Pelagic Fisheries of the Western Pacific Region

2006 Annual Report

June 2006
Western Pacific Regional Fishery Management Council
Honolulu, Hawaii

Cover photo:

Workers and potential buyers inspect the swordfish catch at the United Fishing Agency fish auction (2/7/2007). Photo by Council Staff

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2006 Annual Report

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for the

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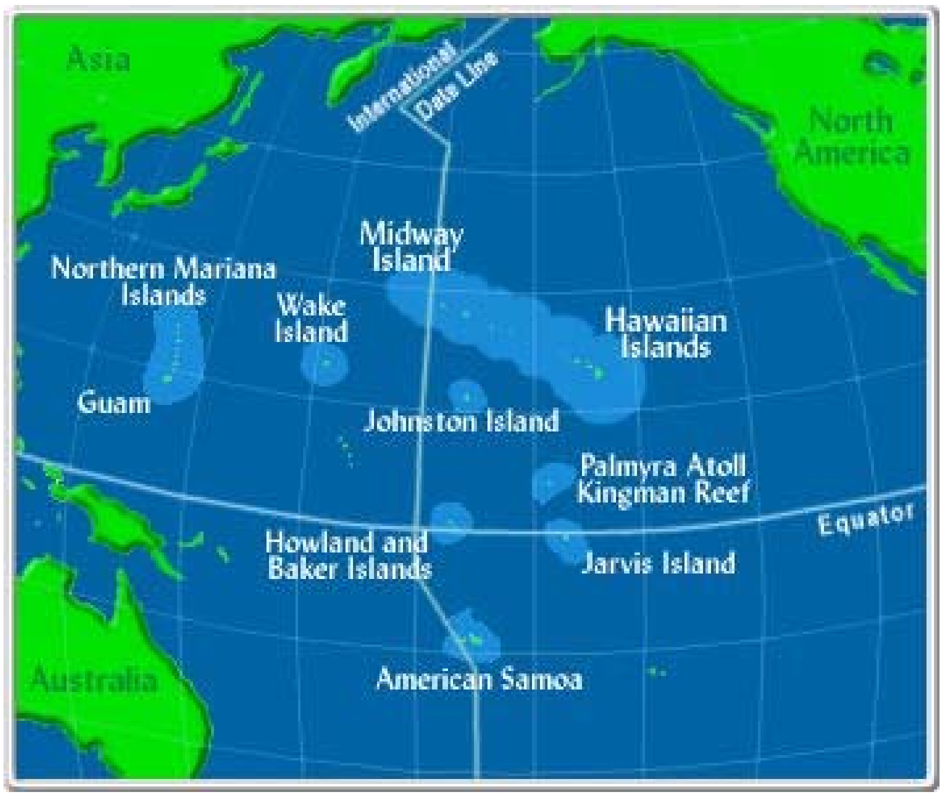
Pelagic Fisheries of the Western Pacific Region — 2005 Annual Report

I. Introduction

A. Background to the Annual Report

The Fishery Management Plan (FMP) for Pelagic Fisheries of the Western Pacific Region was implemented by the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) on 23 March 1987. The Western Pacific Regional Fishery Management Council (WPRFMC, or Council) developed the FMP to manage the pelagic resources that are covered by the Magnuson Fishery Conservation and Management Act of 1976 and that occur in the US Exclusive Economic Zone (EEZ) around American Samoa, Guam, Hawaii, the Northern Mariana Islands, and the US possessions in the Western Pacific Region (Johnston Atoll, Kingman Reef and Palmyra, Jarvis, Howland, Baker, Midway, and Wake Islands).



Map of the Western Pacific Region

The objectives of the Pelagics FMP were revised in 1991. The abridged objectives are to:

- Manage fisheries for Pacific pelagic management unit species (PPMUS) to achieve optimum yield (OY).

- Promote domestic harvest of and domestic fishery values associated with PPMUS[1] (e.g., by enhancing the opportunities for satisfying recreational fishing experience, continuation of traditional fishing practices and domestic commercial fishers to engage in profitable operations).
- Diminish gear conflicts in the EEZ, particularly in areas of concentrated domestic fishing. Improve the statistical base for conducting better stock assessments and fishery evaluations.
- Promote the formation of regional/international arrangements for assessing and conserving PPMUS throughout their range.
- Preclude waste of PPMUS associated with longline, purse seine, pole-and-line or other fishing operations.
- Promote domestic marketing of PPMUS in American Samoa, Guam, Hawaii and the Northern Mariana Islands.

Non-tuna PPMUS are sometimes referred to as "other PPMUS" in this report. This term is equivalent to PMUS (Pelagic Management Unit Species) used in annual reports previous to 1992, before tunas were included in the management unit.

The PPMUS are caught in the troll, longline, handline and pole-and-line (baitboat) fisheries. They are caught in oceanic as well as insular pelagic waters. Most of these species are considered to be epipelagic because they occupy the uppermost layers of the pelagic zone. All are high-level predators in the trophic sense. Pelagic fisheries for PPMUS are among the most important, if not the dominant Pacific Island fisheries.

This report contains fishery performance data from each of the four island groups through 2004, interpretations of trends or important events occurring in the fisheries and recommendations. This report was prepared using reports submitted by the following agencies. The Hawaii report is an integration of State of Hawaii Division of Aquatic Resources and NMFS summaries.

- Territory of American Samoa, Department of Marine and Wildlife Resources
- Territory of Guam, Division of Aquatic and Wildlife Resources
- Territory of Guam, Department of Commerce
- State of Hawaii, Division of Aquatic Resources
- Commonwealth of the Northern Mariana Islands, Division of Fish and Wildlife
- NMFS, Pacific Islands Region (including Pacific Islands Fisheries Science Center, Pacific Islands Regional Office and Office for Law Enforcement)
- US Coast Guard, District 14
- Pelagic Fisheries Research Program, University of Hawaii

A list of the Pelagic Plan Team members during 2006 and persons responsible for compilation of this report are included in Appendix 1.

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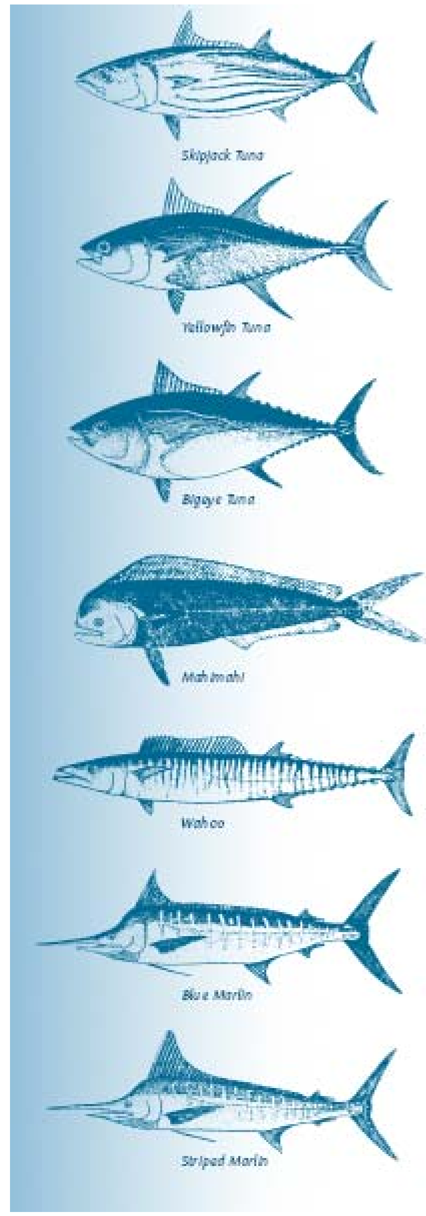
1 The Magnuson Act was amended to allow the inclusion of tunas in US fishery management authority as of January 1992. In the Pacific, tuna management is the responsibility of the regional fishery management councils. Pacific pelagic management unit species (PPMUS) includes former pelagic management unit species (PMUS) and tunas.

B. The Pelagic Species of the Western Pacific Region

The list of Management Unit Species (MUS) managed under the Pelagic FMP has been revised to exclude dogtooth tuna (*Gymnosarda unicolor*) and all sharks except the following nine species: pelagic thresher shark (*Alopias pelagicus*), bigeye thresher shark (*Alopias superciliosus*), common thresher shark (*Alopias vulpinus*), silky shark (*Carcharhinus falciformis*), oceanic whitetip shark, (*Carcharhinus longimanus*), blue shark (*Prionace glauca*), shortfin mako shark (*Isurus oxyrinchus*), longfin mako shark (*Isurus paucus*), and salmon shark (*Lamna ditropis*).



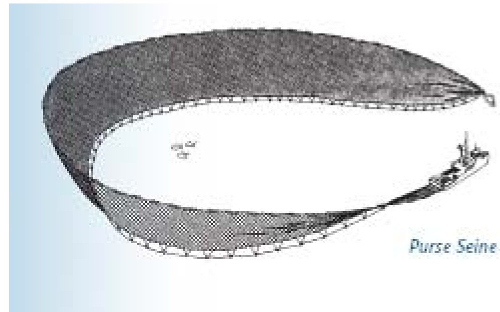
The previous MUS shark listing used to include oceanic species of the families *Alopiidae, Carcharinidae, Lamnidae, Sphynidae*. However, this could be construed to mean all members of these four shark families, which would also include nearshore and demersal sharks. The Pelagics Plan Team recommended in 1999 revising the sharks contained in the management unit when the Council had completed a Coral Reef Ecosystem FMP (CREFMP), which would include nearshore species in the management unit The Plan team also recommended removing dogtooth tuna as this is not a true pelagic fish but a nearshore reef species. The CREFMP was completed in 2001 and among other measures, amended the Pelagics FMP by removing dogtooth tuna from the management unit and listed only 9 true pelagic sharks for inclusion therein (Table1).

Table 1. Names of Pacific Pelagic Management Unit Species

English Common Name	Scientific Name	Samoan or AS local	Hawaiian or HI local	Chamorroan or Guam local	S. Carolinian or NMI local	N. Carolinian or NMI local
Mahimahi (dolphinfishes)	*Coryphaena* spp.	Masimasi	Mahimahi	Botague	Sopor	Habwur
Wahoo	*Acanthocybium solandri*	Paala	Ono	Toson	Ngaal	Ngaal
Indo-Pacific blue marlin Black marlin	*Makaira mazara:* *M. indica*	Sa'ula	A'u, Kajiki	Batto'	Taghalaar	Taghalaar
Striped marlin	*Tetrapturus audax*		Nairagi			
Shortbill spearfish	*T. angustirostris*	Sa'ula	Hebi	Spearfish		
Swordfish	*Xiphias gladius*	Sa'ula malie	A'u kū, Broadbill, Shutome	Swordfish	Taghalaar	Taghalaar
Sailfish	*Istiophorus platypterus*	Sa'ula	A'u lepe	Guihan layak	Taghalaar	Taghalaar
Pelagic thresher shark Bigeye thresher shark Common thresher shark Silky shark Oceanic whitetip shark Blue shark Shortfin mako shark Longfin mako shark Salmon shark	*Alopias pelagicus* *Alopias superciliosus* *Alopias vulpinus* *Carcharhinus falciformis* *Carcharhinus longimanus* *Prionace glauca* *Isurus oxyrinchus* *Isurus paucus* *Lamna ditropis*	Malie	Mano	Halu'u	Paaw	Paaw
Albacore	*Thunnus alalunga*	Apakoa	'Ahi palaha, Tombo	Albacore	Angaraap	Hangaraap
Bigeye tuna	*T. obesus*	Asiasi, To'uo	'Ahi po'onui, Mabachi	Bigeye tuna	Toghu, Sangir	Toghu, Sangir
Yellowfin tuna	*T. albacares*	Asiasi, To'uo	'Ahi shibi	'Ahi, Shibi	Yellowfin tuna	Toghu
Northern bluefin tuna	*T. thynnus*		Maguro			
Skipjack tuna	*Katsuwonus pelamis*	Atu, Faolua, Ga'oga	Aku	Bunita	Angaraap	Hangaraap
Kawakawa	*Euthynnus affinis*	Atualo, Kavalau	Kawakawa	Kawakawa	Asilay	Hailuway
Moonfish	*Lampris* spp	Koko	Opah		Ligehrigher	Ligehrigher
Oilfish family	Gempylidae	Palu talatala	Walu, Escolar		Tekiniipek	Tekiniipek
Pomfret	family Bramidae	Manifi moana	Monchong			
Other tuna relatives	*Auxis* spp, *Scomber* spp; *Allothunus* spp	(various)	Ke'o ke'o, saba (various)	(various)	(various)	(various)

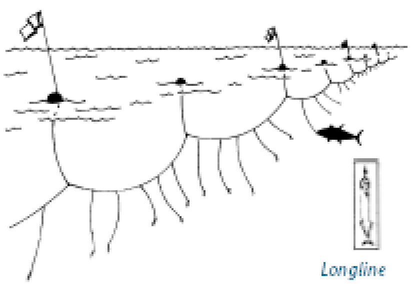
C. Pelagic Gear Types and Fisheries of the Western Pacific Region

U.S. pelagic fisheries in the Western Pacific Region are, with the exception of purse seining, primarily variations of hook-and-line fishing. These include longlining, trolling, handlining and pole-and-line fishing.



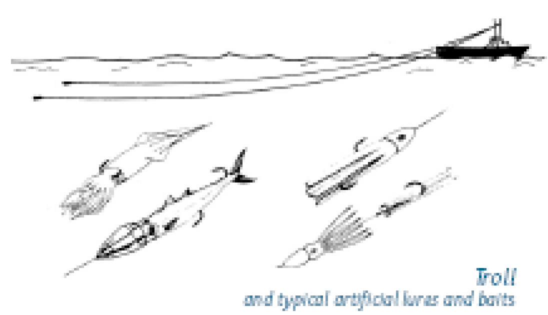
The largest fishery in terms of tonnage of fish landed is the U.S. purse-seine fishery, with catches of skipjack, yellowfin and bigeye tuna, amounting to 87,994 mt. However, this fleet has been decreasing in size from a peak in 1984 of 61 vessels to 14 vessels in 2004. Catches of blue marlins by this fishery are relatively small, amounting to about 40 mt.

The U.S. fleet of albacore trollers, based at West Coast ports, amounts to about 500 vessels, fishing primarily in the temperate waters of the North Pacific and landing in 2003 about 17,000 mt of fish. Some vessels from this fleet also fish seasonally for albacore in the South Pacific, catching on average between 1,000 and 2,500 mt of albacore. Marlins and other billfish are negligible fraction of the catch.



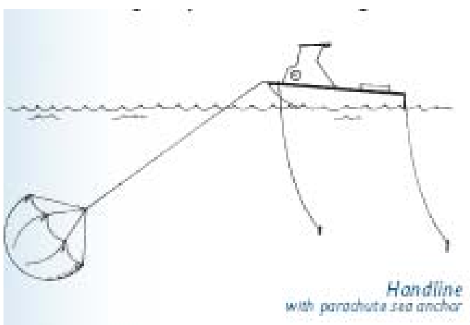
U.S. longline vessels in the Western Pacific Region are based primarily in Hawaii and American Samoa, although Hawaii-based vessels targeting swordfish have also fished seasonally out of California. The Hawaii fishery, with about 125 vessels targets a range of species, with vessels setting shallow longlines to catch swordfish or fishing deep to maximize catches of bigeye tuna.

Catches by the Hawaii fleet also include yellowfin tuna, mahimahi (dorado), wahoo, blue and striped marlins, opah (moonfish) and monchong (pomfret). The Hawaii fishery does not freeze its catch, which is sold for the fresh fish and sashimi market in Hawaii, Japan and the U.S. mainland. The American Samoa fleet of about 50 vessels fishes almost exclusively for albacore tuna, which is landed to two tuna canneries in American Samoa. The combined landings from the two fisheries in 2003 amounted to 14,743 mt, with about two-thirds of landings coming from the Hawaii fishery. In 2003, the combined landings of blue and striped marlins from the longline fishery amounted to 374 and 542 mt respectively.



Trolling and, to lesser extent, handline fishing for pelagics is the largest commercial fishery in terms of participation, although it catches annually a relative modest volume of fish amounting to about 3,000 mt. Part of this catch is made by charter or for-hire fishing vessels. There are 1,494 troll vessels and 156 handline vessels in Hawaii, 73 troll vessels in the Northern Mariana Islands, 343 troll vessels in Guam, and 20 troll vessels in American Samoa. Troll and handline catches are dominated by yellowfin and bigeye tuna in Hawaii and by skipjack in Guam, the Northern Mariana Islands and American Samoa. Other commonly caught troll catches include mahimahi, wahoo and blue marlin. About 85 percent of the troll landings are made by Hawaii vessels. In 2003, the combined catches of blue and striped marlins by these fisheries amounted to 207 and 28 mt respectively.

Troll fishing for pelagics is the commonest recreational fishery in the islands of the Western Pacific Region. The definition of recreational fishing, however, continues to be problematic in a region where many fishermen who are fishing primarily for recreation may sell their fish to cover their expenses. Hawaii's recreational fishery landings amount to about 8,000 mt annually, based on surveys of fishermen, with blue marlins catches ranging from 400 to 600 mt. Recreational or non-commercial landings from boats in Guam, American Samoa and the Northern Mariana Islands amount to about 170 mt, of which about 30 mt is blue marlin.



Tuna fisheries in the Pacific Ocean as a whole catch about 2.7 million mt of fish, with U.S. fisheries catching about 5 percent of the total. Most of the catch is taken by fleets of high seas longliners and purse seiners from countries such as Japan, Taiwan, Korea and the nations of Central and South America. More recently, Pacific Island countries such as Papua New Guinea have grown in importance in terms of their large scale purse-seine and longline fisheries. Small scale artisanal longlining is also conducted in Pacific Island countries like Samoa and in South America, where there are thousands of small scale longline vessels fishing in coastal waters.

II. Development and Description of the Fisheries of the Western Pacific Region

A. American Samoa

The islands of American Samoa are an area of modest productivity relative to areas to the north and west. The region is traversed by two main currents: the southern branch of the westward-flowing South Equatorial Current during June - October and the eastward-flowing South Equatorial Counter Current during November - April. Surface temperatures vary between 27°-29° C and are highest in the January - April period. The upper limit of the thermocline in ocean areas is relatively shallow (27° C isotherm at 100m depth) but the thermocline itself is diffuse (lower boundary at 300m depth).

1. Traditional and Historical Pelagic Fisheries

Small-scale longline: Most participants in the small-scale domestic longline fishery are indigenous American Samoans with vessels under 50 ft in length, most of which are alia boats under 40 ft in length. The stimulus for American Samoa's commercial fishermen to shift from troll or handline gear to longline gear in the mid-1990s (see Figure 10) was the fishing success of 28' alia catamarans that engaged in longline fishing in the EEZ around Independent Samoa. Following this example, the fishermen in American Samoa deploy a short monofilament longline, with an average of 350 hooks per set, from a hand-powered reel (WPRFMC, 2000). An estimated 90 percent of the crews working in the American Samoa small-scale alia longline fleet are believed to be from Independent Samoa. The predominant catch is albacore tuna, which is marketed to the local tuna canneries (DMWR 2001).

***Large-scale longline*:** American Samoa's domestic longline fishery expanded rapidly in 2001. Much of the recent (and anticipated future) growth is due to the entry of monohull vessels larger than 50 ft in length. The number of permitted longline vessels in this sector increased from three in 2000 to 30 by March 21, 2002 (DMWR, unpubl. data). Of these, five permits (33 percent of the vessel size class) for vessels between 50.1 ft - 70 ft and five permits (33 percent of the vessel size class) for vessels larger than 70 ft were believed to be held by indigenous American Samoans as of March 21, 2002 (T. Beeching, DMWR, pers. comm to P. Bartram, March 2002). Economic barriers have prevented more substantial indigenous participation in the large-scale sector of the longline fishery. The lack of capital appears to be the primary constraint to substantial indigenous participation in this sector (DMWR 2001).

While the smallest (less than or equal to 40 ft) vessels average 350 hooks per set, a vessel over 50 ft can set 5-6 times more hooks and has a greater fishing range and capacity for storing fish (8-40 mt as compared to 0.5-2 mt on a small-scale vessel). Larger vessels are also outfitted with hydraulically-powered reels to set and haul mainline, and modern electronic equipment for navigation, communications and fish finding. Most are presently being operated to freeze albacore onboard, rather than to land chilled fish. Three vessels that left Hawaii after the swordfish longline fishery closure are operating in the American Samoa tuna longline fishery under new ownership. It does not appear that large numbers of longliners from Hawaii are relocated in American Samoa. Instead, large vessels have participated in the American Samoa longline fishery from diverse ports and fisheries, including the US west coast (6), Gulf of Mexico (3), and foreign countries (4 now under U.S. ownership) (O'Malley and Pooley, 2002).

Distant-water purse seine fishery: The US purse seine fleet operating in the central and western Pacific uses large nets to capture skipjack, yellowfin and bigeye tuna near the ocean surface, in free-swimming schools and around fish aggregation devices (FADs) deployed by the fleet. These vessels often land their catches at canneries based in American Samoa. These large vessels (200-250 ft length) could not be economically operated for longline fishing but some former participants in the U.S. purse seine fishery have acquired more suitable vessels and participated in the American Samoa-based longline fishery (NMFS 2001

Distant-water jig albacore fishery: Domestic albacore jig vessels also supply tuna to the canneries in American Samoa. Since 1985, about 50-60 US vessels have participated in the high-seas troll fishery for albacore. This fishery occurs seasonally (December through April) in international waters at 35°-40° S latitude. The vessels range in length from 50 to 120 feet, with the average length about 75 feet (Heikkila 2001). They operate with crews of 3-5 and are capable of freezing 45-90 tons of fish (WPRFMC 2000).

Troll and handline fishery: From October 1985 to the present, catch and effort data in American Samoa fisheries have been collected through a creel survey that includes subsistence and recreational fishing, as well as commercial fishing. However, differentiating commercial troll fishing activity from non-commercial activity can be difficult.

Recreational fishing purely for sport or pleasure is uncommon in American Samoa. Most fishermen normally harvest pelagic species for subsistence or commercial sale. However tournament fishing for pelagic species began in American Samoa in the 1980s, and between 1974 and 1998, a total of 64 fishing tournaments were held in American Samoa (Tulafono 2001). Most of the boats that participated were 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 participated in each tournament, which were held 2 to 5 times per year (Craig et al. 1993).

The majority of tournament participants have operated 28-foot alia, the same vessels that engage in the small-scale longline fishery. With more emphasis on commercial longline fishing since 1996, interest in the tournaments has waned (Tulafono 2001) and pelagic fishing effort has shifted markedly from trolling to longling (see Figure 11). Catch and release recreational fishing is virtually unknown in American Samoa. Landing fish to meet cultural obligations is so important that releasing fish would generally be considered a failure to meet these obligations (Tulafono 2001). Nevertheless, some pelagic fishermen who fish for subsistence release fish that are surplus to their subsistence needs (S. Steffany, pers. comm. to Paul Bartram, Sept. 15, 2001).

American Samoa has been unable to develop a significant tourist industry that could support charter fishing (Territorial Planning Commission/Dept. of Commerce, 2000). Nor is American Samoa known for producing large game fish. Few, if any, charter boats are in operation (Tulafono 2001), so no data are collected specifically for the charter fishing sector.

2. Pelagic Fisheries Development

American Samoan dependence on fishing undoubtedly goes back as far as the peopled history of the islands of the Samoan archipelago, about 3,500 years ago (Severance and Franco 1989). Many aspects of the culture have changed in contemporary times but American Samoans have retained a traditional social system that continues to strongly influence and depend upon the culture of fishing. Centered around an extended family (`aiga) and allegiance to a hierarchy of chiefs (matai), this system is rooted in the economics and politics of communally-held village land. It has effectively resisted Euro-American colonial influence and has contributed to a contemporary cultural resiliency unique in the Pacific islands region (Severance et al. 1999).

American Samoa has a small developing economy, dependent mainly on two primary income sources: the American Samoa Government, which receives income and capital subsidies from the Federal government, and the two fish canneries on Tutuila (BOH 2002). These two primary income sources have given rise to a third: a services sector that derives from and complements the first two. In 1993, the latest year for which the ASG has compiled detailed labor force and employment data, the ASG employed 4,355 persons (32.2 percent of total employment), followed by the two canneries with 3,977 persons (29.4 percent) and the rest of the services economy with 5,211 persons (38.4 percent). As of 2000, there were 17,644 people 16 years and older in the labor force, of which 16,718, or 95%, were employed (American Samoa Census 2000).

