within the EEZ is also poorly understood. Furthermore, there is controversy over the unknown degree of adverse effect a NWHI precious coral fishery would have on populations of endangered Hawaiian monk seal. Monk seals have been observed preying on eels found among precious coral colonies. The importance of eels found among precious coral colonies in the monk seal diet is poorly understood

4.6. Indigenous Programs

Indigenous cultures in the Western Pacific developed in isolation over long periods of time. The earliest evidence of settlement in Samoa dates to 3,600 years ago, in Guam and the Mariana Islands to 3,100 years ago, and in Hawaii 1,700 years ago. These earliest travelers brought a suite of traditions and beliefs that supported an island lifestyle—an oceanic culture dependent on the oceanic environment to meet their nutritional and other needs. Wise natural resource management ensured survival of the culture. These values continue to be nurtured and encouraged by the Council through its indigenous program, which seeks to address the right of the aboriginal people of the US Western Pacific to demonstrate and exercise their traditional and customary practices.

The 1996 re-authorization of the Magnuson-Stevens Act confirms these unique characteristics by stating, *"Pacific Island Areas contain unique historical, cultural, legal, political, and geographical circumstances which make fisheries resources important in sustaining their economic growth."* New provisions contained within the Act allow for establishment of Western Pacific Community Demonstration Projects, Community Development Programs and Pacific Islands Area (foreign) Fishery Agreements (PIAFA).

The goals of the Demonstration and Development Programs are to provide greater access for native communities to their fishery resources. In addition to providing greater access, capacity is now being developed in native communities to use federal programs effectively and efficiently to advance their customary, traditional and cultural practices. Grant writing, project planning and monitoring, and community organizing and mobilization are skills now being fostered.

The Magnuson-Stevens Act recognizes that the US territories and commonwealth in the Western Pacific Region have little in the way of economic opportunities, compared to the mainland. Consequently, the Act permits territorial and commonwealth governments to request that the Department of State enter into negotiations with DWFNs wishing to fish in EEZ waters around American Samoa, Guam and the Northern Mariana Islands to develop PIAFAs. A unique feature of the PIAFA arrangement is that all the revenues from the fishing agreement, including fines and penalties, accrue to the territorial government.

5. PRIORITIES FOR THE FUTURE

5.1. International Management

The Western Pacific Council's role in the multilateral management of the highly migratory pelagic stocks in the EEZ and adjacent high seas of the Western Pacific Region has been significant and is likely to increase in the future.

The Western Pacific Council assisted in hosting four of the Multilateral High-Level Conferences (MHLCs) in Honolulu, which led towards the establishment of the Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Central and Western Pacific Region (Western and Central Pacific Fisheries Convention). Developed to be consistent with the 1982 United Nations Convention on the Law of the Sea and follow the framework of the United Nations Implementing Agreement, this Convention was adopted on September 4, 2000, to establish a regional mechanism for the conservation and management of highly migratory fish stocks in the central and western Pacific Ocean. The Convention provides for the establishment of an international fishery commission to implement the provisions of the Convention. The Council participates in Preparatory Conference meetings, convened to lay the groundwork to establish the Commission. Specifically the Preparatory Conference is to establish the organizational and financial framework for the new Commission and its subsidiary bodies, as well as facilitate the future work of the Commission. It is to begin the process of collecting and analyzing data on the status of the fish stocks and, if necessary, recommend conservation and management measures. The Preparatory Conference will continue until the Convention enters into force in late 2004. The Convention applies to all species of highly migratory fish stocks within the Convention Area (defined as all fish stocks of the species listed in Annex I of the 1982 Convention occurring in the Convention Area and such other species of fish as the Commission may determine). Conservation and management measures under the Convention are to be applied throughout the range of the stocks or to specific areas within the Convention Area, as determined by the Commission. The

Apart from Hawaii, Guam, the Northern Mariana Islands and American Samoa there are a further 18 nations and territories in the western Pacific, each with an EEZ and with different political affiliations.

