private capital and, to some extent, by the economic preferences and social values of local fishermen. The median household income in the Territory is \$16,114, and 56 percent of families have incomes below the federal poverty level (Department of Commerce 1998). Most residents interested in commercial fishing do not have sufficient financial resources to invest in specialized, capital intensive vessels that consume large amounts of fuel to pursue and harvest fish. In addition, most, if not all of the fishermen in American Samoa do not rely on the sale of their catch as their only means of income. According to a recent survey, 65 percent of local fishermen are employed at another job (Severance et al. 1998). Furthermore, all Samoans have undeniable commitments to their families, villages, church, elders and chiefs that take them away from their regular employment a great deal of the time (Itano 1996). Undertaking fishing on a part-time basis, rather than as a full-time business, provides local residents with the flexibility to fulfill these kinship and community obligations that are an essential element of Samoan culture.

Over the past three decades, American Samoa has experienced several fishery development programs aimed at the creation of sustainable, economically viable artisanal fishing enterprises (Itano 1996). In general, local fishermen have demonstrated a willingness to adopt new types of fishing gear and methods that have increased catching power and efficiency. A suitable style of boat is now in use and an appropriate harvesting technology has been adopted (Itano 1996). The outboard powered vessels that fishermen favor are easily built and maintained and capable of harvesting multiple target species utilizing a variety of gear types. According to an early report on fisheries development in the American Pacific islands, this flexibility is essential in establishing commercially-viable fisheries in the region (PBDC 1984). Furthermore, the technologies and patterns of fishing that have evolved over the years are culturally acceptable as well as economically reasonable for local artisanal fishermen.

For hundreds, if not thousands, of years fisheries have been of considerable economic and social importance to the people of what is today American Samoa. The narrow shelf around the main islands of American Samoa and the lack of shallow productive lagoon waters has meant that fishing off-shore for pelagic fish has been particularly important. Severance and Franco (1989) and Severance et al. (1998) documented the traditional importance of fishing for large pelagics, particularly skipjack tuna, and the technology and skills developed by Samoans to catch these fish. This included special canoes (*va'a alo*) designed for lightness and speed which could follow tuna schools, and tuna hooks made from mother-of-pearl and turtle shell. In the past, fishermen in canoes might fish as far as 30 miles from shore when following tuna schools. Other tunas, billfish, wahoo and mahimahi were occasionally caught with baited lines and trolling gear.

The methods and equipment for catching skipjack and other pelagic species have changed, and island residents no longer depend on their catches for food. However, seafood continues to be an integral part of the local diet. There has been no recent attempt to formally assess the subsistence fishing contribution to the American Samoa economy, but subsistence fishing is known to be an important supplement to cash income in many communities in the Territory (Severance et al. 1998).

In addition, fishing continues to contribute to the integrity of Samoan culture which is organized around a complex web of family, kinship and village expectations and obligations. Participation in commercial activities, wage labor and a cash economy has not weakened these expectations so much as it has allowed new opportunities for customary exchange of goods and services, both formally and informally, through kinship and friendship networks. Individual Samoans participate as members of extended families or *aiga* that share resources and responsibilities. Each *aiga* is headed by a titled "chief" or *matai* who is the decision-maker and spokes-person for the family in many matters of village life. Untitled men and women of the village have many obligations for service and are expected to contribute goods (including fish), cash and labor to important village ceremonies ranging from holidays to weddings and title investitures.

These customary gifts and exchanges influence a significant portion of fishing effort, and even commercial fishermen are expected to fish when village ceremonies are pending and to be generous in sharing their catch. Some keep fish in freezers with the expectation that they may be called upon by their *matai* or by higher ranking chiefs of their village or district to provide fish for cultural purposes. While reef fish and bottomfish are acceptable offerings, yellowfin and skipjack tuna are preferred. At times, tuna are ceremonially cut up for formal presentation to the *matai* and village pastor (Severance and Franco 1989).

Severance et al. (1998) recently conducted a survey of fishermen in American Samoa who fish for pelagic species. The 60 fishermen interviewed represent about 50% of the total active fishermen in the Territory. Thirty-five percent of the fishermen surveyed reported that they sell less than half of their catch. Forty percent of these fishermen also reported that half or more of the catch that they sold was done so as *fa'ataulofa*, that is, sold at a reduced price to friends or kinsmen as an expression of a sustained social relationship.