The excellent harbor at Pago Pago and certain special provisions of U.S. law form the basis of American Samoa's largest private industry, fish processing, which is now more than forty years old (BOH 1997). The territory is exempt from the Nicholson Act, which prohibits foreign ships from landing their catches in U.S. ports. American Samoan products with less than 50 percent market value from foreign sources enter the United States duty free (Headnote 3(a) of the U.S. Tariff Schedule). The parent companies of American Samoa's fish processing plants enjoy special tax benefits, and wages in the territory are set not by Federal law but by recommendation of a special U.S. Department of Labor committee that reviews economic conditions every two years and establishes minimum wages by industry.

The ASG has estimated that the tuna processing industry directly and indirectly generates about 15 percent of current money wages, 10 to 12 percent of aggregate household income and 7 percent of government receipts in the territory (BOH 2000). On the other hand, both tuna canneries in American Samoa are tied to multinational corporations that supply virtually everything but unskilled labor, shipping services and infrastructure facilities (Schug and Galeai 1987). Even a substantial portion of the raw tuna processed by Star-Kist Samoa is landed by vessels owned by the parent company. The result is that few backward linkages have developed, and the fish-processing facilities exist essentially as industrial enclaves. Furthermore, most of the unskilled labor of the canneries is imported. Up to 90 percent of cannery jobs are filled by foreign nationals from Western Samoa and Tonga. The result is that much of the payroll of the canneries "leaks" out of the territory in the form of overseas remittances.

Harsh working conditions, low wages and long fishing trips have discouraged American Samoans from working on foreign longline vessels delivering tuna to the canneries. American Samoans prefer employment on the U.S. purse seine vessels, but the capital-intensive nature of purse seine operations limits the number of job opportunities for locals in that sector as well. However, the presence of the industrial tuna fishing fleet has had a positive economic effect on the local economy as a whole. Ancillary businesses involved in reprovisioning the fishing fleet generate a significant number of jobs and amount of income for local residents. Fleet expenditures for fuel, provisions and repairs in 1994 were estimated to be between $45 million and $92 million (Hamnett and Pintz 1996).

The tuna processing industry has had a mixed effect on the commercial fishing activities undertaken by American Samoans. The canneries often buy fish from the small-scale domestic longline fleet based in American Samoa, although the quantity of this fish is insignificant compared to cannery deliveries by the U.S. purse seine, U.S. albacore and foreign longline fleets. The ready market provided by the canneries is attractive to the small boat fleet, and virtually all of the albacore caught by the domestic longline fishery is sold to the canneries. Nevertheless, local fishermen have long complained that a portion of the frozen fish landed by foreign longline vessels enters the American Samoa restaurant and home-consumption market, creating an oversupply and depressing the prices for fresh fish sold by local fishermen.

Local fishermen have indicated an interest in participating in the far more lucrative overseas market for fresh fish. To date, however, inadequate shore-side ice and cold storage facilities in American Samoa and infrequent and expensive air transportation links have been restrictive factors.

Using information obtained from industry sources for a presentation to the American Samoa Legislature (Faleomavaega 2002), canning the 3,100 mt of albacore landed in American Samoa by the domestic longline fishery in 2001 is estimated to have generated 75 jobs, $420,000 in wages, $5 million in processing revenue and $1.4 million in direct cannery spending in the local economy. Ancillary businesses associated with the tuna canning industry also contribute significantly to American Samoa's economy. The American Samoa government calculates that the canneries represent, directly and indirectly, from 10% - 12% of aggregate household income, 7% of government receipts and 20% of power sales (BOH 2000).

American Samoa's position in the industry is being eroded by forces at work in the world economy and in the tuna canning industry itself. Whereas wage levels in American Samoa are well below those of the US, they are considerably higher than in other canned tuna production centers around the world. To remain competitive, U.S. tuna producers are purchasing more raw materials, especially pre-cooked loins, from foreign manufacturers. Tax benefits to US canneries operating in American Samoa have also been tempered in recent years by the removal of a provision in the US tax code that previously permitted the tax-free repatriation of corporate income in US territories. Trends in world trade, specifically reductions in tariffs, are reducing the competitive advantage of American Samoa's duty-free access to the US canned tuna market (Territorial Planning Commission/Dept. of Commerce, 2000).

Despite the long history of the tuna canning industry in American Samoa, processing and marketing of pelagic fish by local enterprises has not yet developed beyond a few, short-term pilot projects. However, the government's comprehensive economic development strategy (Territorial Planning Commission/Dept. of Commerce, 2000) places a high priority on establishing a private sector fish processing and export operation proposed to be located at the Tafuna Industrial Park.

3. Administrative or Management Actions to Date

Along with the original measures placed into the Pelagics FMP, the following amendments were made which affected the pelagic fisheries of American Samoa:

AMENDMENT 1 (effective March 1, 1991) defined recruitment overfishing and optimum yield for each PMUS.

AMENDMENT 2 (effective May 26, 1991) implemented permitting and logbook requirements for domestic pelagic longline fishing and transshipment vessel operators.

AMENDMENT 8 (effective Feb. 3, 1999, and July 3, 2003) addressed new requirements under the 1996 Sustainable Fisheries Act, included designations of essential fish habitat, descriptions of fishing communities, overfishing definitions and bycatch.

AMENDMENT 10 (prepared and transmitted to the NMFS for approval in parallel with the FMP for Coral Reef Ecosystems of the Western Pacific Region) clarified the PMUS by removing all but truly oceanic sharks to the Coral Reef Ecosystems FMP along with dogtooth tuna.

AMENDMENT 11 (effective May 24, 2005) established a limited access system for pelagic longlining in EEZ waters around American Samoa with initial entry criteria based on historical participation in the fishery.

FRAMEWORK MEASURE 1 (effective March 1, 2002) established an area seaward of 3 nm out to approximately 50 nm around the islands of American Samoa in which fishing for PMUS is prohibited by vessels greater than 50 feet in length overall that did not land PMUS in American Samoa under a federal longline general permit prior to Nov. 13, 1997.

B. Guam

Generally, the major surface current affecting Guam is the North Equatorial Current, which flows westward through the islands. Sea surface temperatures off Guam vary between 80.9° – 84.9° F, depending on the season. The mixed layer extends to depths between 300-400 ft (Eldredge 1983).

1. Traditional and Historical Pelagic Fisheries

Guam's pelagic fisheries consist of primarily small, recreational, trolling boats that are either towed to boat launch sites or berthed in marinas and fish only within local waters, either within the EEZ around Guam or on some occasions in the adjacent EEZ waters around the Northern Mariana Islands.

Domestic annual pelagic landings in Guam have varied widely, ranging between 322,000 and 937,000 lbs in the 23-year time series. The 2004 total pelagic landings were approximately 691,366 lbs, an increase of 36% compared with 2003. Of this total, it is estimated that 285,545 lbs were sold for a total ex-vessel revenue of $433,911 (WPRFMC 2005).

Landings consisted primarily of five major species: mahimahi (*Coryphaena hippurus*), wahoo (*Acanthocybium solandri*), bonita or skipjack tuna (*Katsuwonus pelamis*), yellowfin tuna (*Thunnus albacares*), and Pacific blue marlin (*Makaira mazara*). Other minor pelagic species caught include rainbow runner (*Elagatis bipinnulatus*), great barracuda (*Sphyraena barracuda*), kawakawa (*Euthynnus affinis*), dogtooth tuna (*Gymnosarda unicolor*), double-lined mackerel *(Grammatorcynus bilineatus*), oilfish (*Ruvettus pretiosus*), and three less common species of barracuda. Sailfish and sharks were also known to be caught during 2004 but these species were not encountered during offshore creel surveys.

There are wide year-to-year fluctuations in the estimated landings of the five major species. 2004 mahimahi catch increased more than 134% from 2003, and reached the highest level since 1998. Wahoo catch totals increased 83% from 2003, and were the sixth highest total during the 23 year recording period. Pacific blue marlin landings decreased 28% from 2003, and were 24%

below the 23 year average. Supertyphoon Pongsona's direct hit on Guam in December 2002 and subsequent negative impact on fishing during the first quarter of 2003 probably account for the low numbers of mahimahi caught during 2003. Participation and effort generally increased in 2004 with the number of trolling boats up by eight percent (WPRFMC 2005)

The number of boats involved in Guam's pelagic or open ocean fishery gradually increased from 193 in 1983 to 469 in 1998. This number decreased until 2001, but then began increasing, and has been increasing since. There were 401 boats active in Guam's domestic pelagic fishery in 2004. A majority of the fishing boats are less than 10 meters (33 feet) in length and are usually owner-operated by fishermen who earn a living outside of fishing. Most fishermen sell a portion of their catch at one time or another and it is difficult to make a distinction between recreational, subsistence, and commercial fishers. A small, but significant, segment of Guam's pelagic fishery is made up of marina-berthed charter boats that are operated primarily by full-time captains and crews. These operations were responsible for 22 percent of all domestic pelagic fishing trips from Guam in 2004 (WPRFMC 2005). Figure 15 provides the estimated annual total domestic pelagics catch in Guam.

2. Pelagic Fisheries Development

Fishing in Guam continues to be important not only in terms of contributing to the subsistence needs of the Chamorro people but also in terms of preserving their history and identity. Fishing assists in perpetuating traditional knowledge of marine resources and maritime heritage of the Chamorro culture.

The importance of commercial fishing in Guam lies mainly in the territory's status as a major regional fish transshipment center and re-supply base for domestic and foreign tuna fishing fleets. Among Guam's advantages as a home port are well-developed and highly efficient port facilities in Apra Harbor; an availability of relatively low-cost vessel fuel; a well-established marine supply/repair industry; and recreational amenities for crew shore leave (Hamnett and Pintz 1996). In addition, the territory is exempt from the Nicholson Act, which prohibits foreign ships from landing their catches in U.S. ports. Initially, the majority of vessels calling in Apra Harbor to discharge frozen tuna for transshipment were Japanese purse seine boats and carrier vessels. Later, a fleet of U.S. purse seine vessels relocated to Guam, and since the late 1980s, Guam has become an important port for Japanese and Taiwanese longline fleets. The presence of the longline and purse seine vessels has created a demand for a range of provisioning, vessel maintenance and gear repair services.

By the early 1990s, an air transshipment operation was also established on Guam. Fresh tuna is flown into Guam from the Federated States of Micronesia and elsewhere on air cargo planes and out of Guam to the Japanese market on wide-body passenger planes (Hamnett and Pintz, 1996). A second air transshipment operation that began in the mid-1990s is transporting to Europe fish that do not meet Japanese sashimi market standards.

Guam is an important re-supply and transshipment center for the international tuna longline fleet in the Pacific. However, the future of home port and transshipment operations in Guam depends on the island's ability to compete with neighboring countries that are seeking to attract the highly mobile longline fleet to their own ports. Trends in the number of port calls made in Guam by various fishing fleets reflect the volatility of the industry. The number of vessels operating out of Guam decreased by almost half from 1996 to 1997, and further declined in 1998 (Hamnett and Anderson 2000).

The Guam Department of Commerce reported that fleet expenditures in Guam in 1998 were about $68 million, and a 1994 study estimated that the home port and transshipment industry employed about 130 people (Hamnett and Pintz 1996). This industry constitutes an insignificant percentage of the gross island product, which was about $2.99 billion in 1996, and is of minor economic importance in comparison to the tourist or defense industries (Hamnett and Anderson 2000). Nevertheless, home port and transshipment operations make an important contribution to the diversification of Guam's economy (Hamnett and Pintz 1996). As a result of fluctuations in the tourism industry and cuts in military expenditures in Guam, the importance of economic diversification has increased.

3. Administrative or Management Actions to Date

Along with the original measures placed into the Pelagics FMP, the following amendments were made which affected the pelagic fisheries of Guam:

AMENDMENT 1 (effective March 1, 1991) defined recruitment overfishing and optimum yield for each PMUS.

AMENDMENT 2 (effective May 26, 1991) implemented permitting and logbook requirements for domestic pelagic longline fishing and transshipment vessel operators.

AMENDMENT 5 (effective March 2, 1992) created domestic longline vessel exclusion zones around the Main Hawaiian Islands (MHI) ranging from 50 to 75 nm and a similar 50 nm exclusion zone around Guam and its offshore banks.

AMENDMENT 6 (effective Nov. 27, 1992) specified that all tuna species are designated as fish under U.S. management authority and included tunas and related species as PMUS under the FMP. It also applied the longline exclusion zones of 50 nm around the island of Guam and the 25-75 nm zone around the MHI to foreign vessels.

AMENDMENT 8 (effective Feb. 3, 1999, and July 3, 2003) addressed new requirements under the 1996 Sustainable Fisheries Act, included designations of essential fish habitat, descriptions of fishing communities, overfishing definitions and bycatch.

AMENDMENT 10 (prepared and transmitted to the NMFS for approval in parallel with the FMP for Coral Reef Ecosystems of the Western Pacific Region) clarified the PMUS by removing all but truly oceanic sharks to the Coral Reef Ecosystems FMP along with dogtooth tuna.

C. Hawaii

The archipelago's position in the Pacific Ocean lies within the clockwise rotating North Pacific Subtropical Gyre, extending from the northern portion of the North Equatorial Current into the region south of the Subtropical High, where the water moves eastward in the North Pacific Current. At the pass between the MHI and the NWHI there is often a westward flow from the region of Kauai along the lee side of the lower NWHI. This flow, the North Hawaiian Ridge Current (NHRC), is extremely variable and can also be absent at times. The analysis of 10 years of shipboard acoustic Doppler current profiler data collected by the NOAA Ship Townsend Cromwell shows mean flow through the ridge between Oahu and Nihoa, and extending to a depth of 200 m. (J. Firing pers. comm.).

Imbedded in the mean east-to-west flow are an abundance of mesoscale eddies created from a mixture of wind, current, and sea floor interactions. The eddies, which can rotate either clockwise or counter clockwise, have important biological impacts. For example, eddies create vertical fluxes, with regions of divergence (upwelling) where the thermocline shoals and deep nutrients are pumped into surface waters enhancing phytoplankton production, and also regions of convergence (downwelling) where the thermocline deepens. Sea surface temperatures around the Hawaiian Archipelago experience seasonal variability, but generally vary between 18°-28° C (64°-82° F) with the colder waters occurring more often in the NWHI.

A significant source of interannual physical and biological variation around Hawaii are El Niño and La Niña events. During an El Niño, the normal easterly trade winds weaken, resulting in a weakening of the westward equatorial surface current and a deepening of the thermocline in the central and eastern equatorial Pacific. Water in the central and eastern equatorial Pacific becomes warmer and more vertically stratified with a substantial drop in surface chlorophyll.

Physical and biological oceanographic changes have also been observed on decadal time scales. These low frequency changes, termed regime shifts, can impact the entire ocean ecosystem. Recent regime shifts in the North Pacific have occurred in 1976 and 1989, with both physical and biological (including fishery) impacts (Polovina, 1996; Polovina et al., 1995). In the late 1980's an ecosystem shift from high carrying capacity to low carrying capacity occurred in the NWHI. The shift was associated with the weakening of the Aleutian Low Pressure System (North Pacific) and the Subtropical Counter Current. The ecosystem effects of this shift were observed in lower nutrient and productivity levels and decreased abundance of numerous species in the NWHI including the spiny lobster, the Hawaiian monk seal, various reef fish, the red-footed booby, and the red-tailed tropic bird (Polovina and Haight, 1999; Demartini et. al., 2002).

1. Traditional and Historical Pelagic Fisheries

Hawaii’s pelagic fisheries, which include the longline, Main Hawaiian Islands troll and handline, offshore handline, and the aku boat (pole and line) fisheries; are the state’s largest and most valuable fishery sector. The target species are tunas and billfish, but a variety of other species are also important. Collectively, these pelagic fisheries made approximately 23 million lbs of commercial landings with a total ex-vessel value of $48 million in 2003 (WPFMC 2003).

The largest component of pelagic catch in 2003 was tunas. Bigeye tuna was the largest component and has increased almost five-fold from its 1987 catch. Swordfish was the largest component of the billfish catch from 1990 through 2000, but was replaced by blue marlin in the next two years, and followed by striped marlin in 2003. Mahimahi was the largest component of the non-tuna and non-billfish catch though ono (wahoo) and moonfish catches rose to comparable levels.

2. Pelagic Fisheries Development

The most recent estimate of the contribution of the commercial, charter and recreational fishing sectors to the state economy indicated that in 1992, these sectors contributed $118.79 million of output (production) and $34.29 million of household income and employed 1,469 people (Sharma et al. 1999). These contributions accounted for 0.25% of total state output ($47.4 billion), 0.17% of household income ($20.2 billion) and 0.19% of employment (757,132 jobs). In contrast to the sharp decline in some traditional mainstays of Hawaii's economy such as large-scale agriculture the fishing industry has been fairly stable during the past decade. Total revenues in Hawaii's pelagic, bottomfish and lobster fisheries in 1998 were about 10% higher than 1988 revenues (adjusted for inflation) in those fisheries.

The Hawaii longline fishery is by far the most important economically, accounting for 77 percent of the estimated ex-vessel value of the total commercial fish landings in the state in 2003 (WPRFMC 2004).

3. Administrative or Management Actions to Date

Along with the original measures placed into the Pelagics FMP, the following amendments were made which affected the pelagic fisheries of Hawaii:

AMENDMENT 1 (effective March 1, 1991) defined recruitment overfishing and optimum yield for each PMUS.

AMENDMENT 2 (effective May 26, 1991) implemented permitting and logbook requirements for domestic pelagic longline fishing and transshipment vessel operators.

AMENDMENT 3 (effective Oct. 14, 1991) created a 50 nm longline exclusion zone around the Northwestern Hawaiian Islands (NWHI) to protect endangered Hawaiian monk seals and also implemented framework provisions for establishing a mandatory observer program to collect information on interactions between longline fishing and sea turtles.

AMENDMENT 4 (effective Oct. 10, 1991, through April 22, 1994) established a three-year moratorium on new entry into the Hawaii-based domestic longline fishery and required Hawaii-based longline vessels to carry and use a National Marine Fisheries Service (NMFS)-owned vessel monitoring system (VMS) transmitter to ensure that they do not fish within prohibited areas.

AMENDMENT 5 (effective March 2, 1992) created domestic longline vessel exclusion zones around the Main Hawaiian Islands (MHI) ranging from 50 to 75 nm and a similar 50 nm exclusion zone around Guam and its offshore banks.

AMENDMENT 6 (effective Nov. 27, 1992) specified that all tuna species are designated as fish under U.S. management authority and included tunas and related species as PMUS under the FMP. It also applied the longline exclusion zones of 50 nm around the island of Guam and the 25-75 nm zone around the MHI to foreign vessels.

AMENDMENT 7 (effective June 24, 1994) instituted a limited entry program for the Hawaii-based domestic longline fishery with transferable permits, a limit of 164 vessels, and a maximum vessel size of 101 feet in length overall.

AMENDMENT 8 (effective Feb. 3, 1999, and July 3, 2003) addressed new requirements under the 1996 Sustainable Fisheries Act, included designations of essential fish habitat, descriptions of fishing communities, overfishing definitions and bycatch.

AMENDMENT 9 (under development since early 2000) would manage the harvest and retention of sharks in the Hawaii-based longline fishery.

AMENDMENT 10 (prepared and transmitted to the NMFS for approval in parallel with the FMP for Coral Reef Ecosystems of the Western Pacific Region) clarified the PMUS by removing all but truly oceanic sharks to the Coral Reef Ecosystems FMP along with dogtooth tuna.

FRAMEWORK MEASURE 2 (effective June 13, 2002) incorporated the terms and conditions of a Nov. 28, 2000, Biological Opinion issued by the U.S. Fish and Wildlife Service under section 7 of the Endangered Species Act to protect seabirds from longline fishing. These measures require Hawaii-based pelagic longline vessel operators to use blue-dyed bait, strategic offal discards and line shooters with weighted branch lines to mitigate seabird interactions when fishing north of 23° N. Also included was a requirement that all Hawaii-based longline vessel owners and operators annually attend a protected species workshop conducted by NMFS.

REGULATORY AMENDMENT 1 (effective June 9, 2002) incorporated the reasonable and prudent alternative of a March 2001 Biological Opinion issued by NMFS under section 7 of the Endangered Species Act. To mitigate interactions with sea turtles, this amendment prohibits shallow set pelagic longlining north of the equator by vessels managed under the FMP and closed waters between 0° and 15°N from April through May of each year to longline fishing. It also institutes sea turtle handling requirements for all vessels using hooks to target pelagic species in the region's EEZ waters.

REGULATORY AMENDMENT 2 (effective Oct. 4, 2002) established federal permit and reporting requirements for any vessel using troll or handline gear to catch PMUS in EEZ waters around the Pacific Remote Island Areas of Kingman Reef; Howland, Baker, Jarvis, Johnston and Wake Islands; and Palmyra and Midway Atolls.

REGULATORY AMENDMENT 3 (effective April 1, 2005) reopened swordfish longline fishing in Hawaii. The amendment requires vessels targeting swordfish to use mackerel type bait and 18/0 circle hooks. It also set an effort limit of 2,120 set per year and hard caps on loggerhead and leatherback turtles takes, which if reached would close the fishery for the remainder to the year.

D. Commonwealth of the Northern Marianas Islands

Generally, the major surface current affecting CNMI is the North Equatorial Current, which flows westward through the islands, however the Subtropical Counter Current affects the Northern Islands and generally flows in a easterly direction (Elgredge 1983). Depending on the season, sea surface temperatures near the Northern Mariana Islands vary between 80.9° – 84.9° F. The mixed layer extends to between depths of 300-400 ft (Eldredge 1983).

1. Traditional and Historical Pelagic Fisheries

The CNMI's pelagic fisheries occur primarily from the island of Farallon de Medinilla south to the island of Rota. Trolling is the primary fishing method utilized in the pelagic fishery. The pelagic fishing fleet consists primarily of vessels less than 24 ft in length which usually have a limited 20-mile travel radius from Saipan.

The primary target and most marketable species for the pelagic fleet is skipjack tuna (67% of 2004 commercial landings). Yellowfin tuna and mahimahi are also easily marketable species but are seasonal. During their runs, these fish are usually found close to shore and provide easy targets for the local fishermen. In addition to the economic advantages of being near shore and their relative ease of capture, these species are widely accepted by all ethnic groups which has kept market demand fairly high. Figure 13 presents historical data on pelagic landings in CNMI. It is estimated that in 2004, 68 fishery participants made 235,382 lbs of commercial landings of pelagic species with a total ex-vessel value of $466,490 (WPRFMC 2005b).

2. Pelagic Fisheries Development

Fishery resources have played a central role in shaping the social, cultural and economic fabric of the CNMI. The aboriginal peoples indigenous to these islands relied on seafood as their principal source of protein and developed exceptional fishing skills. Later immigrants to the islands from East and Southeast Asia also possessed a strong fishing tradition. Under the MSA, the CNMI is defined as a fishing community.

In the early 1980s, U.S. purse seine vessels established a transshipment operation at Tinian Harbor. The CNMI is exempt from the Jones Act, which requires the use of U.S.-flag and U.S.-built vessels to carry cargo between U.S. ports. The U.S. purse seiners took advantage of this exemption by offloading their catch at Tinian onto foreign vessels for shipment to tuna canneries in American Samoa. In 1991, a second type of tuna transshipment operation was established on Saipan (Hamnett and Pintz 1996). This operation transships fresh tuna caught in the Federated States of Micronesia from air freighters to wide-body jets bound for Japan. The volume of fish flown into and out of Saipan is substantial, but the contribution of this operation to the local economy is minimal (Hamnett and Pintz 1996).

With the exception of the purse seine support base on Tinian (now defunct), the CNMI has never had a large infrastructure dedicated to commercial fishing. The majority of boats in the local fishing fleet are small, outboard engine-powered vessels. Between 1994-1998, the annual ex-vessel value of commercial landings of bottomfish and pelagic species has averaged about

$473,900, which bottomfish accounts for about 28% of the total revenues (WPFMC 1999). Existing planning data for the CNMI are not suited to examining the direct and indirect contributions attributed to various inter-industry linkages in the economy. It is apparent, however, that fishing by the local small-boat fleet represents only a small fraction of the economic activity in the commonwealth.