The 14 independent Pacific Island nations are members of the South Pacific Forum, which also includes Australia and New Zealand. The secretariat for the Forum is based in Fiji, with its fisheries administration, the Forum Fisheries Agency (FFA) in the Solomon Islands. The FFA was established to negotiate access agreements by foreign fleets for the Forum member countries, to

administer the revenues accruing from these agreements, and to provide a platform for managing tuna fisheries in the EEZs of member countries. Forum member countries and other Pacific Islands may also negotiate bilateral agreements for access to their EEZ waters.

The FFA countries plus the US flag territories, French territories and the UK territory of the Pitcairn Islands, together with membership by Australia, New Zealand, France and the US, form the South Pacific Conference. The Conference secretariat is the Secretariat of the Pacific Community (SPC), a technical, research and development assistance organization based in New Caledonia. The SPC's Oceanic Fisheries Programme (OFP) conducts research and monitoring of highly migratory pelagic fisheries and publishes regular summaries of the catches of different domestic and DWFN tuna fishing fleets the western Pacific. The OFP has also been the lead agency for tuna stock assessment and biological research in the western Pacific region for the past 20 years, conducting major tagging projects on the three tropical tunas and on albacore. Recent developments within the OFP include an observer project to monitor catches and deployment of in-country port samplers throughout the Pacific. The Standing Committee on Tuna and Billfish was originally established by the OFP to direct its work program, but was decoupled from the OFP in 1996, so it could provide advice to the emerging management commission being developed by the MHLC process. The OFP continues to provide the secretariat for the meeting with the chair rotating between member countries. The OFP has several research groups; the Western Pacific Council's senior scientist chairs the Billfish and Bycatch Research Group.

Pelagic fisheries management requires the Council to interact frequently with both the FFA and SPC, and staff members from both organizations have been or are currently members of the Western Pacific Council's Scientific and Statistical Committee and Plan Teams.

There are several tuna fishing fleets in the western Pacific, such as pole-and-line boats in the Solomon Islands and Fiji, and a number of small but expanding longline fleets in countries such as Tonga, Fiji and the FSM. Most of the commercial landings of tuna in the western Pacific, however, are currently taken by purse seine and longline fleets from metropolitan countries on the Pacific rim, namely the United States, Japan, Korea, Taiwan, Philippines and the Republic of China, i.e., the DWFNs (Figure 5).

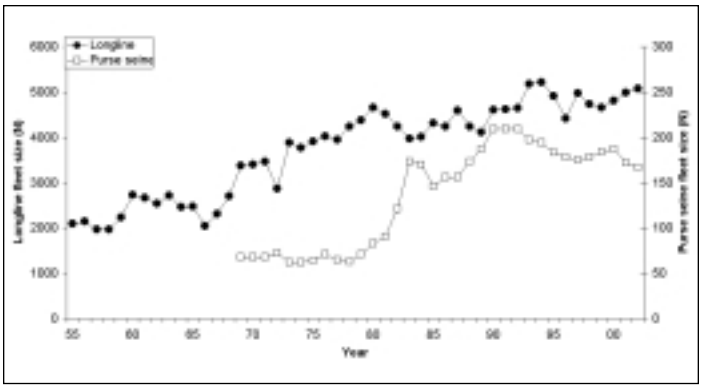

Figure 5.
Growth of longline and purse seine fleets in the Central and Western Pacific, 1955-2000.

DWFNs such as Japan, Taiwan and the Philippines also conduct their own research and monitoring on tuna catches with the western Pacific and contiguous Southeast Asian and East Asian waters. The management of Pacific tuna and other highly migratory species is complex at the international level and involves a number of different agencies within the region. The complexity becomes more labyrinthine since the Melanesian Island of Vanuatu is also a member of the body that manages tuna in the Eastern Pacific, the Inter-American Tropical Tuna Commission, due to flag-of-convenience registration of Eastern Pacific purse seiners. The Western Pacific Council is, however, in a prime position to lead US pelagic fisheries management in the western and central Pacific through regular interaction with the various countries and organizations involved in the region's pelagic fisheries.