The survey examined the cultural importance of the distribution of the unsold portion of the catch. The average number of times during the past year that individual fishermen contributed fish to Sunday village meetings was 22. Nineteen percent of the fishermen surveyed reported that half or more of their catch was contributed to a matai as a form of tautua, that is, service to the kin group. This service is expected of untitled men if they are to rise in status and perhaps achieve a *matai* title themselves. Twenty-five percent of the fishermen surveyed already hold *matai* titles, but they may be obligated to contribute fish to the village pastor or to a higher-ranked individual. Another form of obligatory contribution takes the form of assistance to kinsmen in times of need known as fa'alavelave. Forty-two percent of the fishermen surveyed reported contributing fish as fa'alavelave three or more times during the past year. A more individualized way of assisting kinsmen is referred to as *fesoasoani*. Thirty-two percent of the fishermen stated that half or more of the unsold portion of their catch was offered as *fesoasoani*. In summary, despite increasing commercialization of the catch, fishing continues to contribute to the cultural integrity and social cohesion of American Samoa communities. Over time, local communities developed a close emotional as well as utilitarian association with the marine environment. It shaped their social organization, cultural values and religion. Of course, many aspects of Samoan culture have changed; but fishing remains an important cultural practice for many communities. These sociocultural attributes of fishing are at least as important as the contributions made to the nutritional or economic well-being of island residents.

Below is a summary of the environmental assessment (EA), certain components of which appear in various sections of this document. The relevant sections are listed in parentheses.

a) The rule is expected to support the long-term productivity of pelagic stocks (Section 3.5.2).

b) The rule will have no adverse impact on ocean and coastal habitats.

c) The rule is not expected to have any impact on public health or safety (Section 3.5.5).

d) The rule will not directly affect any endangered or threatened species.

e) The rule will not result in cumulative, long-term, adverse impacts that could substantially affect pelagic species (Section 3.5.2).

f) The rule is not expected to generate controversy in terms of whether or not it will significantly affect the quality of the human environment.

g) The rule will not have any effect upon flood plains or wetlands, nor upon any trails and rivers listed, or eligible for listing, on the National Trails and Nationwide Inventory of Rivers. Based on the information contained in this combined amendment and EA, it is concluded that this rule will not have a significant effect on the human environment. Therefore, the preparation of an environmental impact statement is not required. The Paperwork Reduction Act requires federal agencies to minimize paperwork and reporting burdens whenever collecting information form the public. No additional record-keeping and reporting requirements are necessary to implement this rule. **Act** 

Section 307(c)(1) of the Coastal Zone Management Act of 1972 requires all Federal activities which directly affect the coastal zone be consistent with approved state coastal zone management programs to the maximum extent practicable.

The rule will have any effect on any listed endangered or threatened species, or habitat of those species.

All fisheries in the Western Pacific region are designated as Category 3, meaning that fishermen must report interactions with marine mammals, but they are not required to obtain exemption certificates in order to fish. This rule does not require a MMPA category redesignation for the pelagics fishery off American Samoa.

The problems to be resolved by this rule are described in Section 2.1.

The objectives of this rule are described in Section 2.3.

The approximate numbers of fishing boats of different types that could potentially be affected by this rule are as follows:

Small (<50 ft LOA) troll and longline vessels 51

Large (>50 ft LOA) longline vessels 3

Large (>50 ft LOA) purse seine vessels 32

Large (>50 ft LOA) albacore troll vessels 20

A description of the fishing operations of these different types of vessels is provided in Section 4.2. Except for the purse seine vessels, all of these vessels are likely to have annual receipts of less than \$3 million, and, therefore, they meet the Small Business Administration's criterion for a small commercial fishing firm. The annual revenue of some purse seine vessels may exceed \$3 million.

Small entities will not be subject to any new reporting or record-keeping requirements by this action. Compliance will be affected under the rule in that operators of large fishing vessels that are not exempted from the rule will be required to modify operations to comply with the area closure (Section 2.6.2). There are no exemptions from coverage of the regulation for small entities per se, nor does an analysis of performance rather than design standards apply.

The rule should have a beneficial effect on small-scale commercial fishing enterprises in American Samoa. By limiting the risk of interceptions of pelagic management unit species (PMUS) in the EEZ, the area closure will maximize the potential for increased small boat catches and increased artisanal, subsistence and recreational fishing values in the Territory. In addition, by fostering and promoting the development of the small-boat fishery, the rule will have a positive economic impact on those small businesses in American Samoa linked to the small-boat fishing fleet such as boat building.