3. Administrative or Management Actions to Date

Along with the original measures placed into the Pelagics FMP, the following amendments were made which affected the pelagic fisheries of CNMI:

AMENDMENT 1 (effective March 1, 1991) defined recruitment overfishing and optimum yield for each PMUS.

AMENDMENT 2 (effective May 26, 1991) implemented permitting and logbook requirements for domestic pelagic longline fishing and transshipment vessel operators.

AMENDMENT 8 (effective Feb. 3, 1999, and July 3, 2003) addressed new requirements under the 1996 Sustainable Fisheries Act, included designations of essential fish habitat, descriptions of fishing communities, overfishing definitions and bycatch.

AMENDMENT 10 (prepared and transmitted to the NMFS for approval in parallel with the FMP for Coral Reef Ecosystems of the Western Pacific Region) clarified the PMUS by removing all but truly oceanic sharks to the Coral Reef Ecosystems FMP along with dogtooth tuna.

E. Pacific Remote Island Areas

Due to its position near the equator, Baker Island lies within the westward flowing South Equatorial Current. Baker Island also experiences an eastward flowing Equatorial Under Current that causes upwelling of nutrient and plankton rich waters on the west side of the island (Brainard et. al 2005). Sea surface temperatures of pelagic EEZ waters around Baker Island are often near 30° C.[1] Although the depth of the mixed layer in the pelagic waters around Baker Island is seasonally variable, average mixed layer depth is around 100 m (R. Moffit, PIFSC, pers. comm.).

Due to its position slightly north of the equator, Howland Island lies within the margins of the eastward flowing North Equatorial Counter Current and the margins of the westward flowing South Equatorial Current. Sea surface temperatures of pelagic EEZ waters around Baker Island are often near 30° C.[2] Although the depth of the mixed layer in the pelagic waters around Howland Island is seasonally variable, average mixed layer depth is around 70 m – 90 m (R. Moffit, PIFSC, pers. comm.).

Due to its position below the equator, Jarvis Island lies within the South Equatorial Current which runs in a westerly direction. Sea surface temperatures of pelagic EEZ waters around

[1] http://oceanwatch.pifsc.noaa.gov/
[2] http://oceanwatch.pifsc.noaa.gov/

Jarvis Island are often 28°- 30° C.[3] Although depth of the mixed layer in the pelagic waters around Jarvis Island is seasonally variable, average mixed layer depth is around 80 m (R. Moffit, PIFSC, pers. comm.).

Due to its relative proximity to the equator, Palmyra Atoll and Kingman Reef lie in the North Equatorial Countercurrent which flow in a west to east direction. Sea surface temperatures of pelagic EEZ waters around Palmyra Atoll are often 27°- 30° C.[4] Although the depth of the mixed layer in the pelagic waters around Kingman Reef is seasonally variable, average mixed layer depth is around 80 m (R. Moffit, PIFSC, pers. comm.).

Sea surface temperatures of pelagic EEZ waters around Johnston Atoll are often 27°- 30° C.[5] Although the depth of the mixed layer in the pelagic waters around Johnston Atoll is seasonally variable, average mixed layer depth is around 80 m (R. Moffit pers. comm.).

Sea surface temperatures of pelagic EEZ waters around Wake Island are often 27°- 30° C.[6] Although the depth of the mixed layer in the pelagic waters around Wake Atoll is seasonally variable, average mixed layer depth is around 80 m (R. Moffit, PIFSC, pers. comm.).

1. Traditional and Historical Pelagic Fisheries

As many tropical pelagic species (e.g. skipjack tuna) are highly migratory, the fishing fleets targeting them often travel great distances. Although the EEZ waters around Johnston Atoll and Palmyra Atoll are over 750 nm and 1000 nm (respectively) away from Honolulu, the Hawaii longline fleet does seasonally fish in those areas. For example, the EEZ around Palmyra is often visted by Hawaii-based longline vessels targeting yellowfin tuna, whereas at Johnston Atoll, albacore tuna is often caught in greater numbers than yellowfin or bigyeye tuna. Similarly, the U.S. purse seine fleet also targets pelagic species (primarily skipjack tuna) in the EEZs around some PRIA, specifically, the equatorial areas of Howland, Baker, and Jarvis Islands. The combined amount of fish harvested from these areas from the U.S. purse seine on average is less than 5 per cent of their total annual harvest.

2. Pelagic Fisheries Development

The USFWS prohibits fishing within the Howland Island, Jarvis Island, and Baker Island National Wildlife Refuge (NWR) boundaries. Currently, Howland Island and Baker Island are uninhabited. Currently the USFWS continues to manage Johnston Atoll as a National Wildlife Refuge, but does allow some recreational fishing within the Refuge boundary

3. Administrative or Management Actions to Date

Along with the original measures placed into the Pelagics FMP, the following amendments were made which affected the pelagic fisheries of the PRIAs:

[3] http://oceanwatch.pifsc.noaa.gov/
[4] http://oceanwatch.pifsc.noaa.gov/
[5] http://oceanwatch.pifsc.noaa.gov/
[6] http://oceanwatch.pifsc.noaa.gov/

AMENDMENT 1 (effective March 1, 1991) defined recruitment overfishing and optimum yield for each PMUS.

AMENDMENT 2 (effective May 26, 1991) implemented permitting and logbook requirements for domestic pelagic longline fishing and transshipment vessel operators.

AMENDMENT 8 (effective Feb. 3, 1999, and July 3, 2003) addressed new requirements under the 1996 Sustainable Fisheries Act, included designations of essential fish habitat, descriptions of fishing communities, overfishing definitions and bycatch.

AMENDMENT 10 (prepared and transmitted to the NMFS for approval in parallel with the FMP for Coral Reef Ecosystems of the Western Pacific Region) clarified the PMUS by removing all but truly oceanic sharks to the Coral Reef Ecosystems FMP along with dogtooth tuna.

REGULATORY AMENDMENT 2 (effective Oct. 4, 2002) established federal permit and reporting requirements for any vessel using troll or handline gear to catch PMUS in EEZ waters around the Pacific Remote Island Areas of Kingman Reef; Howland, Baker, Jarvis, Johnston and Wake Islands; and Palmyra and Midway Atolls.

III. The Current Status of Pelagic Fisheries of the Western Pacific Region

A summary of the total pelagic landings during 2006 in the Western Pacific and the percentage change between 2005 and 2006 is shown in Table 2.

Table 2. Total pelagic landings in lbs in the Western Pacific Region in 2006

Species	Am Samoa	% change	Guam	% change	CNMI	% change	Hawaii *	% change
Swordfish	65,959	+741.7					2,599,000	-26.7
Blue marlin	46,039	+9.4	29,222	+217.4	1,402	-12.1	1,200,00	+6.8
Striped marlin	13,970	+98.4					1,466,000	+20.2
Other billfish	17,925	+90.5	3,032	+	315	+728.9	417,000	-17.9
Mahimahi (dolphinfish)	49,415	-6	162,512	+51.6	17,181	-36.1	1,479,000	-6.8
Wahoo	624,809	+29.4	105,879	+141	3,116	-7	984,000	+11.3
Opah (moonfish)	6,455	-13.5					1,084,000	-0.9
Sharks (whole wgt)	2538	+180.1	630	+			337,000	-14.2
Albacore	9,201,145	+42.7					783,000	-25.4
Bigeye tuna	441,786	+51.5					10,520,000	-9.9
Bluefin tuna							1,000	-50
Skipjack tuna	465,640	+43.4	146,658	+47.6	265,753	+2.6	1,081,000	-8.6
Yellowfin tuna	1,088,741	-4.7	28,049	+12.6	41,996	-19.3	3,118,000	-3
Other pelagics	6890	-5.8	34,628	+84.6	17,120	-10.6	1,070,000	-4.5
Total	**12,031,310**	**+36.4**	**510,610**	**+68.3**	**346,885**	**-6.4**	**26,138,000**	**-8.6**

**Hawaii data not available as of 7/5/07*

IV. 2006 Region-wide Pelagics Plan Team Recommendations

The Pelagics Plan Team met in Honolulu, Hawaii on April 17-19, 2007 and made the following recommendations to the Council:

1. The Pelagic Plan Team recommends that a compliance guide be developed by PIRO for general longline permit holders in the Western Pacific.

2. The Pelagic Plan Team recommends that the PIFSC and PIRO conduct a review of the methods employed by the Pacific Council's Highly Migratory Species Management Team for effort standardization of US vessels targeting north Pacific albacore.

V. Data Modules

A. American Samoa

Introduction

The pelagic fishery in American Samoa has historically been an important component of the traditional domestic fisheries. Prior to 1995 the pelagic fishery was largely a troll-based fishery. Horizontal of longlining was introduced to the Territory by Western Samoan fishermen in 1995. Local fishers have found longlining a worthwhile venture as they land more pounds with less effort and use less gasoline for trips. All most all of the vessels used are “alias”. These are locally built, twin-hulled (wood with fiberglass or aluminum) boats about 30 feet long, powered by 40HP gasoline outboard engines. Navigation on the alias is visual, using landmarks with the exception of a few modernized alias that have global positioning systems (GPS). Gear is stored on deck attached to a hand-crank reel that can hold as much as 10 miles (25 miles for the jig-boat) of monofilament mainline. The gear is set by spooling the mainline off the reel and retrieved by handpulling and cranking the mainline back onto the reel. Trips are one day long (about 8 hours) with the exception of 2 boats. The boats are slightly bigger overnight gear than the regular alia. Setting generally begins in early morning. Haulback is generally in the mid-day to afternoon. The catch is stored in containers secured to the deck, or in the hulls. Albacore is the primary species caught, and is generally stored in personal freezers until a sufficient amount accumulates to the canneries. Some of the catch is sold to stores, restaurants and local residents. Catch is also donated for family functions.

In mid-1995 five alias began longlining. The number of alias grew to 12 boats involved in longline fishing in 1996. In 1997, 33 vessels had permits to longline of which 21 were actively fishing on a monthly basis. Also, in 1997 the first longline vessel of 60 plus feet in length (the 60 plus foot longliners are capable of making multi-day trips) began operating in American Samoa. In 1998, 50 local vessels received federal permits to longline but only 25 did longline. Fifty-nine local vessels received federal permits in 1999 to longline but only 29 participated in the longline fishery. In 2000, 37 vessels were active in the longline fishery. In the last half of 2000 the number of larger multi-day longline boats operating in American Samoa grew dramatically to over a half a dozen. In 2001, the number of vessels participating in the longline fishery increased dramatically by 68%, whereas the number of vessels participating in the trolling fishery slightly decreased by 5%. In 2002, 66 boats registered and 60 participated in the longline fishery while in 2003 the number of boats which registered dropped to 57 and the number effectively fishing dropped to 51. Drop in length frequency after 2002.

Prior to 1985, only commercial landings were monitored. From October 1985 to the present, data was collected through an offshore creel survey including subsistence and recreational fishing as well as commercial fishing. In September, 1990 a Commercial Purchase (receipt book) System was instituted requiring all businesses in Samoa, except for the canneries, that buy fish commercially to submit to Department of Marine and Wildlife Resources (DMWR) with a copy of their purchase receipts. In January 1996, in response to the developing longline fishery a federal longline logbook system was implemented. All longline fishermen are required to obtain a federal permit and require to submit logs containing detailed data on each of their sets and the resulting catch. From 1996 to 1999, the logbooks submitted by the local longliners were edited in Samoa for any missing data and were then sent to the NMFS Honolulu Lab every week for further editing and data processing. Starting with 2000, logbook data was entered and maintained in Samoa and downloaded to NMFS in Hawaii periodically.

On July of 1999, In response to a problem with delinquent longline logs, the DMWR initiated a Daily Effort Census (DEC) program to monitor the local longline fleet. Using the Daily Effort Census form, containing all active longline vessels, data collectors monitor which boats are out longlining and which boats are in port. The DEC form is returned to DMWR for data entry at the end of each working day. Federal logbooks are submitted to DMWR by the following Monday after each fishing trip. Warnings are issued to the fishermen that fail to submit logbook. More punitive measures are taken when warnings are not heeded.

Toward the end of 2000 many new multi-day trip boats joined the longline fleet making it hard to tell what they were doing when out of port. To solve this problem the longline logbook data is compared with reports from the canneries of fish unloaded to identify boats delinquent in their longline logs.

"Peculiarities" in the historical data, the emergence of new, bigger boats that make multi-day trips required amending and supplementing the algorithms that expand American Samoa's offshore creel survey data. WPacFIN staff have completed modifications to the Visual FoxPro data processing system to address data concerns and better reflect the status of the Territory's pelagic fisheries. Changes are outlined below. The data from 1982-1985 has been left unchanged from the Dbase IV Commercial Catch Monitoring System however data from 1986-2006 in this report has been re-expanded with the new Visual FoxPro data processing system. The report contains true annual expansions of the entire year's interviews across the entire year's sample days and are no longer sums of 12 monthly expansions. Note that there are some changes to the historical data due to the new re-expanded and adjusted data. As a result, the graph presentations have also changed.

Total landings data covers all fish caught and brought back to shore whether it enters the commercial market or not. Commercial landings covers that portion of the total landings that was sold commercially in Samoa both to the canneries and other smaller local business. Total landings include both the commercial and recreational/subsistence components of the fishery. Commercial landings data from 1982-1985 was imported from the Commercial Catch Monitoring System without change. From 1986 to 1990, the estimated total landings and estimated commercial landings data was taken from the Offshore Creel Survey System expansion.

One problem with the offshore creel survey was that spear fishing and bottom fishing trips are usually done at night. These boats came in early in the morning before the interviewers were on duty resulting in very few interviews for these types of trips. These fishermen still had to sell their fish so starting in 1991 the Commercial Purchase System provided information on what they caught. From 1991 to present the Offshore Creel Survey landings were replaced by Commercial Purchase System landings for species where the Commercial Purchase System landings exceeded the Offshore Creel Survey landings. This happens most often for swordfish and dogtooth tuna.

Until 1995 all trips where interviews were not obtained were put in the “unknown” fishing method category. For all of the trips where interviews were obtained a percentage of trips by fishing method was calculated. The unknown trips were then divided up by this percentage and added to the interviewed trips. Since most of these unknown trips were bottomfishing and spearfishing trips and very few real interviews for these fishing methods were obtained, these two fishing methods were under represented in the offshore creel survey expansion.

Since the vessels involved in these unknown trips was known and since certain boats only engaged in certain fishing methods, their fishing method could be changed from unknown to some known method. From 1995 and after this was done except for vessels engaging in multiple fishing methods at the same time. The fishing method for these remained unknown. The number of unknown fishing trips was greatly reduced and the bottomfishing and spearfishing trips became better represented in the offshore creel survey.

In 1997 the first vessel to make multi-day trips started operating in Samoa. It unloaded only at the canneries and if an interview could be obtained it would be hard to fit its data into the offshore creel survey system which was designed for vessels making one day trips. Toward the end of 2000 six more vessels joined this category known as non-interviewed vessels. Fortunately all of these larger non-interviewed vessels are required to submit longline logs. The longline log record of kept fish from these non-interviewed vessels was added to the longline total landings from interviewed vessels in the offshore creel survey system.

From 1997 to 2000, the entire logbook kept catch of wahoo, albacore, bigeye, skipjack and yellowfin tuna by the non-interviewed vessels was assumed to have been sold to the canneries and was added to the commercial landings at canneries prices obtained from the creel survey system. All other species of kept fish in the longline logs of non-surveyed vessels was treated as unsold and were only added to the total landings. Starting in 2001, the disposition of fish kept by the non-surveyed vessels became available from Cannery Sampling Forms. From these Cannery Sampling Forms a percentage of each species that were sold locally, sold to the canneries, or not sold could be calculated for the year and applied to the entire non-surveyed catch. This allowed the proper percentages of each species to be added to the commercial landings with either the canneries price/pound or the local price/pound.

These Cannery Sampling Forms also listed the lengths of individual fish from which their weights can be calculated. They started in 1998 listing only albacore lengths but in 2001 they listed lengths of other species as well. The weight per fish for the non-surveyed vessels was first taken as the monthly average of the cannery sampling data if there were at least 20 samples for a month. It was then taken as the annual average of the cannery sampling data if there were at least 20 samples for the year. If there wasn’t enough cannery samples for a species, the weight per fish was calculated from the offshore creel survey data on a monthly basis where there were 20 or more samples or on a yearly basis. If there weren’t 20 samples for a year a default value of weight per fish was obtained by averaging all of the offshore creel survey data or by manually entering a value.

In 1999 vessels emerged that made 3-5 day trips and could still be interviewed. Since the interview data is generally better than log data, these vessels are treated like normal interviewed vessels in the offshore creel survey system but their catch is divided by the number of sets they made during their multi-day trips.

Starting in 1999, many of the longline boats began landing their catches gilled and gutted to obtain higher prices at the canneries. The offshore creel survey system was modified to calculate appropriate round weights from the non-round weight using standard conversion factors for all species.

Starting in 2000, many interviewers started recording the length of the larger fish rather than trying to weigh them. The offshore creel survey system was modified to calculate appropriate round weights from the length measurements using a standard regression formula.

Starting in 2001 the method of determining price/pound was revised. Before 2001 price/pound was determined by averaging offshore creel survey data. This sometimes resulted in 4-5 samples, some of which were erroneous determining the price per pound for an entire species for a year. In 2001, the price per pound for fish sold locally in Tutuila was first determined by averaging the Commercial Purchase System (Receipt Book) data for each month. For months and species without any monthly data an annual average price/pound value from the receipt book data was used. If there was no annual average from the receipt book data a monthly average of the offshore creel survey data was calculated for each of three price/pound categories; Tutuila-Local, Manua_local and Cannery. Again if there was no monthly samples available for a given month, species and category an annual average of creel survey data was used. In cases where there was no creel survey data for a species and category for a year a value was entered manually. Values were also entered manually to override calculated values that were determined to be erroneous.

The “other pounds” category in Table 1 includes pelagic species not caught by longlining or trolling. Examples are barracuda, rainbow runner and dogtooth tuna, caught with bottomfishing or spearfishing methods. In addition, “other sharks” as it is identified on Table 1, categorizes all species of sharks that could and could not be identified by the fishermen.

The Offshore Creel Survey System showed almost no By-Catch species during 2002 thus the bycatch for longlining was assumed to be the released species in the longline logbook system. In addition, the number of bycatch has impressively increased for this year. There were no fishing tournaments held during 2002.

The island of Tutuila is also a major base for the trans-shipment and processing of tuna taken by the distant-waters longliner and purse seine fleets. The domestic pelagic fishery is monitored by the Department of Marine and Wildlife Resources (DMWR), through a program established in conjunction with the Western Pacific Fishery Information Network (WPacFIN). This report was prepared by DMWR using information obtained and processed as explained above.

With the increase of the longline fishery since its development, many different-size vessel entered the fisheries, especially 2001. For this latest report (2001), the following tables have been included to better represent effort & catch, bycatch percentages, and CPUE for the different-size vessels:

- Table 3 & 4 represents longline effort and catch
- Table 5 represents longline bycatch percentages
- Table 7 represents longline catch per 1000 hooks
- Table 8 has been modified to include the cannery sampling average weight per fish.

Summary

Landings (in pound, not number of fish) - In the year 2003, there was a 28.7% decrease in the total landings for tuna and a 7% increase in the total landings for other pelagic species. Longlining constituted approximately 99.7 % of the total landings whereas trolling constituted 0.3 % of landings recorded. All in all, there has been a 27.3% decrease in the total landings for all tuna species and other pelagic species caught using the longline method. The total landings of albacore, which is the main target, has decreased by 32.8%.

CPUE - The CPUE for total catch has decreased by 22.5 % reflecting mainly the huge decreases of CPUE for Albacore (- 35.6% from 25.48 to 16.41 fish per 1000 hooks) and skipjack (-40.4 from 4.92 to 2.93 fish per 1000 hooks). CPUE for Mahimahi and for billfish decreased also, but their part in the fishery is minor. In contrast there was an increase of CPUE for Bigeye and Yellowfin while CPUE for Wahoo and sharks has changed very little.

Fish Size - The average size for all Tuna has dramatically decreased (e.g., from 2002 to 2003, the weight, in pound per fish, drop from 11.1 to 8.6 for Skipjack, from 45.5 to 38.6 for Albacore, from 28.0 to 17.8 for Yellowfin and from 67.6 to 37.2 for Bigeye), while for the mahimahi and the wahoo, the average weight has changed very little. For the majority of the remaining of the pelagic species, the reported catch is too small to come to any conclusion about the variability in the average size.

Pelagic fishing revenues - The total revenue of $10,491,420.00 has decreased by 27.1% compared to last year ($14,390,751.00) (Table 2). This reflects the decreased catch and the lower prices for the non Tuna PMUS, compensated to a small extent by the increase in the price per pound for the Tuna.

Evolution of the longline fishery - During 2003, 51 boats engaged in the longline fishery of American Samoa whereas 20 boats participated in the trolling fishery. This depicts a 15% decrease from the 60 boats that engaged in the longline fishery last year and a 25% increase from the 16 boats participating in the trolling fishery in 2002..

Changes in the longline fishery were significant this year, with a decrease of 44% in the Alia fleet (from 27 to 15), while the number of large vessels increased +10 % (from 29 to 32 boats). This change is reflected in the decrease in sets deployed (-9.4%) and by the larger number of hooks deployed (+8.2% according to the logbook data and +7.9% according to the creel survey data). Since 1997 and the first large vessel entered the longline fishery, it is the first year that the total tuna CPUE is lower for the vessels greater than 50 feet than for the Alia fleet. The decrease in CPUE is important for the large vessels (-30%) and for the monohull<50feet (-27.6%) while it increased for the Alia fleet (+19.9%).

Evolution of the trolling fishery - Trolling catch rates have varied since 1982, with a steady decrease between 1999 and 2002. This year we observed an important increase in the catch rate (+60.9%), but the total hours (1035 hours) spend trolling has decreased by 23 % compared to 2002 (1341 hours), close to its lowest level (1019 hours) in 1982. At the same time, more boats were trolling than last year. It is possible that the Alias which stopped longlining in 2002 now troll occasionally when the fishing conditions are very good. That could explain the high catch rates and the low average hours the boats were fishing.

Conclusion - Overall, the longline fishery has been growing from 1995 to 2002. At first the growth was mainly in the small scale fishery of the Alia fleet, now the growth is in the industrial fishery and their large vessels. In 2003 the declining trend of the fishing, biological and commercial indicators is a strong warning for the pelagic fishery. This decline could be the result of an overfishing situation but the effect of a "mini El Nino "which occurred by the end of 2003 could possibly have affected the fishery. By the end of 2003, some large longliners have left the American Samoa fishery for the Hawaiian fishery, which may be more profitable.

2005 Recommendations and *current status*

1. The Pelagics Plan Team recommends that the National Marine Fisheries Service (NMFS) or the PFRP (Pelagic Fisheries Research Program) perform a study on the spatial and temporal dynamics of longline fishing around American Samoa. Some of the analyses in the American Samoa module suggest fishery interactions may be occurring, and the concentration of fishery effort in the American Samoa fishery now exceeds anything previously seen in Council managed fisheries. ***A PFRP funded project will conduct the analyses outlined in this recommendation.***
2. The Pelagics Plan Team recommends that more collaborative research and management initiatives be developed between the American Samoa Department of Marine and Wildlife Resources (DMWR) and the Western Samoa Fisheries Division, given that the combined landings from both longline fisheries produce about 30% of the albacore caught in the southern Pacific Ocean, and may be representative of the stock as a whole. ***The Council contacted the Samoa Fisheries Division in August 2003 and received a favorable response in September 2003 about collaborative approach to longline research and management. Note also that the PFRP project mentioned above includes collaboration with Samoa's Fisheries Division.***
3. The Pelagics Plan Team recommends holding informative workshops for boat-owners and fishermen explaining to them the importance of obtaining this information, how to accurately fill in the information and benefits they can receive through accurately filling out this information e.g longline logbook. ***NMFS-PIRO has conducted protected species workshops in American Samoa which included instruction on logbook completion***.
4. The Pelagics Plan Team recommends that NMFS fund an observer program for the American Samoa longline fishery. A priority for the observer program in American Samoa should be the documentation of the condition and disposition of all fish released from longline fisheries. The Pelagics Plan Team recognizes that there may be an issue with the large percentage of releases of species in this expanding fishery. It will be important to document or estimate how many of these releases are alive. Although less reliable than observer data, logbook data could provide such information, especially if the observer program is slow to start. ***An observer program will be implemented when the American Samoa limited entry program is finalized in 2004. Trials with observers on***

three longline trips were completed by PIRO in 2003.