The Council has also been active in a broader ecological sense in the international arena, because of its interest in protected species management. It hosted a major international workshop on black-footed albatross population dynamics in 1998 and a major regional research and management workshop for turtles in the central and western Pacific in 2002. The Council has also entered into a formal arrangement with the South Pacific Regional Environment Programme (SPREP) to build in-house capacity for sea turtle conservation activities. SPREP is a regional organization established under the auspices of the United Nations Environmental Program. It draws its membership from the governments and administrations of the Pacific region and is based in Apia, Samoa. The Council is also developing similar linkages with the Southeast Asian Fisheries Development Center (SEAFDEC) and its turtle conservation program. SEAFDEC is one of the agencies serving Southeast Asia under the umbrella of the Association of Southeast Asian Nations.

The Western Pacific Council has assisted in hosting several international meetings, including the Second International Fishers Forum in 2002, an international series of meeting for longline fishermen on minimizing seabird and sea turtle bycatch in longline fisheries, and in 2000, an international conference on marine debris, a large volume of which originates from fishing activity by domestic and foreign trawlers in the North Pacific

5.2. Bycatch of Protected Species – Longline Fisheries

The monk seal (*Monachus schauinslandi*) is a tropical seal in the Hawaiian Islands. About 1,200– 1,450 seals are confined mostly to the NWHI, but a population of seals in the MHI is growing. The species was designated as depleted under the Marine Mammal Protection Act in 1976, following a 50% decline in beach counts from the late 1950s and mid 1970s. This species was also listed as endangered under the Endangered Species Act in 1976. Critical habitat for monk seals was designated in 1988 from beaches to a depth of 20 fathoms (121 ft, 37m) around breeding islands and at Maro Reef.

Evidence of interactions between seals and the longline fishery began to accumulate in 1990, including three hooked seals and 13 unusual seal wounds thought to have resulted from interactions. In October 1991, the Council established a permanent Protected Species Zone, where pelagic and demersal longline fishing is prohibited, extending 50 nm around the NWHI and including a 100-mile-wide corridor connecting the islands. Subsequent shore-based observations of seals and observer records suggest that interactions ceased after establishment of the Protected Species Zone.

Available estimates for total albatross mortality in North Pacific pelagic longline fisheries, along with population modeling experiments on the black-footed albatross, highlight the concern that mortality in longline fisheries threatens the existence of black-footed albatrosses and may pose a significant threat to the other North Pacific albatross species. In the past, Hawaii pelagic longline fisheries resulted in the annual mortality of approximately 3,000 Laysan (*Phoebastria immutabilis*) and black-footed (*P. nigripes*) albatrosses. However, changes in regulations have significantly reduced the fleet's albatross bycatch. As a result of these changes to the Hawaii longline fleet, the annual seabird mortality in the Hawaii longline fishery is currently estimated to be an order of magnitude lower than previous levels. However, the mortality of albatrosses in the North may not have been fully resolved because much of the former Hawaii-based swordfish fleet relocated to ports based in California where there is relatively low observer coverage, no seabird mitigation requirements and possibly higher rates of black-footed albatrosses mortality due to the higher abundance of this species at the fishing grounds where the fleet relocated, further to the east.

Since the adoption of regulations designed to reduce seabird interactions in the Hawaii longline fleet, new cooperative research has been conducted in Hawaii longline fisheries on methods designed to minimize seabird capture, and some of the tested seabird mitigation methods show significant promise for both nearly eliminating seabird mortality and being commercially viable.

Available but limited information implies that cumulative sea turtle mortality in pelagic longline fisheries is a significant source of mortality of some Pacific and Atlantic populations of loggerhead and leatherback sea turtles. As is the case for seabirds and is expected for long-lived species with low adult mortality rates and delayed maturity, sea turtles are not expected to be able to sustain significant increases in adult or juvenile mortality above natural levels. Only limited quantitative information on interactions between sea turtles and longline fisheries is available, and there is insufficient information to enable modeling of most sea turtle populations due to large gaps in understanding of the biology and ecology of sea turtles.