The negative economic effect on the domestic purse seine or albacore troll fleets should be negligible. Almost all of the fishing activity of these vessels occurs outside the EEZ around American Samoa (Section 4.3.1.2). According to catch reports compiled by NMFS, six US purse seine vessels made seven sets within the EEZ around American Samoa between 1988 and 1997. The total catch from these sets was 46 metric tons of skipjack tuna. The average annual catch of skipjack of a US purse seine vessel operating in the central and western Pacific from 1990 to 1997 was 3,161 mt (SPC 1998). Therefore, even if the total 46 mt of fish caught in the EEZ around American Samoa was landed by a single vessel, it would represent only about 1.5 percent of the average annual catch of a purse seiner.

There are no reported catches of tuna within the EEZ around American Samoa by albacore troll vessels. According to a representative of the albacore troll fleet, these vessels seldom, if ever, fish in the EEZ around the Territory (Wayne Heikkila, Western Fishboat Owners Association, pers. comm.). In summary, the area closure is not expected to cause the operating expenses of either purse seine or albacore troll vessels to increase substantially nor will it significantly reduce their total catches and revenues. The Council recognizes that this rule could impose an economic hardship on the three large domestic longline vessels that are currently based in American Samoa, as much of the past fishing activity of these boats inside the US EEZ has occurred within the area that will be closed to fishing by vessels larger than 50 ft. Therefore, the Council recommended that any vessel that is greater than 50 ft in length and holds a NMFS longline permit on or prior to November 13, 1997 and made a landing of pelagic management unit species in American Samoa on or prior to that date be exempt from the prohibition to take PMUS within the closed area.

Other large vessels, including a number of purse seiners, have also fished for pelagic species within 100 nm of the islands of American Samoa. However, the Council did not consider it appropriate to grant these vessels exemptions, as the amount of fish caught by the vessels within the 100-nm area has historically been a negligible fraction of their total catch.

A closed area could potentially result in lost fishing opportunities for large longline vessels currently based in Hawaii or the continental US. However, given the lack of information on the probability that these vessels will relocate in American Samoa, any attempt to estimate the costs associated with these lost fishing opportunities would be inconclusive. To the extent that a closed area will result in lost fishing opportunities for these longline boats, a 50/30-nm are closure would be expected to have a less adverse effect than a 100-nm area closure.

This rule may discourage residents of American Samoa from purchasing or constructing additional large longline vessels. Such vessels may be profitable investments; a larger vessel is faster than a small one, has a greater fishing range and can fish year round. However, in American Samoa there is a shortage of private sector capital to purchase large fishing vessels and an excess of labor. In these circumstances it is likely that American Samoans can benefit more from local ownership of less-expensive boats that provide greater employment opportunities. A cost-earnings analysis provided in Section 4.3.1 of this document indicates that a fishing enterprise using a typical 28 ft *alia* catamaran is a viable economic alternative for American Samoa. This data, coupled with estimates of local per capita income, suggest that the capital investment required to enter the fishery is within the financial reach of the typical American Samoan household. In summary, the Council concluded that limiting the risk of interceptions of PMUS in the EEZ by establishing a 100-nm closed area will maximize the potential for increased small boat catches and increased artisanal, subsistence and recreational fishing values

in the Territory without significantly decreasing the catches of larger vessels targeting pelagic fish. The total potential benefits that the small-boat fleet in American Samoa may receive from an area closure may be substantial, while the potential costs that may be imposed on those large vessels excluded are likely to be low.

The Council recognizes that as information on the economic and social impact of the area closure becomes available, modification of the closure may be desirable. A comprehensive evaluation of the effectiveness and impacts of the closed area will be made each year after implementation of this rule. During the evaluation the views and opinions of representatives of all sectors of the fishing industry in American Samoa will be solicited.

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Figure 3.1. Boundaries of the existing area within the EEZ around American Samoa that is closed to fishing by foreign longline vessels

Figure 3.2. Boundaries of a closed area approximately 50 nm around Tutuila Island, Rose Atoll and the Manu'a Islands, and approximately 30 nm around Swain's Island Figure 3.3. Boundaries of a closed area approximately 100 nm around Tutuila Island, Rose Atoll, the Manu'a Islands and Swain's Island

Figure 3.4 Approximate fishing area of *alia* catamarans equipped with longline gear (dashed line), large (>50 ft) domestic longline vessels (solid line) and purse seine vessels (dotted line) within the EEZ around AMerican Samoa (Source: NMFS Honolulu Laboratory)