5. The Plan Team recommends NMFS or PFRP to conduct research on post-release mortality of bycatch species in the American Samoa longline fishery using archival tags. ***Some observations are being conducted with albacore caught by alia catamarans to assess the internal condition of albacore retrieved alive.***

2006 Recommendations

1. The Pelagic Plan Team recommends that, pending the results of a re-analysis of the longline set data with the verified area closure coordinates, the Council send a letter to NMFS Office of Law Enforcement outlining concerns that large (>50ft) longline vessels may be fishing within the 50 nm closed area around the islands of American Samoa, and that NMFS OLE should conduct an investigation and take action to ensure that these violations are curtailed. [The letter should include the results of an investigation of a rerun of the data with the verified coordinates for the area closures].
2. The Pelagic Plan Team recommends that as the Council and DMWR move forward with the original recommendation for closer collaboration with neighboring Samoa that this be expanded to include broader cooperation with all the countries bordering the American Samoa EEZ, to collect and process regional data in order to have a regional view of the fisheries.
3. The Pelagic Plan Team recommend that DMWR seek grants to develop infrastructure and processes to utilize bycatch, which may require hiring a qualified contract grant writer.

Plan Team Action Items

1. The Pelagic Plan Team recommends that DMWR continue to develop their GIS mapping capability of the American Samoa longline catch, effort and CPUE data
2. The Pelagic Plan Team recommend that WPacFIN develop a time series of vessels by size classes as per the four size classes used in the limited entry amendment for the 2005 Pelagic Plan Team annual meeting.

Table 1. Estimated total pelagic-species landings from longline, troll and other gear for American Samoa during 2006.

Species	LongLine Pounds	Troll Pounds	Other Pounds	Total Pounds
Skipjack tuna	465,640	11,408	0	477,048
Albacore	9,201,145	0	0	9,201,145
Yellowfin tuna	1,088,741	8,309	0	1,097,049
Kawakawa	48	65	5	119
Bigeye tuna	441,786	57	0	441,843
Misc tunas	527	0	0	527
TUNAS SUBTOTALS	11,197,887	19,839	5	11,217,731
Mahimahi	49,415	1,056	0	50,470
Black marlin	711	0	0	711
Blue marlin	46,039	0	0	46,039
Striped marlin	13,970	0	0	13,970
Wahoo	624,809	648	0	625,456
All sharks	2,538	362	90	2,990
Swordfish	65,959	0	0	65,959
Sailfish	12,158	0	0	12,158
Spearfish	5,056	0	0	5,056
Moonfish	6,455	0	58	6,513
Oilfish	2,192	0	0	2,192
Pomfret	1,060	0	0	1,060
NON-TUNA PMUS SUBTOTALS	830,360	2,066	148	832,574
Misc barracudas	1,477	582	805	2,864
Rainbow runner	0	152	72	224
Dogtooth tuna	0	155	467	622
Misc pelagic fish	1,586	4,619	182	6,387
OTHER PELAGICS SUBTOTALS	3,063	5,508	1,526	10,097
TOTAL PELAGICS	**12,031,310**	**27,412**	**1,680**	**12,060,402**

More than twelve million pounds of pelagic species were landed in American Samoa during 2006. Longline fishing dominated (99.8 %) pelagic landings during 2006 for American Samoa. Over 9.2 million pounds of albacore dominated (76 %) the longline caught pelagic species landings in American Samoa during 2006 followed by yellowfin (9%), skipjack (4%) and bigeye (4%) tunas. Wahoo (625,000 pounds) dominated the non-tuna Pelagic Management Unit Species (PMUS) landings for American Samoa during 2006. Nearly 66,000 pounds of swordfish were landed in American Samoa during 2006. The 2006 American Samoa troll landings were mostly skipjack (11,400; lbs 42%) and yellowfin (8,300 lbs; 30%) tunas; other top troll-landings categories included miscellaneous species (17%) and mahimahi (4%).

Calculations: Landing estimates include both commercial and unsold fish sampled by the Department of Marine and Wildlife resources boat-creel survey. The estimates are calculated from trip interviews expanded for trips not included in the interviews. Boat-creel landing estimates are cross checked with logbooks and commercial sales.

The "troll pounds" category includes the pelagic landings of combined troll/bottomfishing trips as well as the landings of purely troll trips. The "other pounds" category in Table 1 includes pelagic species not caught by longlining or trolling such as barracuda, rainbow runner and dogtooth tuna, caught with bottomfishing or spearfishing methods.

Table 2. Estimated 2006 commercial landings, value and average price for pelagic species in American Samoa.

	Longline			Troll/Non-Longline		
Species	**Pounds**	**Value($)**	**$/LB**	**Pounds**	**Value($)**	**$/LB**
Skipjack tuna	463,030	$256,558	$0.55	9,747	$9,082	$0.93
Albacore	9,195,939	$9,237,907	$1.00	0	$0	
Yellowfin tuna	1,085,432	$1,019,298	$0.94	7,391	$14,976	$2.03
Kawakawa	0	$0		70	$140	$1.99
Bigeye tuna	438,234	$486,505	$1.11	57	$86	$1.50
TUNAS SUBTOTALS	11,182,635	$11,000,267	$0.98	17,265	$24,283	$1.41
Mahimahi	28,981	$51,071	$1.76	688	$888	$1.29
Black marlin	613	$613	$1.00	0	$0	
Blue marlin	8,428	$9,602	$1.14	0	$0	
Wahoo	613,178	$372,458	$0.61	364	$458	$1.26
All sharks	198	$99	$0.50	426	$213	$0.50
Swordfish	46,296	$103,266	$2.23	0	$0	
Sailfish	2,339	$2,339	$1.00	0	$0	
Moonfish	372	$484	$1.30	58	$76	$1.30
NON-TUNA PMUS SUBTOTALS	700,405	$539,931	$0.77	1,536	$1,634	$1.06
Misc barracudas	1,130	$2,259	$2.00	994	$1,988	$2.00
Rainbow runner	0	$0		107	$217	$2.03
Dogtooth tuna	0	$0		431	$822	$1.91
Misc pelagic fish	0	$0		4,801	$12,002	$2.50
OTHER PELAGICS SUBTOTALS	1,130	$2,259	$2.00	6,333	$15,029	$2.37
TOTAL PELAGICS	**11,884,170**	**$11,542,457**	**$0.97**	**25,135**	**$40,946**	**$1.63**

More than 11.8 million pounds of pelagic species are estimated to have been sold in American Samoa during 2006; 98.8 % of the estimated total pelagic-species landings. Longline fishing dominated (99.8 %) pelagic landings during 2006 for American Samoa. Over 9.19 million pounds of albacore dominated (77 %) the longline caught pelagic-species commercial landings in American Samoa during 2006 followed by yellowfin (1 million lbs), skipjack (463,000 lbs) and bigeye (438,000 lbs) tunas. Wahoo (613,000 pounds) dominated the non-tuna Pelagic Management Unit Species (PMUS) commercial landing estimates for American Samoa during 2006. Nearly 46,000 pounds of swordfish were landed in American Samoa during 2006. The estimated 2006 American Samoa commercial troll landings were mostly skipjack (9,700; lbs 39%) and yellowfin (7,400 lbs; 29%) tunas and miscellaneous species (4800 lbs; 19%).

More than 11.5 million dollars worth of pelagic species were landed in American Samoa during 2006. Longline fishing dominated (99.6 %) the value of pelagic landings during 2006 for American Samoa. Over 9.2 million dollars worth of albacore dominated (80 %) the value of longline caught pelagic species in American Samoa during 2006 followed by yellowfin ($1 million), bigeye ($0.49 million), and skipjack ($0.26 million) tunas. Wahoo ($370,000), swordfish ($100,000) and mahimahi ($51,000) were the top-value non-tuna Pelagic Management Unit Species (PMUS) for American Samoa during 2006. The highest value troll landing categories for 2006 in American Samoa were yellowfin tuna ($14,900), miscellaneous species ($12,000) and skipjack tuna ($9,000).

Troll and non-longline fish were generally higher or at least equal value to longline caught fish, except for mahimahi. The higher value may reflect that the troll caught fish are from near port and require very limited transport, where as longline fish are often stored and brought from greater distances. Swordfish ($2.23) and mahimahi ($1.76) were the highest longline values per pound. Wahoo averaged $0.61 per pound during 2006 in American Samoa. Longline caught tunas averaged $0.98 per pound in American Samoa during 2006.

Calculation: Estimated landings calculations are described with Table 1. Commercial landings are total landings adjusted by the percent sold reported in boat-based angler interviews and checked against sale reciepts. Value is totaled from sales receipts. Average dollars per pound is calculated by dividing total value by total pounds sold.

Table 3A-1. Longline effort for boats landing in American Samoa during 2006

EFFORT

	All Vessels
Boats	28
Trips	331
Sets	5,069
1000 Hooks	14,263
Lightsticks	22,363

Table 3A-2. Number of fish kept by longline boats landing in American Samoa during 2006

KEPT (Number of Fish)

Species	All Vessels
Skipjack tuna	35,557
Albacore	262,905
Yellowfin tuna	21,748
Bigeye tuna	12,259
Misc tunas	32
TUNAS SUBTOTALS	332,501
Mahimahi	2,598
Black marlin	1
Blue marlin	402
Striped marlin	134
Wahoo	19,577
All sharks	36
Swordfish	939
Sailfish	176
Spearfish	111
Moonfish	195
Oilfish	158
Pomfret	130
NON-TUNA PMUS SUBTOTALS	24,457
Misc barracudas	15
Misc pelagic fish	33
OTHER PELAGICS SUBTOTALS	48
TOTAL PELAGICS	**357,006**

Table 3B. American Samoa 2006 longline number of fish released

RELEASED (Number of Fish)

Species	All Vessels
Skipjack tuna	10,295
Albacore	174
Yellowfin tuna	879
Bigeye tuna	1,259
Misc tunas	4
TUNAS SUBTOTALS	12,611
Mahimahi	2,711
Black marlin	4
Blue marlin	2,236
Striped marlin	341
Wahoo	1,851
All sharks	7,487
Swordfish	167
Sailfish	626
Spearfish	1,177
Moonfish	502
Oilfish	6,359
Pomfret	526
NON-TUNA PMUS SUBTOTALS	23,987
Misc barracudas	224
Misc pelagic fish	618
OTHER PELAGICS SUBTOTALS	842
TOTAL PELAGICS	**37,440**

Interpretation: Table 3A-1 lists that 28 vessels landed pelagic species in American Samoa during 2006. The vessels conducted a total of 331 fishing trips, that accomplished 5069 longline sets, while using 14,263,000 hooks and 22,363 lightsticks during 2006. Table 3A-1 values were used to calculate that on average for longline vessels landing in American Samoa during 2006:

11.8 trips and 181 sets were made **per boat**
509,393 hooks and 799 lightsticks were used **per boat**
15.3 sets were made, 43,090 hooks were set, and 68 lightsticks were used **per trip**
2814 hooks and 4.4 lightsticks were used **per set**

More than two-hundred and sixty thousand (260,000) individual albacore were kept by longline fishermen landing in American Samoa during 2006; these calculate to 73.6 percent of the fish kept by these fishermen. Over 35,000 skipjack, 21,000 yellowfin, 12,000 bigeye tunas were also kept by longline fishermen landing in American Samoa during 2006. Over 19,000 Wahoo, 2,500 mahimahi, and 900 swordfish were also kept by longline fishermen landing in American Samoa during 2006. Less than 1000 individuals were kept for each of the other pelagic-species categories during 2006.

More than 10,000 skipjack tuna, 7,400 shark and 6,300 oilfish were released by longline fishermen landing pelagic-species in American Samoa during 2006; these three species are 27.5, 19 and 17 percent of the released individuals (63.5 % of total releases), respectively. Few tunas were released, on average 3.7 percent of the individuals. Tuna release rates was highest for skipjack at 22.5 percent followed by bigeye at 9.3 percent. The non-tuna Pelagic Management Unit Species (PMUS) were most often released by pelagic longline fishermen landing in American Samoa during 2006. Wahoo at 8.6, swordfish at 15, and mahimahi at 51 percent were released the least for non-tuna PMUS. Fish can be released for various reasons including quality, handling and storage difficulties, and marketing problems. Investigation into the reasons for releasing of pelagic species are recommended because of the high release rate for many non-tuna PMUS and releases of some tuna.

Calculation: These values are sums of Longline Logbook data for the three types of longline vessels in Samoa. All species of sharks entered in the Longline Logs are combined in the Other Sharks species. Rays and Sunfish are included in the Other Pelagic Fish species. A trip is a unique combination of boats and return dates where the return date is in the current year.

Table 4. **Longline effort and catch by different length vessels relative to the 50 mile restricted areas surrounding Tutuila-Anu'u and Swains Islands, American Samoa during 2006**

No 2006 table Intentionally

Specific table entries are confidential when presented in combination. Number of vessels, longline sets and hooks set were dominated (over 95 percent) by boats greater than fifty feet setting outside restricted areas. The ratio of total pelagic catches (numbers of fish) by the larger boats outside:inside the restricted areas are greater than 95 percent. Albacore continues to be the most commonly caught species inside and outside of the 50 mile areas regardless of boat size.

Calculation: These values are sums of Longline Logbook catch (kept + released + finned) data for longline vessels in Samoa that are less than 50 feet long and more than 50 feet long. The less than 50 foot category includes alias and monohulls less than 50 feet long. The 50 mile areas include one around Tutuila bounded by the following four points

13 deg 30 min S latitude x 170 deg 50 min W longitude
13 deg 30 min S latitude x 167 deg 25 min W longitude
15 deg 13 min S latitude x 167 deg 25 min W longitude
15 deg 13 min S latitude x 171 deg 39 min W longitude

and one around Swains's Atoll bounded by the following four points

10 deg 13 min 11 sec S latitude x 170 deg 20min W longitude
11 deg 48 min S latitude x 170 deg 20min W longitude
11 deg 48 min S latitude x 171 deg 50min W longitude
10 deg 23 min 30 sec S latitude x 171 deg 50min W longitude

A set is considered inside one of these areas if any of the begin set, end set, begin haul or end haul positions is inside one of these areas. All species of sharks entered in the Longline Logs are combined in the Sharks species. Rays and Sunfish are included in the Other Pelagic Fish species.

A trip is defined as a unique pair of boats and return dates where the return date is in the current year. A trip is considered inside of the 50 mile areas if any of its sets are in the 50 mile areas.

There are three vessels over fifty feet in length who are allowed to fish inside of the 50 mile restricted zones because they were longline fishing before 11/13/97 and are grandfathered in. Their sets are in the **Boats > 50' Outside** category regardless of where they actually fished.

Table 5A. American Samoa 2006 bycatch percentages for longline vessels

Species	All Boats
Skipjack tuna	22.5
Albacore	0.1
Yellowfin tuna	3.9
Bigeye tuna	9.3
Misc tunas	11.1
TUNAS SUBTOTALS	3.7
Mahimahi	51.1
Black marlin	80.0
Blue marlin	84.8
Striped marlin	71.8
Wahoo	8.6
All sharks	99.5
Swordfish	15.1
Sailfish	78.1
Spearfish	91.4
Moonfish	72.0
Oilfish	97.6
Pomfret	80.2
NON-TUNA PMUS SUBTOTALS	49.5
Misc barracudas	93.7
Misc pelagic fish	94.9
OTHER PELAGICS SUBTOTALS	94.6
TOTAL PELAGICS	**9.5**

Table 5B. American Samoa 2005 Trolling Bycatch

	Bycatch						Interviews		
Species	Alive	Dead Inj	Unk	Total	Catch	%BC	With BC	All	%BC
All Species (Comparison)					2149	0.000	0	310	0.00

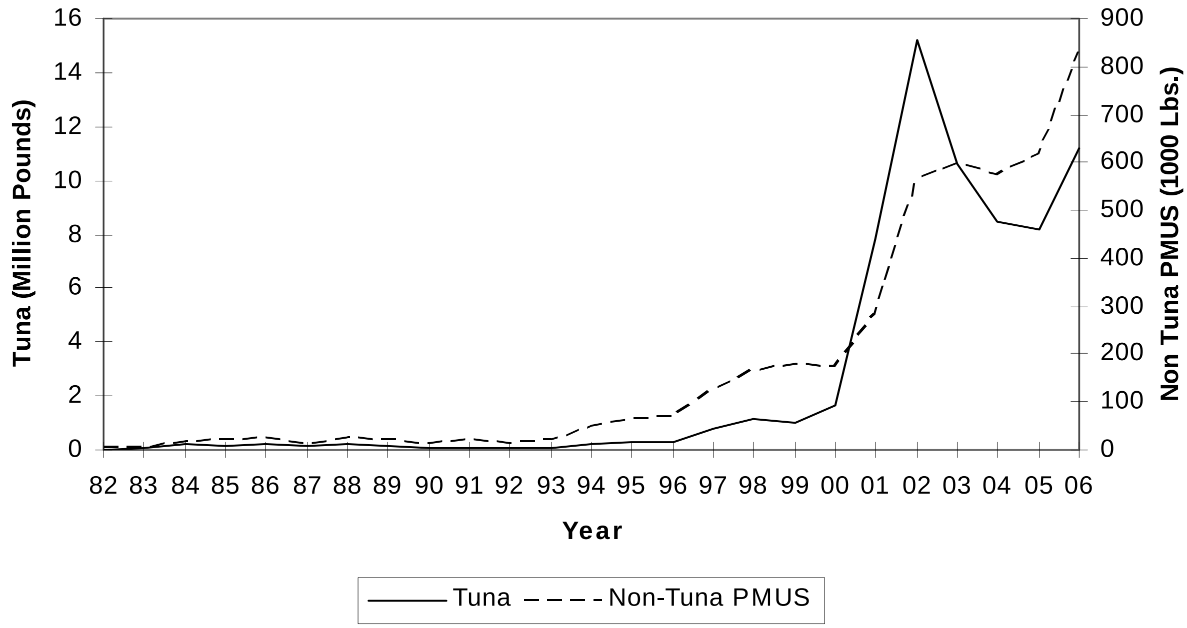
Interpretation Table 5A: Longline tuna release rates was highest for skipjack at 22.5 percent followed by bigeye at 9.3 percent. The non-tuna Pelagic Management Unit Species (PMUS) were most often released by pelagic longline fishermen landing in American Samoa during 2006. Wahoo at 8.6, swordfish at 15, and mahimahi at 51 percent were released the least for non-tuna PMUS. Fish can be released for various reasons including quality, handling and storage difficulties, and marketing problems. Investigation into the reasons for releasing of pelagic-species by longline fishermen are recommended because of the high release rate for many non-tuna PMUS and releases of some tuna.

Interpretation Table 5B: Three-hundred-ten (310) trolling only interviews record 2149 pelagic fish landed with no fish returned at sea: zero bycatch. Using fishermen's reports at the dock may not accurately reflect the number of fish returned at sea.

Calculation: The percentages in Table 5A are sums of the Longline Logbook numbers of released fish divided by the sums of the numbers of kept+released fish for each species and size of vessel. For shark species the numbers of fish kept includes those finned. The percentages for all boats is the sum of released species for all boats divided by the sum of kept plus the sum of released for all boats. The percentages in the SUBTOTALS and TOTALS row are similarly weighted percentages. All shark species in the Longline Logs are combined in the Other Sharks species. Rays and Sunfish are included in the Other Pelagic Fish species.

The Trolling Bycatch table is obtained from creel survey interviews. The Bycatch numbers are obtained by counting fish on interview forms for purely troll trips with a disposition of bycatch. Bycatch is reported by fishermen when interviewed at the landing site in response to questions from the data collector; bycatch are fish thrown back at sea by the fishermen. The catch for all species is included for comparison and is obtained by counting all fish listed on the same interview forms. The number of interviews is a count of the purely trolling interview forms.

Figure 1. Estimated total landings of Tuna and Non-Tuna pelagic-species by American Samoa vessels during 2006



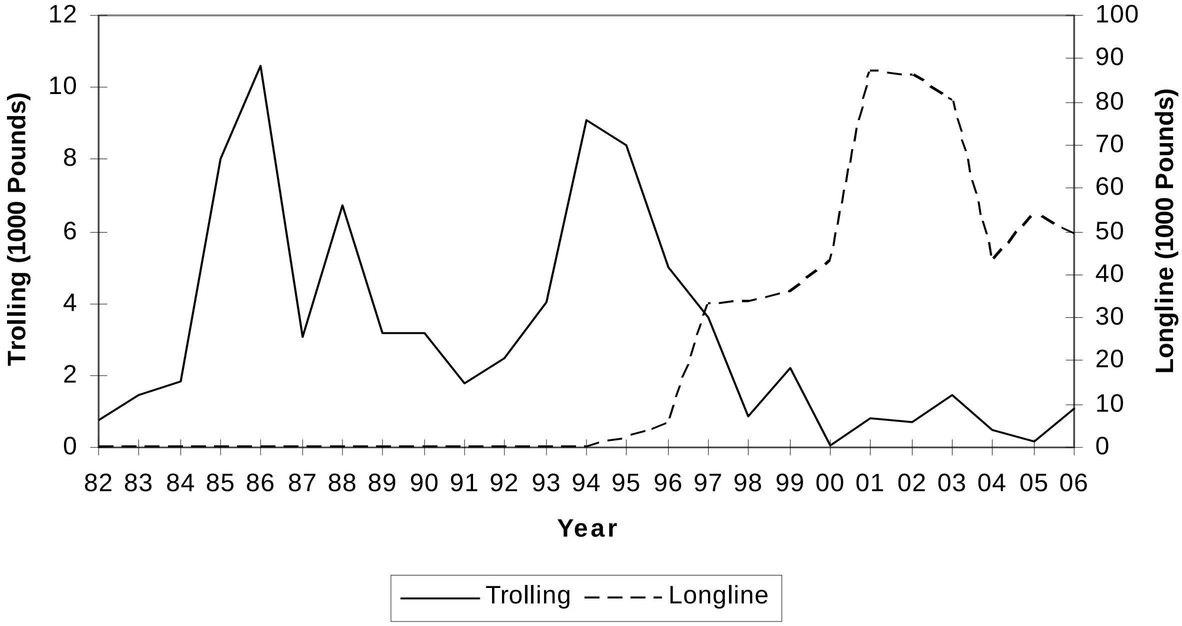
Interpretation: Total landing estimates exceeded 11.2 million pounds for tuna and 830,000 pounds for non-tuna Pelagic Management Unit Species (PMUS) by American Samoa vessels during 2006. Tuna landing estimates increased 3 million pounds (+37 %) relative to 2005 estimates; non-tuna PMUS landing estimates increased over 215,000 pounds (+35 %) relative to 2005 estimates. Estimated tuna landings peaked over 15 million pounds during 2002 and decreased through 2005. The estimated 2006 American Samoa tuna landings are the second highest recorded in the 25 year data record; seventy-four percent (74%) of the highest annual landings estimate from 2002. Estimated non-tuna PMUS landings have generally been increasing overtime; 2006 is the highest estimate for non-tuna PMUS in the 25 year record.

Calculation: Estimated total landings for Tunas and Non-Tuna PMUS were calculated by summing the total landings for the species

Year	Pounds Landed	
	Tuna	Non Tuna PMUS
1982	23,042	2,106
1983	90,057	4,806
1984	198,961	15,121
1985	107,659	19,686
1986	191,928	24,035
1987	144,122	10,899
1988	207,084	23,462
1989	173,518	20,720
1990	81,652	10,487
1991	72,664	21,522
1992	102,020	12,530
1993	47,428	19,620
1994	190,295	48,154
1995	288,105	64,252
1996	318,457	68,721
1997	800,326	123,420
1998	1,160,077	163,625
1999	1,007,323	178,746
2000	1,678,168	173,650
2001	7,850,044	283,632
2002	15,182,822	566,217
2003	10,588,856	598,540
2004	8,452,205	573,029
2005	8,208,466	617,016
2006	11,217,731	832,574
Average	**2,735,320**	**179,063**
Std. Dev.	**4,418,709**	**243,202**

in these categories as defined by Table 1.