In the Pacific, loggerheads (*Caretta caretta*), leatherbacks (*Dermochelys coriacea*) and olive ridleys (*Lepidochelys olivacea*) are taken by pelagic longline vessels, potentially contributing to declines in some populations. Green turtles are also caught in Pacific Ocean pelagic longline fisheries, but in relatively low numbers.

Between 1994 and 1999 in the Hawaii-based longline fishery, there were 0.069 turtle interactions per 1,000 hooks. These estimates, however, were based on low onboard observer coverage averaging 4.3% of trips. Recent changes in regulations due to concerns over mortality of sea turtles closed the Hawaii swordfish fishery, placed restrictions on the tuna fleet, increased observer coverage to 20% and have significantly changed the Hawaii fleet's effort, spatial distribution of effort and amount of turtle bycatch. Turtle bycatch has decreased to 0.002 turtles captures per 1,000 hooks, which is an approximately 90% reduction from previous levels in the Hawaii longline fleet. As noted previously, however, an August 31, 2003, judgment (as amended on October 6, 2003) by the federal district court for the District of Columbia vacated regulations promulgated in 2002, implementing a 2001 NMFS Biological Opinion, designed to reduce interactions between Hawaii pelagic longline fishing gear and sea turtles, but stays its mandate by leaving these regulations in effect until NOAA Fisheries develops replacement regulations by April 1, 2004.

Genetic evidence suggests that sea turtle populations most likely to be affected by the Hawaii longline fishery include juvenile loggerheads originating from nesting aggregations in Japan; adult leatherbacks originating primarily from western Pacific nesting aggregation from Indonesia, the Solomon Islands and Papua New Guinea, with a minor component from the eastern Pacific (Mexico and Costa Rica); olive ridleys originating primarily from the eastern Pacific, with a smaller component from the western Pacific; and green turtles from the eastern Pacific with a smaller component from Hawaii.

The Hawaii longline fleet is a small component of total pelagic and demersal longline fishing effort in the North Pacific and represents about 2.7% of the longline hooks deployed in the entire Pacific Ocean each year. The US pelagic longline fleet contributed 13%–21% of the hooks deployed during 1994–2000 within areas of occurrence of the Laysan and black-footed albatrosses and accounted for 10% of the total catch of Pacific pelagic species. In 2001 the number of active pelagic longline vessels in the western and central Pacific Ocean included 104 from China; 1,386 from Japan (combined coastal, distant-water and offshore fleets); 176 from Korea; 1,797 from Taiwan (distant-water and offshore); and 90 from Hawaii. Most of the catch and effort in terms of number of hooks set by pelagic longline vessels in the western and central Pacific region is by the large-vessel, distant-water fleets of Japan, Korea and Taiwan. Distant-water vessels from China have recently entered the fishery, a longline fishery in Vietnam has been developing rapidly. The Hawaii pelagic longline fleet comprises roughly 3% of the total pelagic longline vessels operating in the western and central Pacific

Ocean region (where fishing grounds overlap sea turtles) and roughly 5% of the total effort in terms of number of hooks set per year in this area.

Research on Hawaii-based longliners by the Council, NMFS and the fishing industry has developed an array of methods for mitigating longline-seabird interactions. Recent trials with a new side-setting longline technique have shown that seabird interactions can be reduced to almost zero. The Council has recently recommended the establishment of a model swordfish longline fishery to conduct trials with sea turtle mitigation technology developed by NMFS in the Atlantic. This new method of fishing employs 18.0 circle hooks and mackerel bait, which in the Atlantic reduced loggerhead turtle interactions by 92% and with leatherback turtles by 97%. The model fishery will also offer further opportunities to test turtle mitigation technology, and to serve as a demonstration of environmentally responsible longline fishing for foreign longline fleets that fish in the Pacific.