Figure 2. Estimated total landings of Mahimahi by American Samoa's vessels during 2006



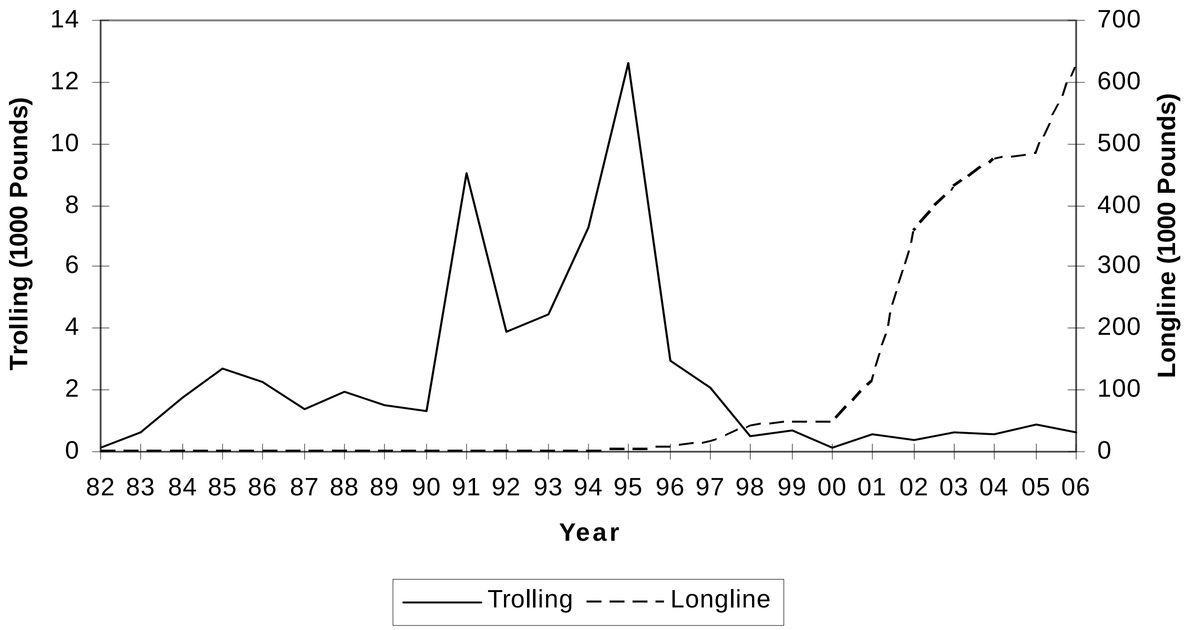
Interpretation: Estimated landings of mahimahi decreased 3,310 pounds (6%) during 2006 to 50,471 pounds. Longline gear dominates the mahimahi estimated landings. Estimated mahimahi longline landings decreased 4,200 pounds (8%) between 2005 and 2006 to 49,400 pounds. Estimated mahimahi troll landings increased 888 pounds (529%) between 2005 and 2006 to 1,056 pounds. Estimated mahimahi longline landings peaked during 2001 at 87,100 pounds and again in 2005 at 53,600 pounds. Estimated 2006 mahimahi longline landings are 57% of the 2001 peak value and 14,800 pounds above the running average estimate. Estimated troll landings of mahimahi peaked in 1986 at 10,600 and 1994 at 9,100 pounds. The 2006 estimated mahimahi troll landings are twelve percent (12%) of the 1994 peak estimate and 2,180 pounds below (33% of) the running average troll landings estimate of 3237 pounds. The estimated 2006 troll landings of mahimahi were more than six times larger than 2005, more than double the 2004 landings, and the third largest estimate since 1997.

Calculation: The estimated total annual landings

	Pounds Landed	
Year	**Longline**	**Trolling**
1982	0	777
1983	0	1,443
1984	0	1,844
1985	0	8,011
1986	0	10,603
1987	0	3,051
1988	0	6,736
1989	0	3,201
1990	0	3,166
1991	72	1,796
1992	0	2,464
1993	215	4,029
1994	101	9,088
1995	2,373	8,377
1996	5,420	5,022
1997	33,343	3,624
1998	33,458	843
1999	35,909	2,193
2000	43,037	66
2001	87,114	786
2002	85,952	680
2003	80,345	1,434
2004	42,985	458
2005	53,614	168
2006	49,415	1,056
Average	**34,585**	**3,237**
Std. Dev.	**30,482**	**2,983**

of mahimahi is listed for longline and trolling fishing methods from boat-intecept creel estimates. All methods landings may be greater than the sum when mahimahi are caught by other methods.

Figure 3. American Samoa annual estimated total landings of Wahoo by gear.



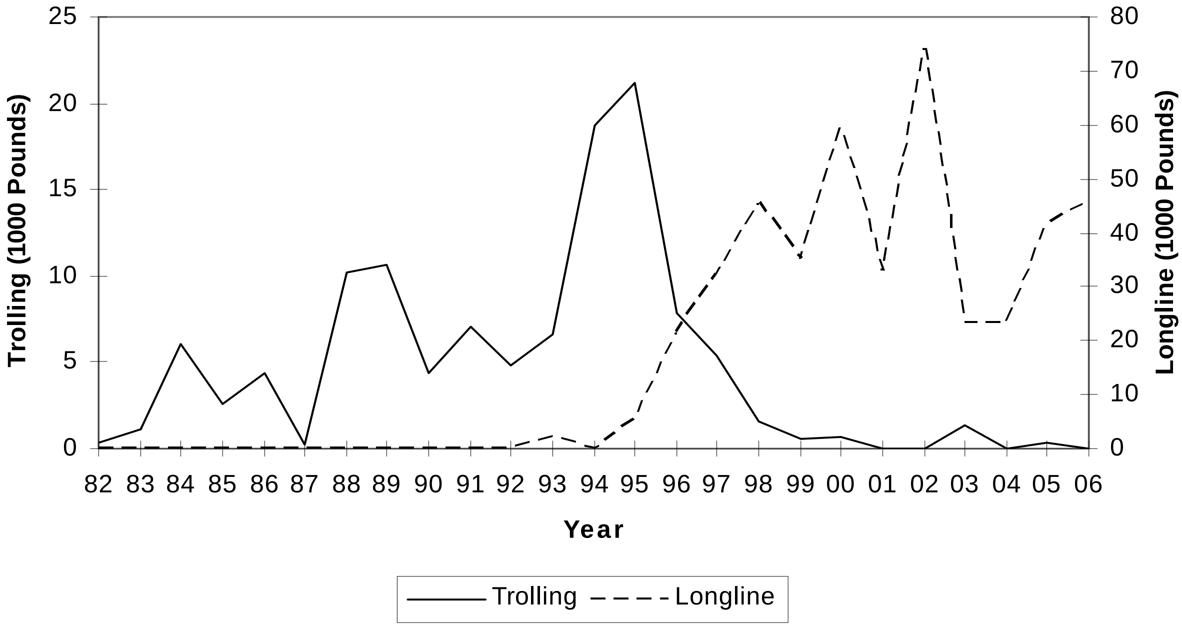
Interpretation: Estimated landings of wahoo increased 141,000 pounds (+29%) between 2005 and 2006 to 625,000 pounds. Longline gear dominates the wahoo landings. Estimated wahoo longline landings increased 141,000 pounds (+29%) between 2005 and 2006 to 624,800 pounds. Estimated wahoo troll landings decreased 203 pounds (-24%) between 2005 and 2006 to 648 pounds. The 2006 estimated wahoo longline landings are at an all-time high for the sixth consecutive year, are 4.5 times the running average estimate, and continue an increasing trend since 1996.

Estimated troll landings of wahoo peaked in 1995 at 12,600 pounds. The 2006 estimated wahoo troll landings are five percent (5%) of the 1995 peak estimate and 1,784 pounds below (27% of) the running average troll landings.

Calculation*:* The estimated total annual landings of wahoo is listed for longline and trolling fishing methods. The All methods landings may be greater than the sum of the longline and trolling landings when wahoo are caught by other methods.

	Pounds Landed	
Year	**Longline**	**Trolling**
1982	0	114
1983	0	632
1984	0	1,777
1985	0	2,678
1986	0	2,294
1987	0	1,395
1988	84	1,962
1989	0	1,489
1990	0	1,332
1991	360	9,007
1992	0	3,895
1993	533	4,445
1994	0	7,262
1995	1,642	12,603
1996	6,922	2,955
1997	15,776	2,075
1998	40,405	487
1999	48,303	685
2000	47,432	140
2001	114,517	588
2002	358,227	351
2003	428,591	612
2004	473,246	535
2005	483,611	851
2006	624,809	648
Average	**139,182**	**2,432**
Std. Dev.	**206,705**	**2,977**

Figure 4. American Samoa annual estimated total landings of Blue Marlin by gear.

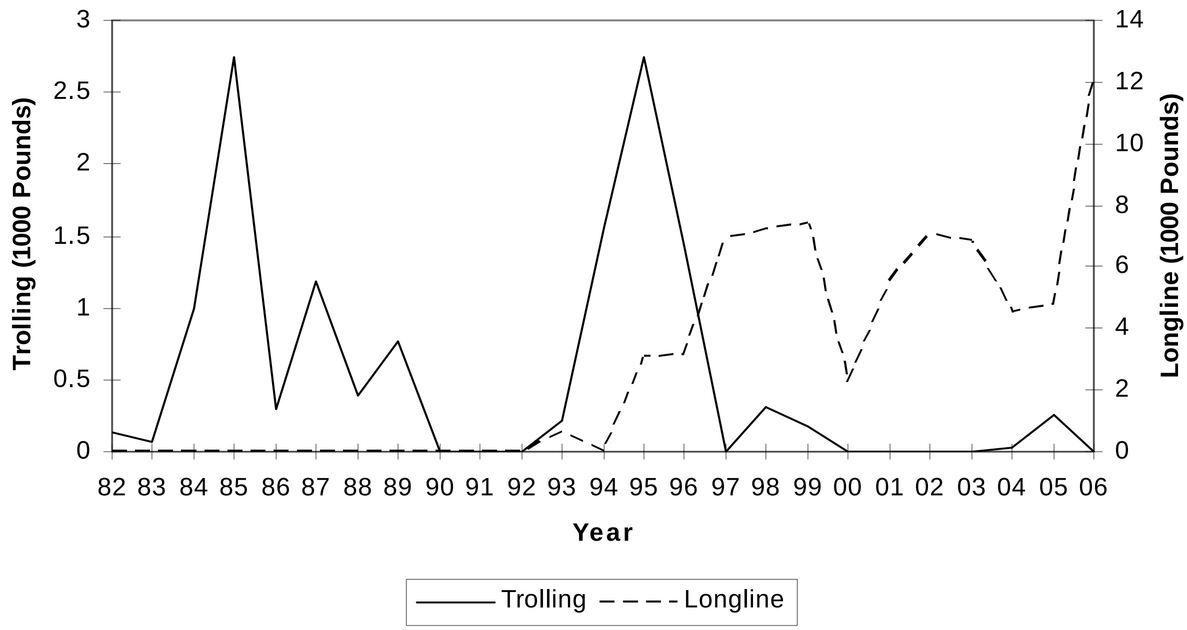


Interpretation:

Calculation: The estimated total annual landings of blue marlin is listed for longline and trolling fishing methods. The All methods landings may be greater than the sum of the longline and trolling landings when blue marlin are caught by other methods. The average and standard deviation for the Longline Method is calculated from 1993 onward.

	Pounds Landed	
Year	**Longline**	**Trolling**
1982	0	315
1983	0	1,083
1984	0	6,097
1985	0	2,574
1986	0	4,353
1987	0	265
1988	0	10,217
1989	0	10,680
1990	0	4,336
1991	0	7,096
1992	0	4,865
1993	2,193	6,586
1994	0	18,665
1995	5,339	21,241
1996	21,669	7,867
1997	32,371	5,380
1998	45,440	1,592
1999	34,981	590
2000	59,519	623
2001	32,836	0
2002	74,244	0
2003	23,368	1,344
2004	23,422	0
2005	41,789	306
2006	46,039	0
Average	**31,658**	**4,643**
Std. Dev.	**20,531**	**5,569**

Figure 5. American Samoa annual estimated total landings of Sailfish by gear.

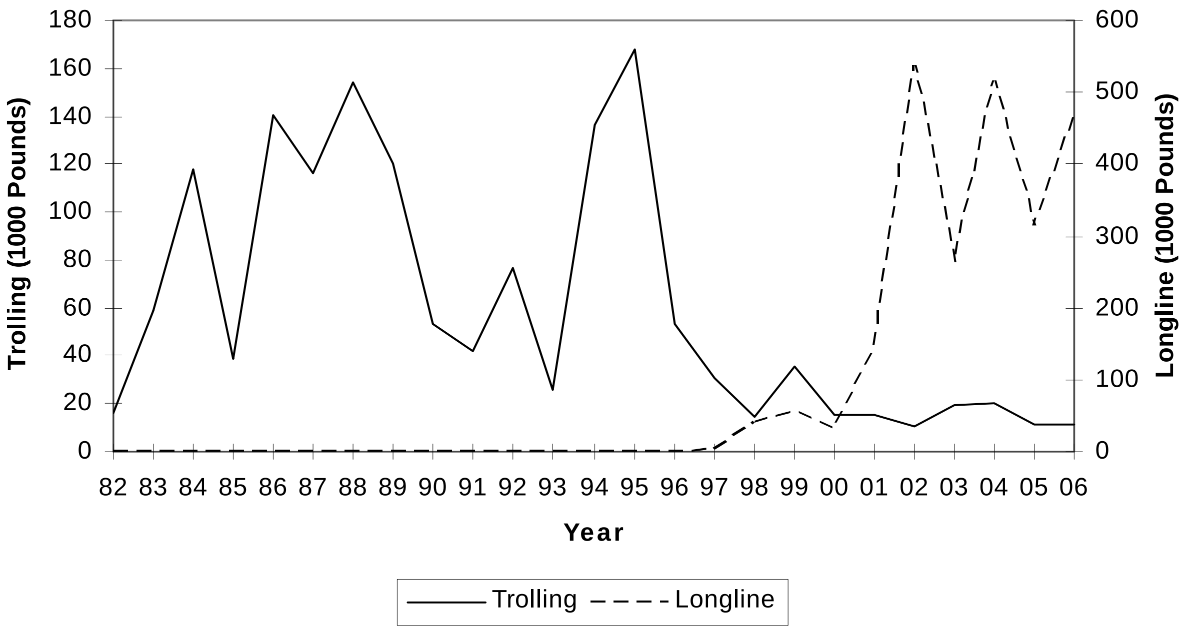


Interpretation:

Calculation*:* The estimated total annual landings of sailfish is listed for longline and trolling fishing methods. The All methods landings may be greater than the sum of the longline and trolling landings when sailfish are caught by other methods.

	Pounds Landed	
Year	**Longline**	**Trolling**
1982	0	127
1983	0	74
1984	0	989
1985	0	2,744
1986	0	296
1987	0	1,188
1988	0	394
1989	0	767
1990	0	0
1991	0	0
1992	0	0
1993	626	218
1994	0	1,561
1995	3,078	2,743
1996	3,146	1,444
1997	6,907	0
1998	7,185	314
1999	7,424	184
2000	2,257	0
2001	5,535	0
2002	7,060	0
2003	6,862	0
2004	4,537	31
2005	4,747	262
2006	12,158	0
Average	**5,109**	**533**
Std. Dev.	**3,075**	**799**

Figure 6. American Samoa annual estimated total landings of Skipjack Tuna by gear.

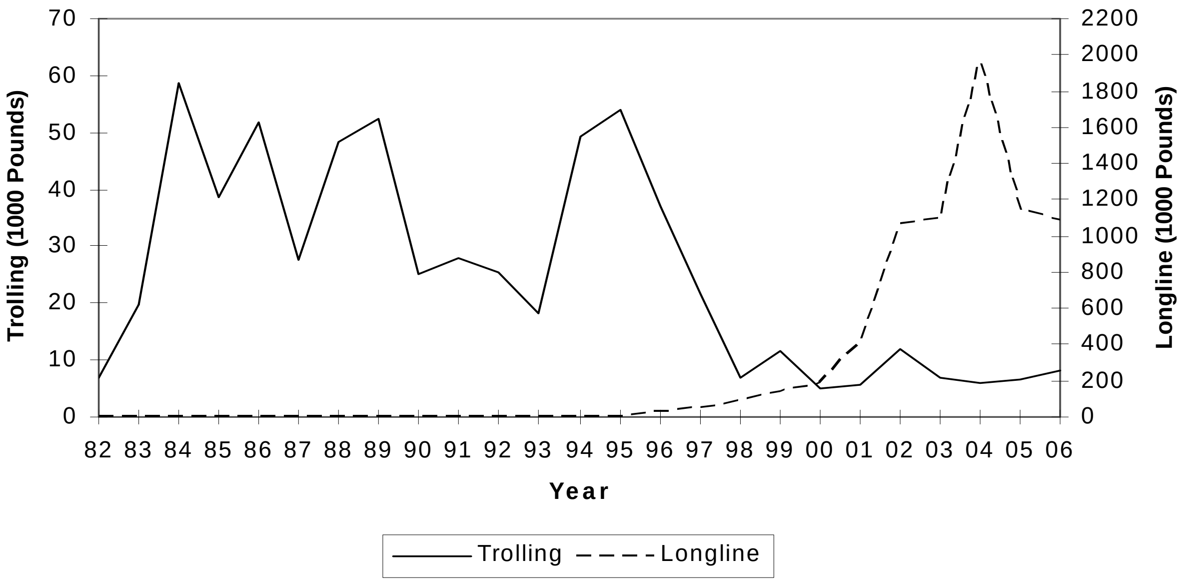


Interpretation:
This species is characterized by a large stock size, fast growth, early maturity and high fecundity. The decline of landings can be explained by variation in the recruitment in the two last years.

Calculation: The estimated total annual landings of skipjack tuna is listed for longline and trolling fishing methods. The All methods landings may be greater than the sum of the longline and trolling landings when skipjack tuna are caught by other methods.

	Pounds Landed	
Year	**Longline**	**Trolling**
1982	0	15,877
1983	0	58,997
1984	0	117,693
1985	0	38,902
1986	0	140,127
1987	0	116,505
1988	0	153,893
1989	0	120,171
1990	0	53,376
1991	345	42,150
1992	0	76,319
1993	539	25,459
1994	103	136,786
1995	160	167,998
1996	440	53,096
1997	2,541	30,434
1998	40,596	14,822
1999	56,171	35,171
2000	32,144	15,660
2001	145,781	15,170
2002	538,386	10,839
2003	263,695	19,464
2004	517,189	20,470
2005	313,608	11,234
2006	465,640	11,408
Average	**148,584**	**60,081**
Std. Dev.	**196,200**	**51,017**

Figure 7. Estimated total landings of yellowfin tuna by American Samoa vessels for 2006



Interpretation: Estimated total landings of yellowfin tuna decreased 52,600 pounds (-5%) between 2005 and 2006 to 1,097,000 pounds. Longline gear dominate the estimated yellowfin tuna landings for American Samoa vessels. Estimated longline landings of yellowfin tuna decreased 54,000 pounds (-5%) to 1,095,000 pounds between 2005 and 2006. Estimated troll landings of yellowfin tuna increased 1570 pounds (+23%) between 2005 and 2006.

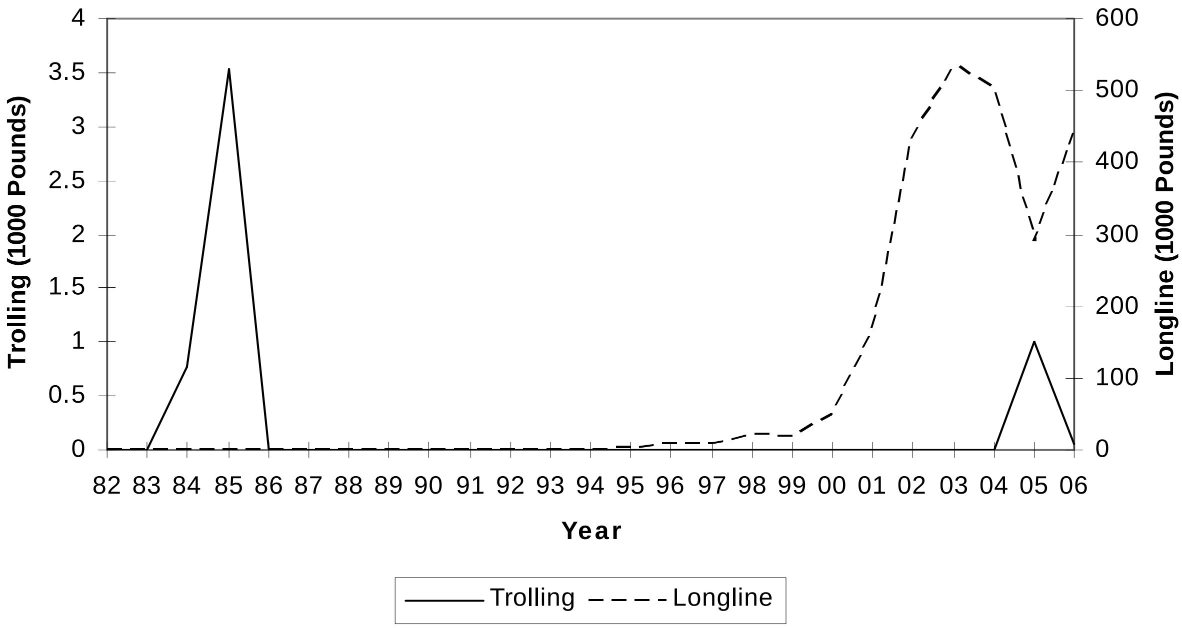
Estimated yellowfin tuna longline landings peaked during 2004 at 1,960,000 pounds; Estimated 2006 landings are 56% of the 2004 peak value and 705,000 pounds more (2.8 times larger) than the running average estimate.

Estimated troll landings of yellowfin tuna peaked between 51,600 and 59,000 four times between 1984 and 1995. The 2006 estimated yellowfin tuna troll landings are fourteen percent (14%) of the 1984 peak estimate and 2,180 pounds below (33% of) the estimated running average for American Samoa troll landings 25,200 pounds. The estimated 2006 troll landings of yellowfin tuna were 1.2 times the 2005 estimate and continued a short-term increasing trend since 2004.

	Pounds Landed	
Year	Longline	Trolling
1982	0	7,038
1983	0	19,789
1984	0	58,704
1985	0	38,586
1986	0	51,693
1987	0	27,467
1988	1,775	48,316
1989	129	52,350
1990	0	25,172
1991	262	28,052
1992	0	25,421
1993	2,662	18,262
1994	1,717	49,423
1995	4,053	54,043
1996	25,782	37,052
1997	48,486	21,682
1998	92,462	6,763
1999	140,061	11,566
2000	190,041	4,892
2001	414,157	5,573
2002	1,069,454	11,794
2003	1,095,254	6,953
2004	1,959,871	5,827
2005	1,142,927	6,739
2006	1,088,741	8,309
Average	**383,044**	**25,259**
Std. Dev.	**567,876**	**18,005**

Calculation: The estimated total annual landings of yellowfin tuna is listed for longline and trolling fishing methods. The All methods landings may be greater than the sum of the longline and trolling landings when yellowfin tuna are caught by other methods.

Figure 8. Estimated 2006 Total Landings of Bigeye Tuna by American Samoa Vessels



Interpretation: Estimated total landings of bigeye tuna increased 150,000 pounds (+52%) between 2005 and 2006 to 441,800 pounds. Longline gear dominates the estimated bigeye tuna landings for American Samoa vessels by 100 times or more. Estimated longline landings of bigeye tuna increased 151,000 pounds (+52%) to 441,700 pounds between 2005 and 2006. Estimated troll landings of bigeye tuna decreased 94% between 2005 and 2006.

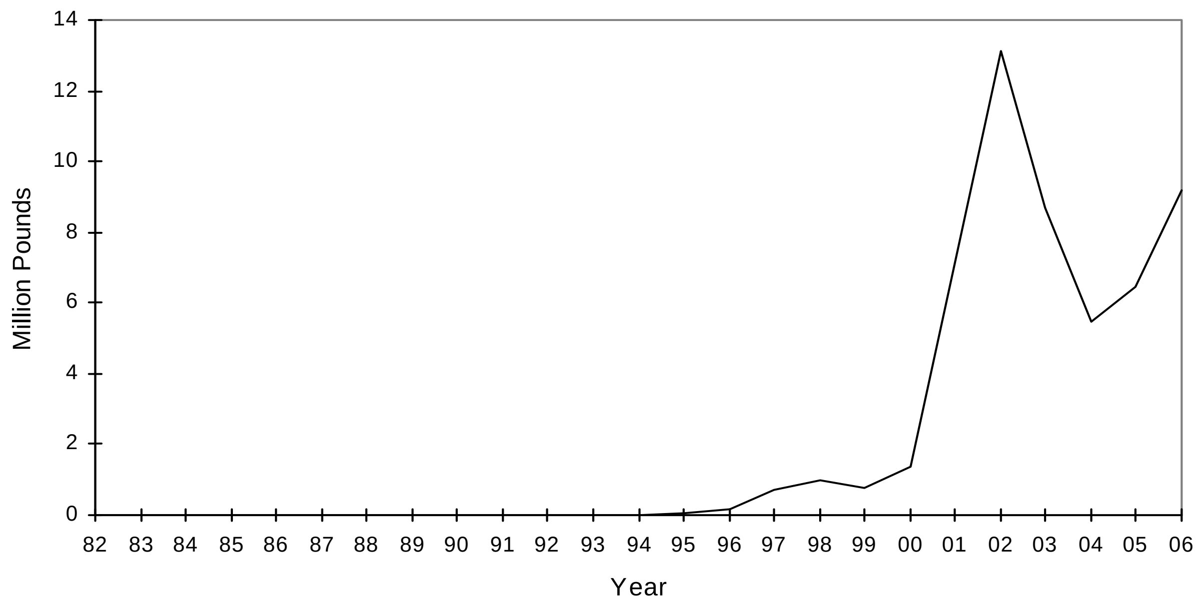
Estimated bigeye tuna longline landings peaked during 2003 at 534,300 pounds; estimated 2006 landings are 83% of the 2003 peak value and 287,000 pounds more (2.9 times larger) than the running average estimate.

Estimated troll landings of bigeye tuna are usually zero and peaked at 3,500 pounds in 1985 and 1,000 pounds for 2005 for American Samoa vessels. The 2006 estimated bigeye tuna troll landings are 57 pounds, six percent (6%) of the 2005 estimate and 27 percent of the running average for American Samoa troll landings.

	Pounds Landed	
Year	**Longline**	**Trolling**
1982	0	0
1983	0	0
1984	0	769
1985	0	3,527
1986	0	0
1987	0	0
1988	0	0
1989	0	0
1990	0	0
1991	0	0
1992	0	0
1993	100	0
1994	0	0
1995	2,191	0
1996	8,738	0
1997	8,419	0
1998	22,287	0
1999	19,254	0
2000	47,484	0
2001	165,420	0
2002	432,426	0
2003	534,343	0
2004	500,066	0
2005	290,358	1,004
2006	441,786	57
Average	**154,555**	**214**
Std. Dev.	**201,635**	**718**

Calculation: The estimated total annual landings of bigeye tuna is listed for longline and trolling fishing methods. The All methods landings may be greater than the sum of the longline and trolling landings when bigeye tuna are caught by other methods. The average and standard deviation for the Longline Method is calculated from 1991 onward.

Figure 9. Estimated total landings of albacore by American Samoa vessels longlining during 2006.

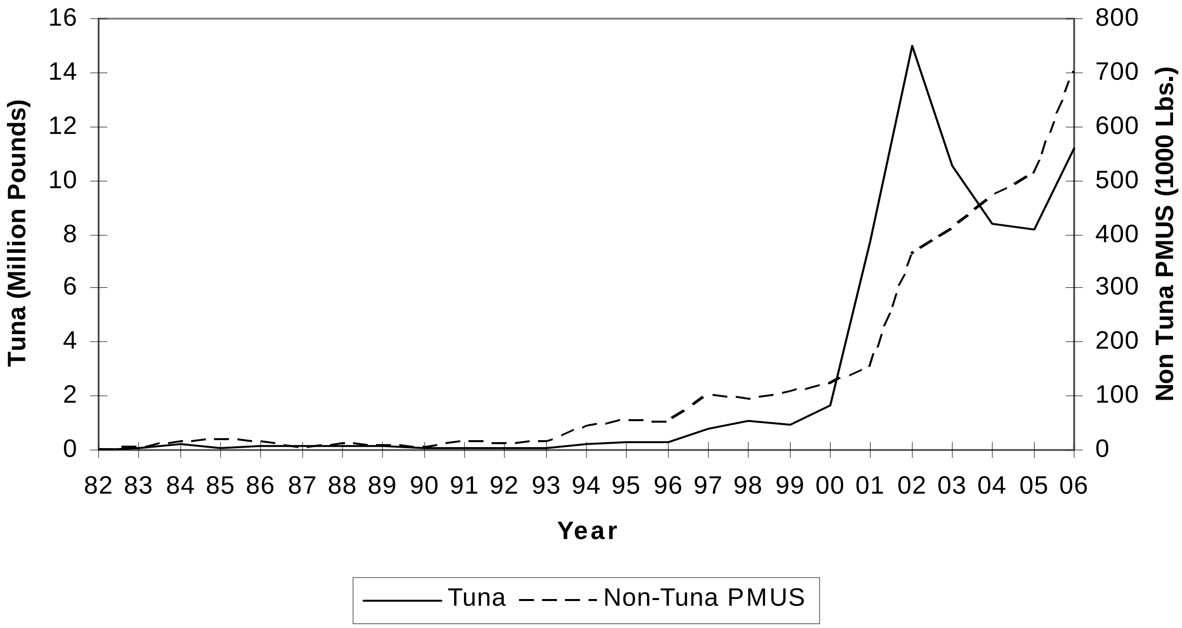


Interpretation: Estimated total albacore longline landings increased 2.76 million pounds (43%) to 9,200,000 pounds between 2005 and 2006. Estimated albacore landings during 2006 are the second highest in the 25-year record, and seventy percent (70%) of the 13 million pound peak value from 2002. The 2006 albacore landings estimate continues a short-term increasing trend since 2004 and overall upward trend sine 1995 when longline fishing expanded in the American Samoa fleet. Since the longline fishery initially began, it has been the most commonly used method of fishing for pelagic species.

Calculation: The estimated total annual landings of albacore tuna is listed for the longline fishing methods from boat-based creel expansions checked against sales receipts. The All methods landings may be greater than the longline landings when albacore are caught by other methods. The average and standard deviation is calculated from 1988 onward.

Year	Pounds
1982	0
1983	0
1984	0
1985	0
1986	0
1987	0
1988	1,875
1989	244
1990	0
1991	1,730
1992	0
1993	34
1994	1,609
1995	58,954
1996	191,094
1997	688,135
1998	983,015
1999	744,980
2000	1,387,811
2001	7,103,791
2002	13,119,436
2003	8,666,905
2004	5,448,083
2005	6,442,053
2006	9,201,145
Average	**2,844,258**
Std. Dev.	**3,998,658**

Figure 10. Estimated Commercial Landings of Tunas and Non-Tuna PMUS by American Samoa Vessels



Interpretation: Estimated 2006 commercial landings of tuna by American Samoa vessels were nearly 11,200,00 pounds, 99.8 percent of the estimated total landings. Estimated 2006 commercial landings of non-tuna Pelagic Management Unit Species (PMUS) by American Samoa's vessels were nearly 702,000 pounds, 84.3 percent of the estimated total landings. Estimated commercial landings of tuna increased over 3,039,000 pounds (+37%) to the second highest level in the 25-year record. The 2006 estimated commercial tuna landings reverse the short-term landings decline that has occurred since the record landings of 2002. The 2006 estimated commercial tuna landings are 75% of the 2020 record.

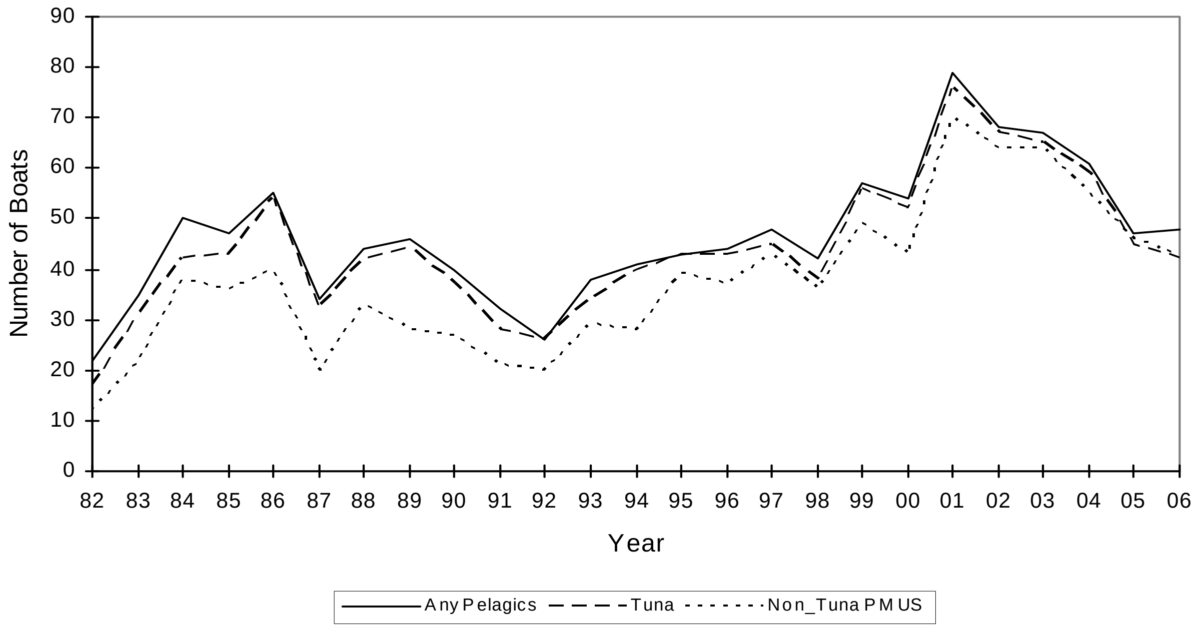
Estimated commercial landings of non-tuna Pelagic Management Unit Species (PMUS) increased over 193,500 pounds (+38%) for the eighth consecutive record high. Non-tuna PMUS have been generally increasing since 1991.

Calculation: Estimated commercial landings for Tunas and Non-Tuna PMUS were calculated by summing the commercial landings for the species

Year	Pounds Landed: Tuna	Pounds Landed: Non Tuna PMUS
1982	22,065	1,515
1983	85,069	4,441
1984	196,100	13,458
1985	99,987	17,515
1986	170,981	15,378
1987	132,316	4,843
1988	172,788	12,110
1989	114,671	8,240
1990	56,573	3,623
1991	58,038	15,453
1992	97,874	11,230
1993	43,803	14,547
1994	189,013	41,337
1995	281,256	54,985
1996	312,199	50,995
1997	798,160	101,299
1998	1,114,700	94,933
1999	949,355	109,152
2000	1,640,058	123,015
2001	7,781,751	153,754
2002	15,003,985	363,140
2003	10,524,510	409,158
2004	8,412,941	471,201
2005	8,160,543	508,417
2006	11,199,901	701,941
Average	**2,704,745**	**132,227**
Std. Dev.	**4,391,838**	**191,237**

these categories as defined by Table 2.

Figure 11. Number of American Samoa vessels landing any pelagic species, tunas and non-tuna PMUS.



Interpretation: The number of American Samoan vessels landing tuna and the number landing non-tuna Pelagic Management Unit Species (PMUS) decreased between 2005 and 2006 by three (7%) to 42 and 43, respectively. The decrease continues a declining trend since the active fleet maximums during 2001. The number of American Samoan vessels landing tuna was 14.5% below, and the number landing non-tuna PMUS was 13% above the 25-year average.

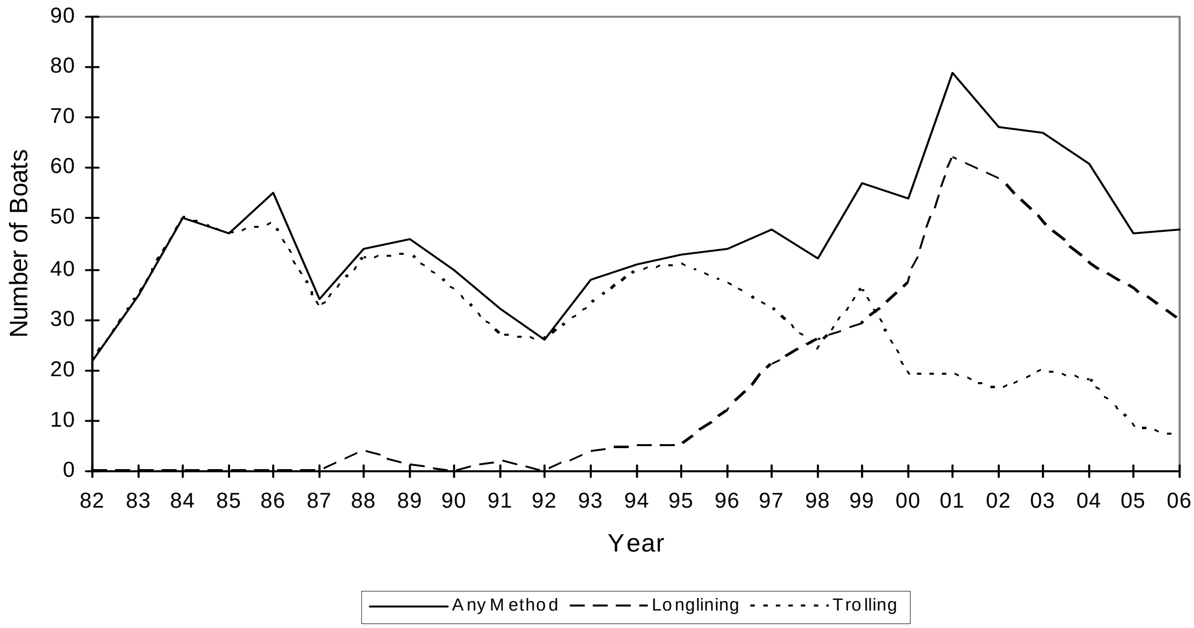
The number of American Samoan vessels landing any pelagic species increased by one (2%) to 48 between 2005 and 2006.

	Number of Boats Landing		
Year	Any Pelagics	Tuna	Non-Tuna PMUS
1982	22	17	12
1983	35	31	22
1984	50	42	38
1985	47	43	36
1986	55	54	40
1987	34	32	20
1988	44	42	33
1989	46	44	28
1990	40	37	27
1991	32	28	21
1992	26	26	20
1993	38	34	29
1994	41	40	28
1995	43	43	39
1996	44	43	37
1997	48	45	43
1998	42	38	36
1999	57	56	49
2000	54	52	43
2001	79	76	70
2002	68	67	64
2003	67	65	64
2004	61	59	55
2005	47	45	46
2006	48	42	43
Average	**47**	**44**	**38**
Std. Dev	**13**	**13**	**14**

Fourty-eight is one more than the 25-year average and 61% of the peak number of vessels landing pelagic species from 2001. The 2006 increase in American Samoan vessels landing any pelagic species revirses the short-term declining trend since 2001.

Calculation: Prior to 1997, each boat counted in the Any Pelagics column made at least one landing in an offshore creel survey interview of at least one species in Table 2 in the given year. Likewise each boat counted in the other two columns made at least one landing in an offshore creel survey interview of at least one species in the corresponding subgroup of Table 2 in the given year. In 1997 and after the count of non-interviewed boats that made at least one landing of the appropriate species in a longline log was added to the count of interviewed boats from the offshore creel survey.

Figure 12. **Number of American Samoa Vessels Landing Pelagic Species By Gear Type**



Interpretation: The number of American Samoan vessels landing pelagic species using longline gear decreased six (17%) to 30 vessels between 2005 and 2006. The number of American Samoan longline vessels has decreased 32 (52%) since the peak count during 2001. The thirty 2006 vessels are 8 (36%) above the average number of American Samoan vessels landing pelagic species caught with longlines.

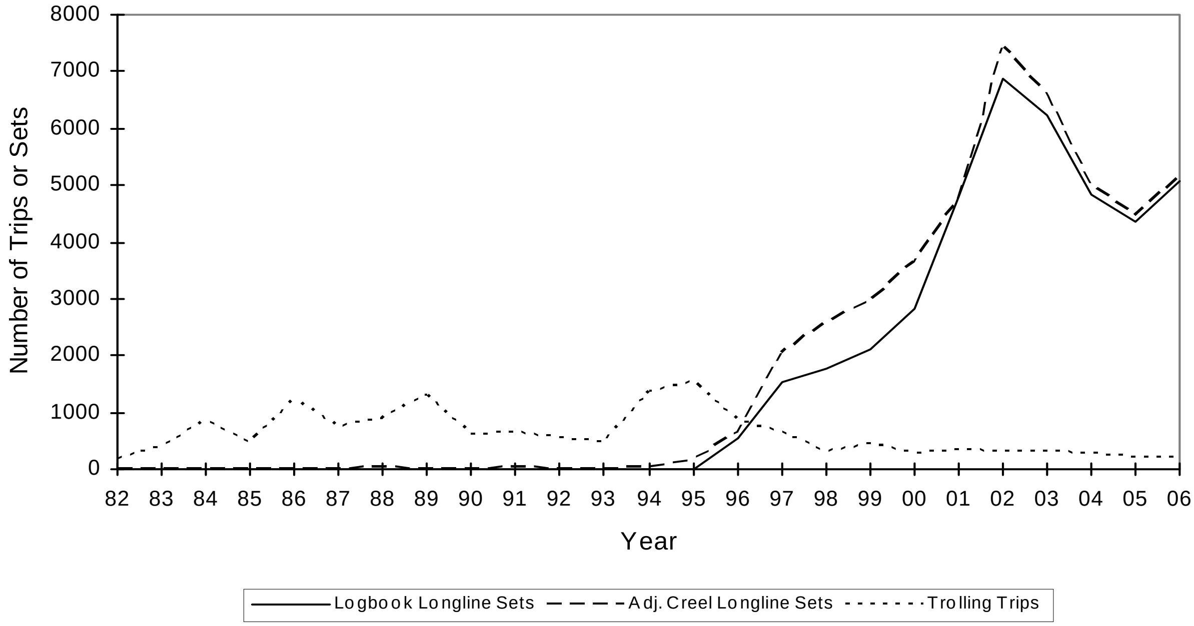
The number of American Samoan vessels landing pelagic-species caught by trolling decreased two (22%) to seven between 2005 and 2006. The seven vessels recorded for 2006 are the second consecutive year with the lowest-ever recorded number of active pelagic troll vessels for American Samoa. The recorded number of pelagic troll vessels in American Samoa landing fish has been decreasing since 1995 and is 14% of the peak

	Number of Boats Using		
Year	Any Method	Longlining	Trolling
1982	22	0	22
1983	35	0	35
1984	50	0	50
1985	47	0	47
1986	55	0	49
1987	34	0	32
1988	44	4	42
1989	46	1	43
1990	40	0	36
1991	32	2	27
1992	26	0	26
1993	38	4	33
1994	41	5	40
1995	43	5	41
1996	44	12	37
1997	48	21	32
1998	42	26	24
1999	57	29	36
2000	54	37	19
2001	79	62	19
2002	68	58	16
2003	67	49	20
2004	61	41	18
2005	47	36	9
2006	48	30	7
Average	**47**	**22**	**30**
Std. Dev.	**13**	**20**	**12**

count from 1984. The Any Method column repeats the Any Pelagics column from Table 11 and is interpreted in the description of Table 11.

Calculation: Prior to 1997, each boat counted in the Any Method column made at least one landing in an offshore creel survey interview of at least one species in Table 2 in the given year. Each boat counted in the Longlining and Trolling columns made at least one landing in an offshore creel survey interview of at least one species in Table 2, using the longline or troll or combined troll/bottom fishing methods in the given year. In 1997 and after the count of non-interviewed boats that made at least one landing of the species in Table 2 in a longline log during the given year was added to the count of interviewed boats from the offshore creel survey in the Any Method and Longlining columns. The average and standard deviation for the number of boats using Longlining is calculated from 1988 onward.

Figure 13. Number of American Samoa fishing trips or sets for all pelagic species by method.



Interpretation:

Calculation

The number of Troll Trips is calculated by first subtracting the total longline pounds of Table 1 from the total pounds to get an estimate of the number of pounds caught by trolling and other fishing methods. This value is divided by the catch per hour for pure troll trips, from the offshore creel survey system expansion, to get the number of trolling hours. The number of trolling hours is then divided by the hours per trip for a purely trolling trip from the offshore creel survey system expansion to get the number of troll trips.

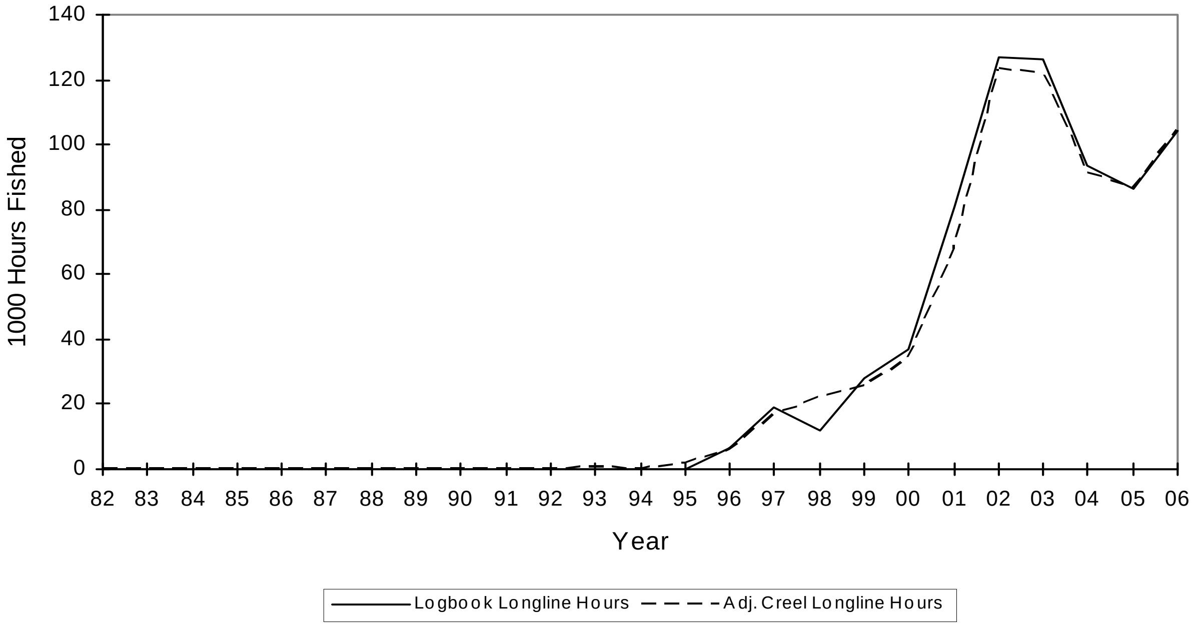
The number of longline sets using logbook data is obtained by counting all of the sets

		Longline Sets	
Year	**Troll Trips**	**Logbook**	**Creel (Adj)**
1982	177	0	0
1983	406	0	0
1984	853	0	0
1985	464	0	0
1986	1,241	0	0
1987	752	0	0
1988	875	0	31
1989	1,277	0	3
1990	612	0	0
1991	642	0	21
1992	549	0	0
1993	474	0	17
1994	1,355	0	20
1995	1,544	0	187
1996	843	528	656
1997	660	1,528	2,033
1998	316	1,754	2,582
1999	426	2,108	2,978
2000	287	2,814	3,650
2001	331	4,801	4,723
2002	291	6,872	7,433
2003	310	6,220	6,557
2004	276	4,830	4,954
2005	218	4,359	4,468
2006	190	5,069	5,147
Average	**615**	**3,717**	**4,107**
Std. Dev.	**384**	**1,979**	**1,892**

entered in the longline logbook system for the given year for interviewed and non-interviewed boats.