5.3. Ecosystem-Based Management

In 1996, NMFS convened the Ecosystem Principles Advisory Panel (EPAP) to assess the extent to which ecosystem principles are used in fisheries management and research and to recommend how such principles can be further implemented to improve management of US living marine resources. Based on the recommendations from the EPAP, the Western Pacific Council integrated many of the basic principles and policies of ecosystem-based fisheries management into its Fishery Management Plan for Coral Reef Ecosystems. The Council recognizes that the Coral Reef Ecosystems FMP represents just the first step in developing Fishery Ecosystem Plans as recommended by the EPAP. The Council also acknowledges that the complexities involved in ecosystem-based management will require years of research, development and understanding of ecological systems that produce and support fishery resources.

To begin working toward incorporating ecosystem-based management principles into all FMPs and development of true Fishery Ecosystem Plans, the Council will convene an Ecosystem-based Management Workshop next year to explore this complex approach to fisheries management. Of immediate importance is gaining an understanding of the relationship between managing fisheries on an ecosystem and trophic interaction levels rather than managing fisheries by traditional single species management approaches. An initial approach will be to consider the fishery resources managed by the Council broadly split between those confined to the island archipelagoes that comprise the Western Pacific Region and the highly migratory species that range across the pelagic ecosystem of the Pacific Ocean. It is also of equal importance to understand the implications of ecosystem-based management in light of the National Standards required by the Magnuson-Stevens Fishery Conservation and Management Act. Recognizing that ecosystems are neither static n or predictable, the basic tenants of ecosystem-based management must be founded on an adaptive management approach.

5.4. Access by Indigenous Communities

The Western Pacific Council will continue to focus on providing adequate access to marine resources by indigenous communities in the US Pacific islands. The Council's Indigenous Program seeks to establish the legal, scientific and historical bases to justify preference rights for Native Hawaiians, Samoans, Chamorros and Carolinians in the Council's geographic area of authority. The Council will continue to develop and strengthen support for preference rights of the indigenous people of the US Pacific islands to provide opportunity and access for the native people in fisheries. In addition, there is growing interest in investigating contemporary applications of traditional conservation methods used by indigenous Pacific islanders. The Council sees an opportunity to accommodate this growing interest through the Council process and will continue to work with Congress to recognize indigenous fishing rights and increase the benefits that indigenous peoples derive from fisheries.

5.5. Stock Assessments

The Western Pacific Council has placed a major focus on conducting stock assessments to implement the new biomass-based overfishing control rules. The Council will hold a Bottomfish Stock Assessment Workshop in January 2004 and a Coral Reef Stock Assessment Workshop in February 2004 to initiate this new priority. A stock assessment for striped marlin is expected by early 2004, and region-wide stock assessments of mahimahi, wahoo, opah and pomfret species are priorities for the future.

6. CONCLUSIONS

The fisheries in the Western Pacific Region are unique compared to other US fisheries. The physical differences are striking, as the Region comprises a scattering of small islands across the tropical Pacific with an immense collective EEZ, little coastal shelf and an economic reliance on fisheries for highly migratory pelagic species. Fish and fishing have unique socio-cultural significance for the indigenous peoples of the Western Pacific Region, and it was primarily with this in mind that the interests of island indigenous peoples were embodied in the Magnuson-Stevens Act. NMFS also recognized the unique characteristics of the US Flag Pacific Islands which lay behind the decision which led in 2003 to the creation of the Pacific Islands Region, with a new regional office and science center in Honolulu.

The challenge for the Western Pacific Council is to manage fisheries within its jurisdiction for the benefit of the people of the area and to participate at the international level in the management of highly migratory stocks. This will require mainstreaming best practices for minimizing bycatch of species such as sea turtles and seabirds and incorporating principles of ecosystem-based management into all existing FMPs. Equally essential is the Council's continued work to provide indigenous communities access to marine resources so that this rich cultural tradition may persist for future generations.