Prior to 1997, the number of longline sets using creel survey data is the expanded number of longline fishing trips from the offshore creel survey system. In 1997 and after this number is the expanded number of longline fishing trips from the offshore creel survey system for interviewed vessels plus the count of all of the sets entered in the longline logbook system for non-interviewed vessels. The average and standard deviation for Longline Sets from logbook data and creel data is calculated from 1996 onward for comparison.

Figure 14. Number of American Samoa hours fished for all pelagic species by longlining.



Interpretation:
The hours fished reported by the Longline Logbook system in the early years before the large boats dominated the fishery is usually larger than that reported by the adjusted Creel Survey System because the logbook hours are calculated from actual beginning of set times and end of haul times while many trips in the offshore creel survey system are entered as "8 hours"

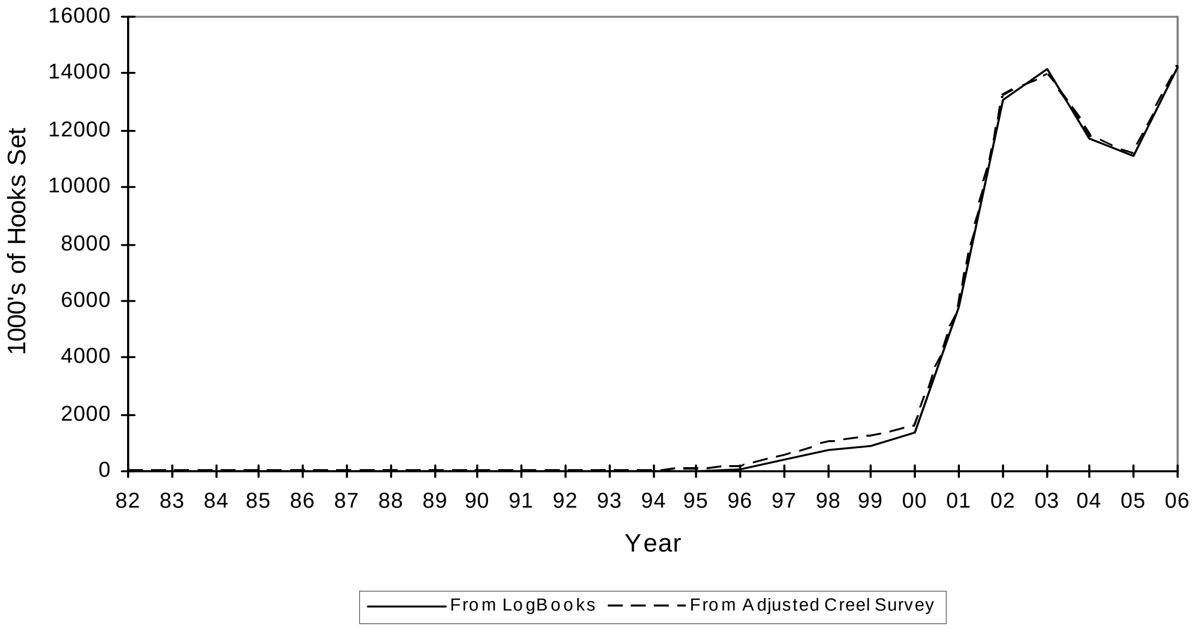
Calculation: The number of longline trip-hours using logbook data is obtained by summing the duration all of the sets entered in the longline logbook system for the given year for interviewed and non-interviewed boats. The duration of a set is defined as from beginning of set time to the end of haul time.

Prior to 1997, the number of longline trip-hours using creel survey data is the expanded number of longline fishing trip-hours from the offshore creel survey system. In 1997 and after this number is the expanded number of longline

	Hours Fished	
Year	Longline Logbook	Longline Creel (Adj.)
1982	0	0
1983	0	0
1984	0	0
1985	0	0
1986	0	0
1987	0	0
1988	0	198
1989	0	17
1990	0	0
1991	0	164
1992	0	0
1993	0	299
1994	0	161
1995	0	1,860
1996	6,366	5,932
1997	19,065	16,924
1998	11,984	21,996
1999	27,708	25,807
2000	36,973	33,703
2001	81,291	67,734
2002	127,023	123,128
2003	126,265	121,621
2004	93,570	91,296
2005	86,332	86,098
2006	104,324	104,038
Average	**65,536**	**63,480**
Std. Dev.	**43,916**	**41,988**

fishing trip-hours from the offshore creel survey system for interviewed vessels plus the sum of the duration of the sets entered in the longline logbook system for non-interviewed vessels. The average and standard deviation for Hours Fished from logbook data and creel data is calculated from 1996 onward for comparison.

Figure 15. **Estimated Number of Hooks Set by American Samoa Longline Vessels**



Interpretation: The number of hooks set by American Samoan longline vessels climbed over 3 million hooks (28%) to record high of 14.3 million hooks for 2006. The 2006 estimate is two percent higher than the former record from 2003. The increase between 2005 and 2006 reverses the the declining trend since 2003.

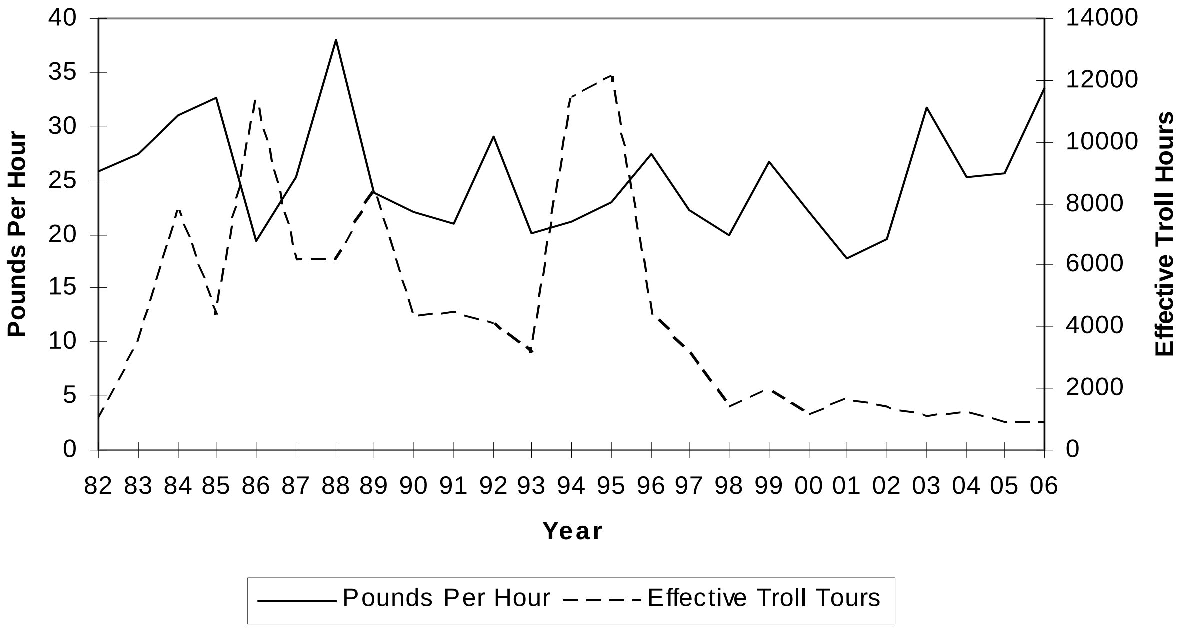
Calculation: The number of longline hooks using logbook data is obtained by summing the number of hooks for sets entered in the longline logbook system for the given year for interviewed and non-interviewed boats and dividing by 1000.

Prior to 1997, the number of longline hooks using creel survey data is the expanded number of longline hooks from the offshore creel survey system. In 1997 and after this number is the expanded number of longline fishing hooks from the offshore creel survey system for interviewed vessels plus the sum of the number of hooks for the sets entered in the longline logbook system for non-interviewed vessels. The average and standard deviation for 1000's of Hooks from logbook data and creel data is

	1000's of Hooks From	
Year	Logbook Data	Creel (Adjusted)
1982	0	0
1983	0	0
1984	0	0
1985	0	0
1986	0	0
1987	0	0
1988	0	1
1989	0	0
1990	0	0
1991	0	0
1992	0	0
1993	0	2
1994	0	0
1995	0	45
1996	99	158
1997	419	517
1998	771	1,042
1999	915	1,229
2000	1,335	1,584
2001	5,795	5,808
2002	13,096	13,242
2003	14,165	13,990
2004	11,685	11,746
2005	11,128	11,173
2006	14,263	14,322
Average	**6,697**	**6,801**
Std. Dev.	**5,874**	**5,794**

calculated from 1996 onward for comparison.

Figure 16. **American Samoa pelagic catch per hour of trolling and number of trolling hours.**



Interpretation:
The overall catch per hour for pelagic species by trolling is primarily the combined skipjack and yellowfin CPUE shown in Figure 18. These two species constituted 85% of the total pelagic troll catch this year.

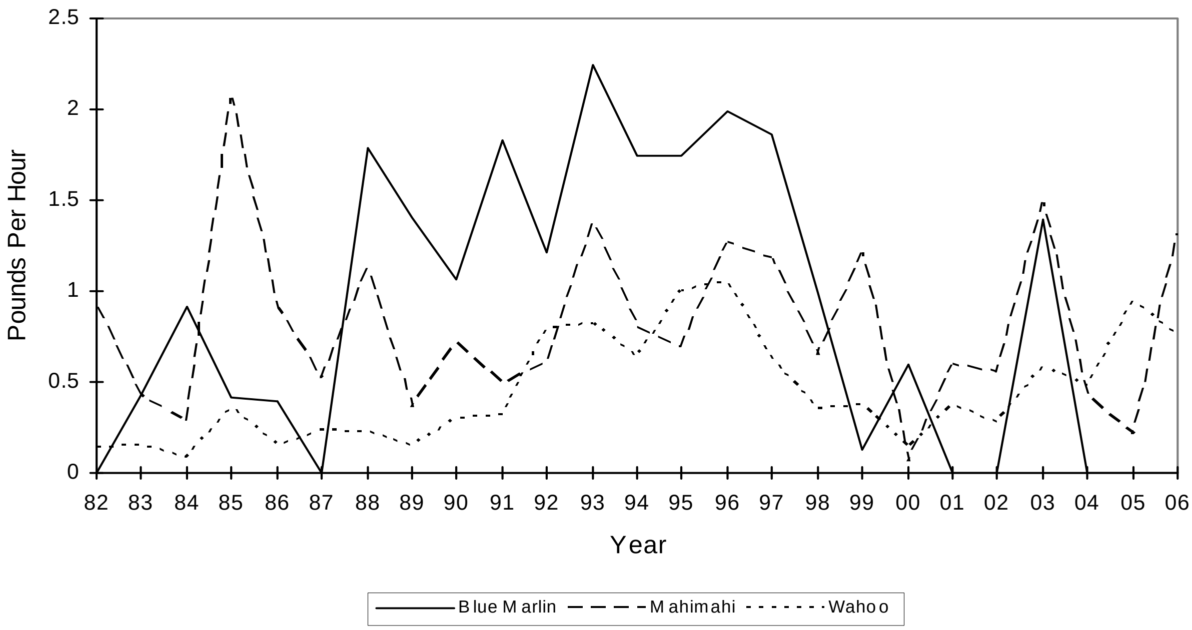
The decline in trolling hours in 1996 was mainly due to the popularity of the longline fishery since it was introduced. However, 1999 was an exceptional year because of the number of new boats that entered the pelagic fishery and were involved in trolling before obtaining their longline permits. This year, the hours spent in trolling are the lowest since 1982, but at the same time the number of boats has increased by 25 % from last year. The result is that we have the lowest average hours spent on trolling since 1982 with only 51.75 hours per boat. Compared to last year, the CPUE has increased by 61 %. The explanation may be in the fact that fishermen go to fish only when the conditions are very good, as trolling seems to be a less professional activity then before.

Year	CPUE	Hours
1982	25.91	1,019
1983	27.41	3,513
1984	30.97	7,785
1985	32.59	4,394
1986	19.35	11,358
1987	25.34	6,182
1988	38.01	6,126
1989	23.87	8,425
1990	21.98	4,335
1991	20.96	4,482
1992	28.99	4,093
1993	20.08	3,169
1994	21.23	11,450
1995	22.93	12,114
1996	27.36	4,422
1997	22.31	3,159
1998	19.93	1,405
1999	26.81	1,971
2000	22.01	1,130
2001	17.72	1,661
2002	19.58	1,378
2003	31.78	1,044
2004	25.30	1,201
2005	25.61	900
2006	33.53	868
Average	**25.26**	**4,303**
Std. Dev.	**5.05**	**3,435**

Calculation: For purely trolling trips where the number of hours was recorded, the total catch was divided by the total number of trolling hours to obtain CPUE.

The number of effective Trolling Trip_Hours is calculated by first subtracting the total longline pounds of Table 1 from the total pounds to get an estimate of the number of pounds caught by trolling and other fishing methods. This value is divided by the catch per hour for pure troll trips, from the offshore creel survey system expansion, to get the number of trolling trip-hours

Figure 17. American Samoa trolling catch rates for Blue Marlin, Mahimahi, and Wahoo.



Interpretation:

Blue marlin CPUE is variable but generally increased over time until about 1997 when it began to decline. It is not known if this decrease has any relationship to the huge growth in the longline fishery during this time span.

Mahimahi CPUE is very erratic through the years. In 2003 it increased to it's highest level since 1985, with a increase of 172% from last year.

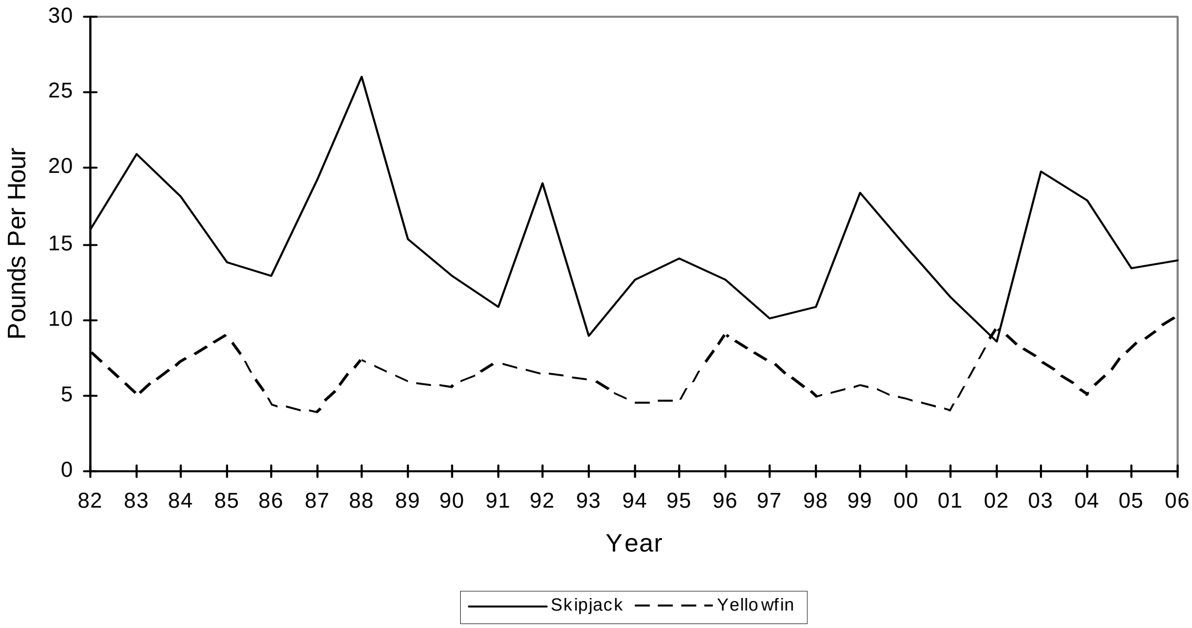
	Pounds Caught Per Trolling Hour		
Year	Blue Marlin	Mahimahi	Wahoo
1982	0.00	0.92	0.14
1983	0.43	0.43	0.15
1984	0.91	0.28	0.09
1985	0.41	2.06	0.36
1986	0.39	0.90	0.15
1987	0.00	0.52	0.23
1988	1.79	1.13	0.22
1989	1.40	0.36	0.15
1990	1.06	0.71	0.30
1991	1.83	0.49	0.32
1992	1.21	0.61	0.80
1993	2.25	1.38	0.82
1994	1.74	0.80	0.64
1995	1.74	0.69	1.00
1996	1.99	1.27	1.05
1997	1.86	1.18	0.63
1998	0.99	0.65	0.35
1999	0.13	1.21	0.37
2000	0.60	0.06	0.14
2001	0.00	0.60	0.37
2002	0.00	0.55	0.28
2003	1.39	1.49	0.59
2004	0.00	0.42	0.48
2005	0.00	0.21	0.95
2006	0.00	1.32	0.76
Average	**0.88**	**0.81**	**0.45**
Std. Dev.	**0.77**	**0.46**	**0.29**

Since 1996 wahoo catch rates have dropped similar to blue marlin rates. This may be related to the increase in longline activity around the island. This year Wahoo CPUE has indeed increased by 107%.

We can observe that the trends in CPUE are similar for mahi mahi and wahoo if we exclude 1983, 87, 88 and 95. However it is difficult to interpret the small amount of data we have this year.

Calculation: The values for each of the three species is obtained by dividing the Troll Pounds for each species in Table 1 by the expanded number of trip-hours for purely trolling trips from the offshore creel survey system.

Figure 18. Trolling Biomass Accumulation Rates for Skipjack and Yellowfin Tuna by American Samoa Vessels



Interpretation: Estimated 2006 troll landings of skipjack and yellowfin tunas were 11,400 and 8,309 pounds, respectively (Table 1). The pounds-per-troll-hour (PPTH) for skipjack in American Samoa increased 0.5 (37%) to 13.9 between 2005 and 2005. The 2006 increase reverses the declines in skipjack PPTH since a peak of 19.8 for 2003. The 2006 figure is 53% of the recorded high value from 1988. The 2006 skipjack PPTH is 93% of the 25-year average.

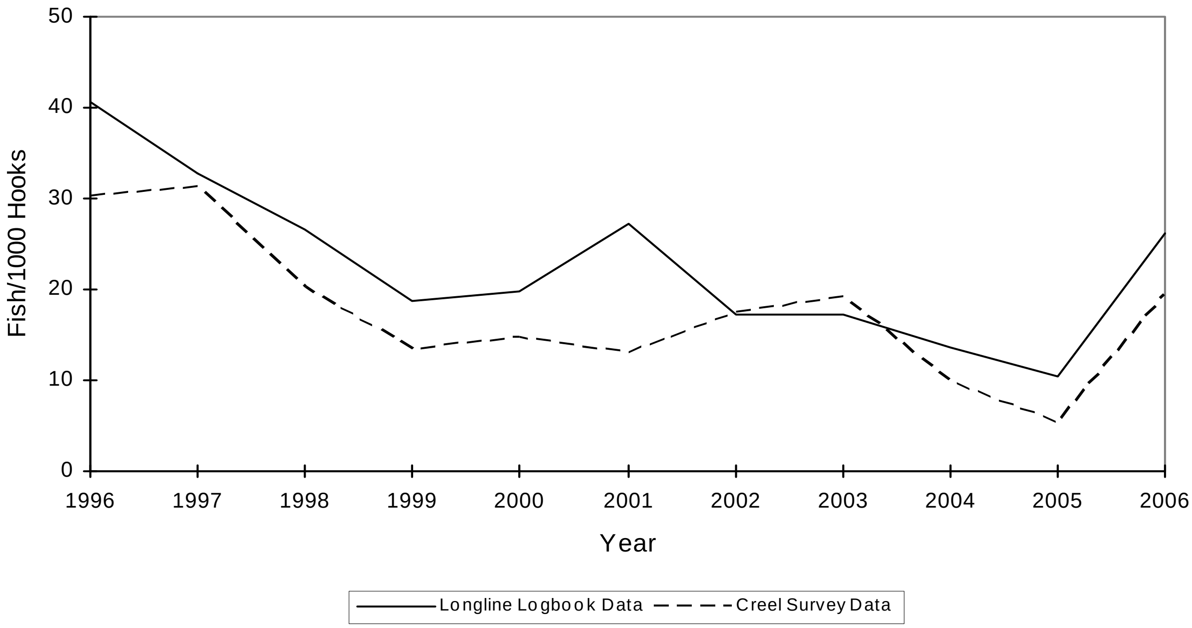
The yellowfin tuna PPTH in American Samoa increased 2.17 (27%) to an 25-year record of 10.2 between 2005 and 2006. The yellowfin tuna PPTH also increased in the previous year (2005) and was near 10 during 2002. The 2006 yellowfin tuna PPTH is 1.6 times the 25-year average.

Trolling regularly occurs closer to the islands of American Samoa, at different times, and targets different depths than longline fishing.

	Pounds Caught Per Trolling Hour	
Year	**Skipjack**	**Yellowfin**
1982	15.90	7.80
1983	21.00	5.04
1984	18.10	7.20
1985	13.80	8.90
1986	12.90	4.31
1987	19.30	3.88
1988	26.00	7.30
1989	15.30	5.91
1990	12.90	5.53
1991	10.80	7.11
1992	19.00	6.32
1993	8.88	6.05
1994	12.60	4.49
1995	14.10	4.57
1996	12.70	8.98
1997	10.10	7.19
1998	10.80	4.89
1999	18.40	5.62
2000	14.80	4.67
2001	11.50	4.01
2002	8.59	9.37
2003	19.80	7.10
2004	17.90	5.00
2005	13.40	8.03
2006	13.90	10.20
Average	**14.90**	**6.38**
Std. Dev.	**4.10**	**1.77**

Calculation: The values for each of the two species is obtained by dividing the Troll Pounds for each species in Table 1 by the expanded number of trip-hours for purely trolling trips from the offshore creel survey system.

Figure 19. **American Samoa catch per 1000 hooks of Albacore for the Alia longline fishery, Comparing Logbook and Creel Survey Data**



Interpretation

The longline fishery in American Samoa is a newly developed fishery that emerged in 1995. Both monitoring systems (Longline Logbook and Creel Survey) indicate similar fluctuations of the catch rates of albacore through this fishery since it first started. Alias are the most commonly used boats by the local fishermen in the fishery and albacore the primary target species. The value of albacore catch rate through the years since 1996 have been declining except for the peak in 2001. The dip in catch rate in 2001 in the Creel Survey data was due to poor data taking in the Creel Survey. During this period many longline interviews were missed and those that were done didn't weigh, measure and report on all of the albacore caught. In 2002, the Longline Logbook indicates a 60% decrease whereas the Offshore Creel Survey shows a slight increase of 36%. This decline may have been due to a stock problem or a background trend on a large scale. However, with the fishery expansion and the low price of fish, a further decrease could soon put the Alia fleet in trouble.

The global decrease of CPUE for the Alia longline fishery probably reflects their interaction with the large vessel activity around the island. The large vessels still catch 40% as much fish inside the 50 nm restricted areas as the alias do.

In 2003 the CPUE calculated by the two methods are close, but it's the first time that the CPUE calculated with the creel survey data is higher than by the logbook method. The difference between these two methods can be partially explained by considering different factors. Same big Alias have started to fish for multiples days and have reported their catch in only one log, increasing the CPUE. Also, the catches of multiple sets in one trip are often partially estimated as all the fish are stocked together in big coolers.

Calculation: These values compare the CPUE's of only the alias. For the longline logbook data, the total number of kept fish of each species is divided by the sum of the hooks in the sets of alias or surveyed vessels over the given year used to catch them. For the creel survey data the expanded total landings for each species given in Table 1 is divided by the pounds/fish value obtained by averaging creel survey data over the year to find the number of pieces of each species. The number of pieces for each species caught during the year is divided by the expanded number of hooks for the given year.

Table 6A. American Samoa 1996-2001 catch per 1000 hooks by species for the alia longline fishery comparing logbook and creel survey Data

	Number of Fish Per 1000 Hooks											
	1996		1997		1998		1999		2000		2001	
Species	**Log**	**Creel**	**Log**	**Creel**	**Log**	**Creel**	**Log**	**Creel**	**Log**	**Creel**	**Log**	**Creel**
Skipjack tuna	0.06	0.29	1.16	0.60	3.71	4.01	4.97	4.77	2.02	1.94	3.01	3.35
Albacore	40.6	30.3	32.8	31.2	26.6	20.2	18.8	13.4	19.7	14.8	27.2	12.9
Yellowfin tuna	6.50	4.31	2.74	2.47	2.18	2.27	6.73	4.49	6.20	3.23	3.27	4.19
Bigeye tuna	1.33	1.06	0.30	0.14	0.27	0.11	0.68	0.20	0.40	0.22	0.61	0.35
Misc tunas					0.01							
Mahimahi	2.29	1.31	2.23	2.83	1.70	1.83	2.24	1.76	1.71	1.75	3.35	4.46
Black marlin			0.09	0.02			0.18	0.03	0.11		0.07	0.03
Blue marlin	0.93	0.90	0.65	0.62	0.55	0.49	0.50	0.38	0.46	0.49	0.38	0.26
Striped marlin			0.02		0.03		0.02		0.06		0.03	
Wahoo	0.83	0.51	0.90	0.85	2.20	2.03	2.03	1.57	1.15	0.90	1.43	1.44
All sharks	0.28	0.37	0.12	0.17	0.12	0.08	0.06	0.03	0.01	0.04	0.01	0.02
Swordfish	0.03	0.01	0.06	0.01	0.03	0.02	0.03	0.01	0.02		0.10	0.02
Sailfish	0.18	0.23	0.17	0.21	0.05	0.14	0.01	0.13	0.03	0.06	0.04	0.13
Spearfish					0.03			0.01	0.01			
Moonfish			0.10	0.15	0.07	0.07	0.07	0.13	0.07	0.20	0.10	0.07
Oilfish					0.01	0.04	0.01	0.01			0.03	0.10
Pomfret							0.01		0.02	0.04	0.02	
Misc barracudas		0.57		0.87		0.42		0.19		0.30	0.02	0.14
Rainbow runner				0.01		0.01		0.02				
Dogtooth tuna						0.00						0.02
Misc pelagic fish	0.02	0.11	0.02	0.01	0.22	0.01	0.25				0.03	

Table 6B. **American Samoa 2002-2006 catch per 1000 hooks by species for the alia longline fishery, comparing logbook and creel survey data.**

	Number of Fish Per 1000 Hooks									
	2002		2003		2004		2005		2006	
Species	**Log**	**Creel**	**Log**	**Creel**	**Log**	**Creel**	**Log**	**Creel**	**Log**	**Creel**
Skipjack tuna	5.99	5.43	4.68	3.93	2.96	2.90	0.97	0.91	1.73	3.06
Albacore	17.2	17.5	17.3	19.2	13.7	9.84	10.3	5.41	26.2	19.3
Yellowfin tuna	7.10	10.6	5.85	7.15	8.77	7.54	6.98	4.13	15.7	15.0
Bigeye tuna	0.59	0.48	1.63	0.47	0.82	0.56	1.04	0.44	1.00	4.03
Misc tunas			0.01		0.01					
Mahimahi	4.02	2.96	2.11	3.18	2.12	1.45	1.99	1.72	4.00	4.23
Black marlin		0.07		0.13		0.04		0.06		0.04
Blue marlin	0.23	0.35	0.12	0.13	0.11	0.17	0.16	0.12	0.30	0.18
Striped marlin	0.05		0.01		0.11		0.10		0.11	
Wahoo	2.66	2.37	1.75	2.69	3.05	2.66	2.31	2.04	2.81	2.16
All sharks	0.01	0.02	0.01	0.01	0.01	0.01				0.04
Swordfish	0.11	0.02	0.05	0.10	0.10	0.09	0.07	0.07	0.10	0.08
Sailfish	0.06	0.17	0.04	0.19	0.04	0.12	0.05	0.15	0.26	0.31
Spearfish	0.02				0.01	0.02			0.02	
Moonfish	0.08	0.05	0.05	0.11	0.09	0.10	0.05	0.04	0.05	0.03
Oilfish	0.02		0.02	0.04	0.01	0.02		0.01	0.03	
Pomfret	0.02	0.11			0.04	0.19		0.02		
Misc barracudas		0.26	0.01	0.47		0.49		0.17		1.34
Rainbow runner		0.03				0.15		0.02		
Dogtooth tuna		0.02				0.01				
Misc pelagic fish			0.01							

Table 7A. American Samoa catch/1000 Hooks for the three sizes of longline vessels for 2000 and 2001

Species	2000 Alias	2000 Mono-hull	2001 Alias	2001 Monohull < 50'	2001 Monohull > 50'
Skipjack tuna	2.02	1.69	3.11	2.31	2.12
Albacore	19.76	28.01	27.26	29.02	33.37
Yellowfin tuna	6.21	3.07	3.31	1.42	1.41
Bigeye tuna	0.40	0.98	0.63	0.40	1.03
TUNAS SUBTOTALS	28.39	33.75	34.31	33.15	37.92
Mahimahi	1.71	0.36	3.36	0.64	0.50
Black marlin	0.11	0.10	0.07	0.00	0.02
Blue marlin	0.46	0.23	0.39	0.57	0.20
Striped marlin	0.06	0.32	0.03	0.02	0.07
Wahoo	1.15	1.05	1.45	0.43	0.66
All sharks	0.01	0.70	0.04	1.42	0.63
Swordfish	0.02	0.01	0.10	0.04	0.03
Sailfish	0.03	0.04	0.05	0.03	0.03
Spearfish	0.01	0.09	0.00	0.01	0.04
Moonfish	0.07	0.15	0.10	0.12	0.08
Oilfish	0.00	0.12	0.03	0.15	0.21
Pomfret	0.02	0.12	0.02	0.07	0.09
NON-TUNA PMUS SUBTOTALS	3.66	3.29	5.64	3.50	2.56
Misc barracudas	0.00	0.00	0.02	0.00	0.03
Rainbow runner	0.00	0.00	0.00	0.00	0.00
Misc pelagic fish	0.00	0.00	0.03	0.00	0.04
OTHER PELAGICS SUBTOTALS	0.00	0.00	0.05	0.01	0.07
TOTAL PELAGICS	**32.06**	**37.04**	**40.00**	**36.65**	**40.56**

Table 7B. American Samoa catch/1000 Hooks for the three sizes of longline vessels for 2002 and 2003

Species	2002 Alias	2002 Monohull < 50'	2002 Monohull > 50'	2003 Alias	2003 Monohull < 50'	2003 Monohull > 50'
Skipjack tuna	5.99	1.34	5.09	4.68	1.12	2.92
Albacore	17.22	21.17	26.02	17.31	15.87	16.39
Yellowfin tuna	7.10	0.80	1.33	5.85	0.40	2.05
Bigeye tuna	0.59	0.42	0.94	1.63	0.15	1.15
Misc tunas	0.00	0.00	0.01	0.01	0.01	0.01
TUNAS SUBTOTALS	30.89	23.73	33.38	29.48	17.54	22.51
Mahimahi	4.02	0.91	0.57	2.24	0.20	0.38
Black marlin	0.00	0.00	0.00	0.02	0.00	0.00
Blue marlin	0.23	0.22	0.29	0.19	0.17	0.20
Striped marlin	0.05	0.00	0.03	0.01	0.02	0.02
Wahoo	2.66	1.14	1.00	1.76	0.58	1.12
All sharks	0.02	1.15	0.81	0.30	1.33	0.78
Swordfish	0.11	0.04	0.04	0.06	0.00	0.03
Sailfish	0.06	0.01	0.03	0.10	0.04	0.04
Spearfish	0.02	0.01	0.02	0.06	0.00	0.03
Moonfish	0.08	0.03	0.07	0.11	0.07	0.07
Oilfish	0.02	0.22	0.52	0.29	0.27	0.53
Pomfret	0.02	0.01	0.09	0.09	0.05	0.08
NON-TUNA PMUS SUBTOTALS	7.29	3.74	3.48	5.22	2.73	3.28
Misc barracudas	0.00	0.00	0.09	0.01	0.00	0.03
Misc pelagic fish	0.00	0.00	0.27	0.17	0.04	0.21
OTHER PELAGICS SUBTOTALS	0.01	0.00	0.36	0.18	0.04	0.24
TOTAL PELAGICS	**38.19**	**27.47**	**37.22**	**34.87**	**20.31**	**26.03**

Table 7C. American Samoa catch/1000 Hooks for the two kinds of longline vessels for 2004 to 2006

	2004		2005		2006
Species	**Alias**	**Monohulls**	**Alias**	**Monohulls**	**All Vessels**
Skipjack tuna	2.96	3.94	0.97	2.74	3.21
Albacore	13.70	12.88	10.33	17.41	18.45
Yellowfin tuna	8.77	3.18	6.99	2.64	1.59
Bigeye tuna	0.82	1.27	1.04	0.88	0.95
Misc tunas	0.01	0.00	0.00	0.00	0.00
TUNAS SUBTOTALS	26.25	21.27	19.33	23.66	24.20
Mahimahi	2.12	0.19	1.99	0.30	0.37
Black marlin	0.00	0.00	0.00	0.00	0.00
Blue marlin	0.11	0.18	0.16	0.16	0.18
Striped marlin	0.11	0.02	0.11	0.02	0.03
Wahoo	3.05	1.56	2.31	1.41	1.50
All sharks	0.05	0.86	0.03	0.67	0.53
Swordfish	0.10	0.03	0.07	0.02	0.08
Sailfish	0.04	0.07	0.05	0.05	0.06
Spearfish	0.01	0.08	0.00	0.05	0.09
Moonfish	0.09	0.06	0.05	0.07	0.05
Oilfish	0.01	0.69	0.01	0.30	0.46
Pomfret	0.04	0.10	0.05	0.07	0.05
NON-TUNA PMUS SUBTOTALS	5.73	3.85	4.83	3.10	3.40
Misc barracudas	0.00	0.04	0.00	0.02	0.02
Misc pelagic fish	0.00	0.10	0.00	0.09	0.05
OTHER PELAGICS SUBTOTALS	0.00	0.14	0.00	0.10	0.06
TOTAL PELAGICS	**31.98**	**25.26**	**24.17**	**26.87**	**27.66**

Interpretation:

Since the development of the longline fishery in 1995, a growing number of boats with a range of different sizes entered the fishery. These boats include alias, averaging around 28 to 30 feet, monohull less than 50 feet, and monohull greater than 50 feet in length. Table 7 has been included in this report to better represent the catch per 1000 hooks for each type of longline vessel. Additionally, total catch rates for pelagic species dropped this year for the monohulls compared to rates in 2001 and 2002 while the catch rates for alias increased. This indicates that the 50 mile closed areas around the islands for the monohulls is benefiting the alias. When compared to the albacore catch rate this shows that the fishery in American Samoa is becoming more diverse and not just all albacore catch.

Calculation: These values are sums of the Longline Logbook catch (number of fish kept+released+finned) for the three types of longline vessels in Samoa divided by the total number of hooks set by each type of vessel. In 2000 there was only one monohull < 50’ so its catch was combined with the rest of the monohulls. All species of sharks entered in the Longline Logs are combined in the Other Sharks species. Rays and Sunfish are included in the Other Pelagic Fish species.

Table 8A. American Samoa estimated average weight per fish by species from the Offshore Creel Survey Interviews

	Creel Survey Annual Average Pounds per Fish										
Species	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
Skipjack tuna	9.6	8.4	12.5	9.7	11.6	14.8	11.1	8.6	8.1	7.7	13.2
Albacore	39.9	44.0	45.7	42.6	45.1	44.8	45.5	38.7	37.8	36.8	37.0
Yellowfin tuna	37.9	44.2	45.9	33.1	38.1	31.3	28.0	17.7	34.7	33.8	19.1
Bigeye tuna	52.3	82.8	79.2	57.1	61.1	69.2	67.6	37.2	45.3	42.4	22.6
Mahimahi	26.2	25.6	23.3	22.3	24.8	19.7	19.3	20.4	21.7	19.0	17.4
Black marlin		148.3		101.9		67.2	31.9	90.0	103.0	88.2	115.8
Blue marlin	151.8	117.7	119.9	101.9	135.7	70.9	190.4	98.8	62.9	117.9	179.6
Wahoo	44.3	38.4	26.3	27.3	31.9	29.7	28.2	30.8	28.1	29.5	29.0
All sharks	112.3	96.8	69.3	38.0	39.5	68.8	68.5	62.4	71.7		41.6
Swordfish	150.0	100.0	212.6	12.0		59.4	23.4	117.4	37.7	26.0	34.3
Sailfish	88.4	70.7	67.0	61.8	39.1	42.0	33.8	57.6	44.9	49.5	45.2
Spearfish				46.0					46.0		
Moonfish		70.3	33.5	57.7	30.9	102.5	78.3	107.1	59.7	101.5	117.4
Oilfish			12.7	10.0		23.9		11.1	7.8	1.9	
Pomfret					16.5		8.2		8.2	2.3	
Misc barracudas	13.5	14.6	15.3	11.0	13.1	7.6	9.2	8.8	10.4	11.0	8.3
Rainbow runner		14.0	17.5	6.5			16.1		6.9	8.8	
Dogtooth tuna			10.0			15.6	40.8		16.2		
Misc pelagic fish	61.8	8.0	45.3								

Table 8B. American Samoa estimated average weight per fish by species from the Cannery Sampling Data

	Cannery Sampled Average Lbs. per Fish								
Species	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
Skipjack tuna				16.8	11.3	9.9	13.6	13.1	12.2
Albacore	41.0	47.2	40.7	39.8	39.1	37.8	36.5	33.2	34.7
Yellowfin tuna				57.0	62.4	44.3	52.1	39.6	51.9
Bigeye tuna				40.6	46.7	37.4	35.9	31.1	35.2
Mahimahi				16.1	13.5	20.7	13.0	17.0	13.5
Black marlin				36.3					
Blue marlin								45.8	
Wahoo				30.6	30.7	30.0	27.4	31.6	31.7
Swordfish							72.3		70.3
Sailfish					34.0			25.0	
Moonfish				147.6	117.5			95.5	34.7
Pomfret				5.1	6.2			7.8	
Rainbow runner					9.4		10.8		

Interpretation :
The table for cannery data represents the portion of the catch unloaded by larger vessels fishing further away from Tutuila while the table from the Creel Survey represents fish caught by alias near Tutuila. We have observed an important decrease of average lb/fish for the main targeted species of albacore this year. The values recorded are the lowest ever obtained for all the tuna species for both the creel survey and cannery sampling.

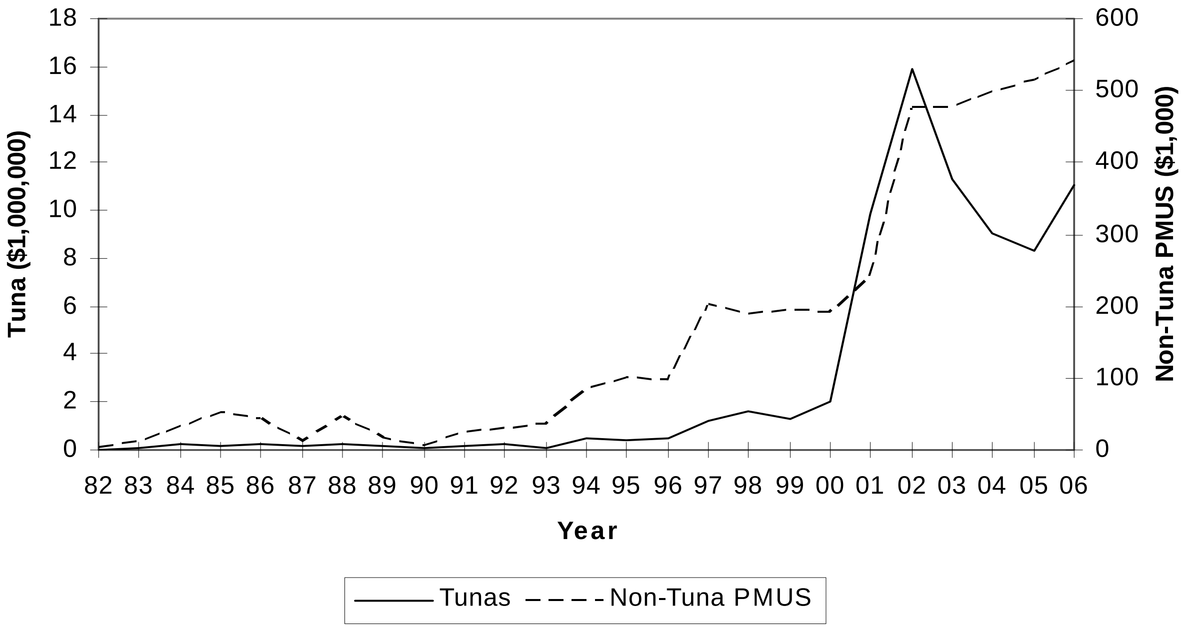
The average size of fish reported in the creel survey of Alias is smaller than in the logbook data from the cannery. Two factors can help explain this difference. First, Alia fishermen retain small fish as well as large, while on the large vessels small fish are discarded. Second, only the Alias troll, and trolling near the surface catches more small fish of some species like yellowfin, than longlining in deeper water.

In 1999 longline boats began landing their catches gilled and gutted to obtain higher prices at the canneries. It is possible that this new method could have an impact on size variation for the longline fishery.

Calculation: The Creel Survey Annual Average Pounds/Fish for each species was calculated from the creel survey interviews by dividing the total pounds of each species sampled during the year by the number of fish of sampled during the year. If the fish were sampled as other than whole (ie Gilled and Gutted) the sampled weight is divided by the appropriate factor (less than 1) to get the whole weight. All weights were measured directly before 2000, but after that most weights were calculated from length measurements. Since these fish are caught by alias operating close to Tutuila this represents fish sizes close to shore.

The Cannery Sampled Annual Average Pounds/Fish for each species was calculated from the length measurements made at the canneries when the fish are unloaded there. The weight of each sampled fish is calculated from the length measurements. These weights are summed over the year for each species and are then divided by the number of fish of that species sampled during the year. Since these fish are caught by larger boats operating away from Tutuila this represents fish sizes further out to sea from Tutuila

Figure 20. Inflation-adjusted Revenue for Tuna and non-Tuna PMUS Landed by American Samoa Vessels



Interpretation: Inflation-adjusted revenues climbed $2.73 million (+33%) to over $11,024,000 for tuna landed by American Samoa vessels between 2005 and 2006. The increase in tuna revenue reversed the declining trend from 2002 to 2005 and is the third highest inflation-adjusted tuna revenue for American Samoa in the 25-year record. Inflation-adjusted tuna revenue peaked in 2002 at nearly $16 million 2006-dollars; 2006 landings generated revenues that were sixty-nine percent (69%) of the 2002 peak revenues, and nearly equal to the second highest revenue in the record.

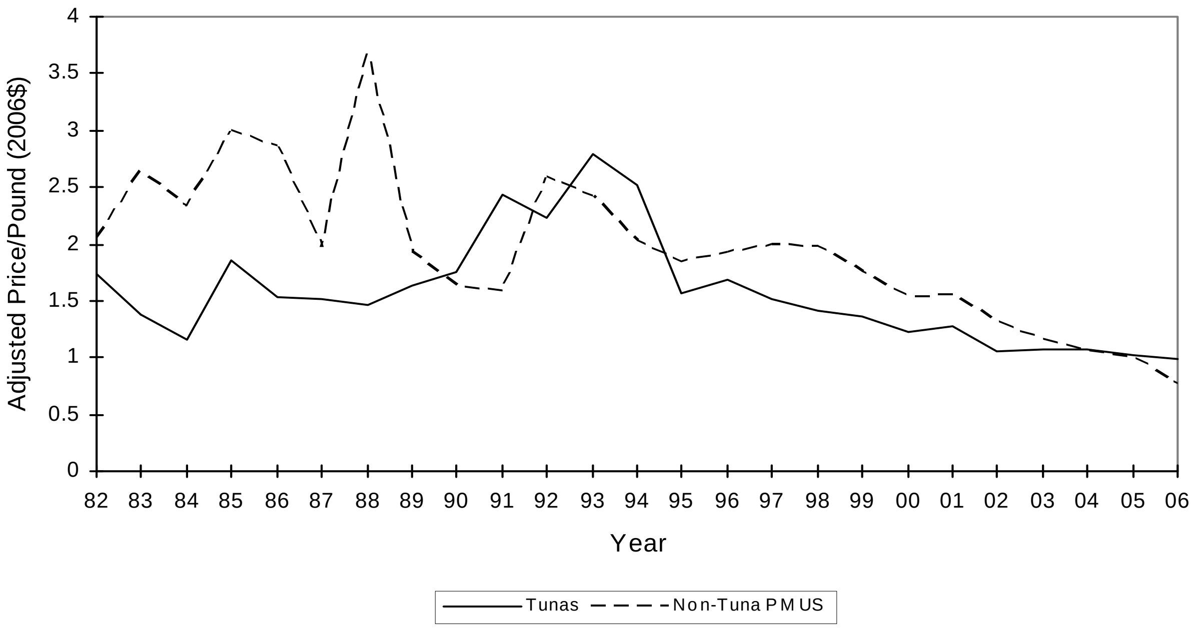
Inflation-adjusted revenues increased $28,320 (+5.5%) to $541,565 for non-tuna Pelagic Management Unit Species (PMUS) landed by American Samoa vessels between 2005 and 2005. The 2006 non-tuna PMUS revenue is the highest recorded; the current high tops an increasing trend of sixteen years.

Calculation: The unadjusted revenues for Tunas and Other PPMUS were calculated by summing the values for the species in these categories as defined by Table 2. The unadjusted revenue for All Pelagics is the sum of the value for the Tuna, Other PPMUS and Miscellaneous categories as defined by Table 2.

The unadjusted revenues from commercial landings for the pelagic species subgroups above were adjusted for inflation by multiplying a given year's revenue by the 2000 consumer price index (CPI) divided by the CPI for that year.

		Revenue ($)			
		Tunas		Non-Tuna PMUS	
Year	CPI	Unadjust	Adjusted	Unadjust.	Adjusted
1982	100.0	$18,990	$38,455	$1,534	$3,106
1983	100.8	$58,561	$117,649	$5,828	$11,708
1984	102.7	$114,981	$226,743	$15,938	$31,430
1985	103.7	$95,157	$185,841	$26,800	$52,341
1986	107.1	$139,680	$264,135	$23,246	$43,957
1987	111.8	$110,076	$199,458	$5,270	$9,549
1988	115.3	$143,613	$252,328	$25,383	$44,599
1989	120.3	$111,425	$187,529	$9,425	$15,863
1990	129.6	$63,229	$98,764	$3,809	$5,950
1991	135.3	$94,363	$141,262	$16,344	$24,468
1992	140.9	$152,115	$218,589	$20,160	$28,970
1993	141.1	$85,052	$122,049	$24,435	$35,065
1994	143.8	$338,038	$475,958	$59,276	$83,461
1995	147.0	$318,724	$438,882	$73,093	$100,649
1996	152.5	$394,679	$524,134	$73,818	$98,030
1997	156.4	$930,138	$1,204,529	$156,099	$202,148
1998	158.4	$1,240,616	$1,585,507	$146,629	$187,392
1999	159.9	$1,018,884	$1,290,926	$151,918	$192,481
2000	166.7	$1,650,593	$2,005,470	$156,344	$189,958
2001	168.8	$8,217,502	$9,852,785	$198,741	$238,290
2002	169.2	$13,311,362	$15,933,701	$397,249	$475,506
2003	177.5	$9,890,729	$11,285,322	$417,614	$476,498
2004	187.2	$8,345,728	$9,030,077	$461,017	$498,820
2005	194.7	$7,973,396	$8,292,332	$493,505	$513,245
2006	202.5	$11,024,551	$11,024,551	$541,565	$541,565
Average	**143.7**	**$2,633,687**	**$2,999,879**	**$140,202**	**$164,202**
Std. Dev.	**30.10**	**$4,150,074**	**$4,630,039**	**$172,158**	**$181,997**

Figure 21. American Samoa average inflation-adjusted price per pound of Tunas and Non-Tuna PMUS.



Interpretation: The average inflation-adjusted price per pound varied since 1982 until 1992-1993 when a continuous decrease was seen. This gradual decrease may be due to the lower price that the canneries pay per pound of tuna compared to the price the local stores and restaurants pay. The decreasing percentage of longline catches that make it to the higher revenue local markets after 1993 probably contribute to this decline in prices for tuna.

Additionally, this decline in prices could be due to competition from frozen fish purchased from foreign longline vessels moored in Pago Harbor and from fishes imported from neighboring islands. This year, even if the adjusted price per pound increased (+1.1%) it is

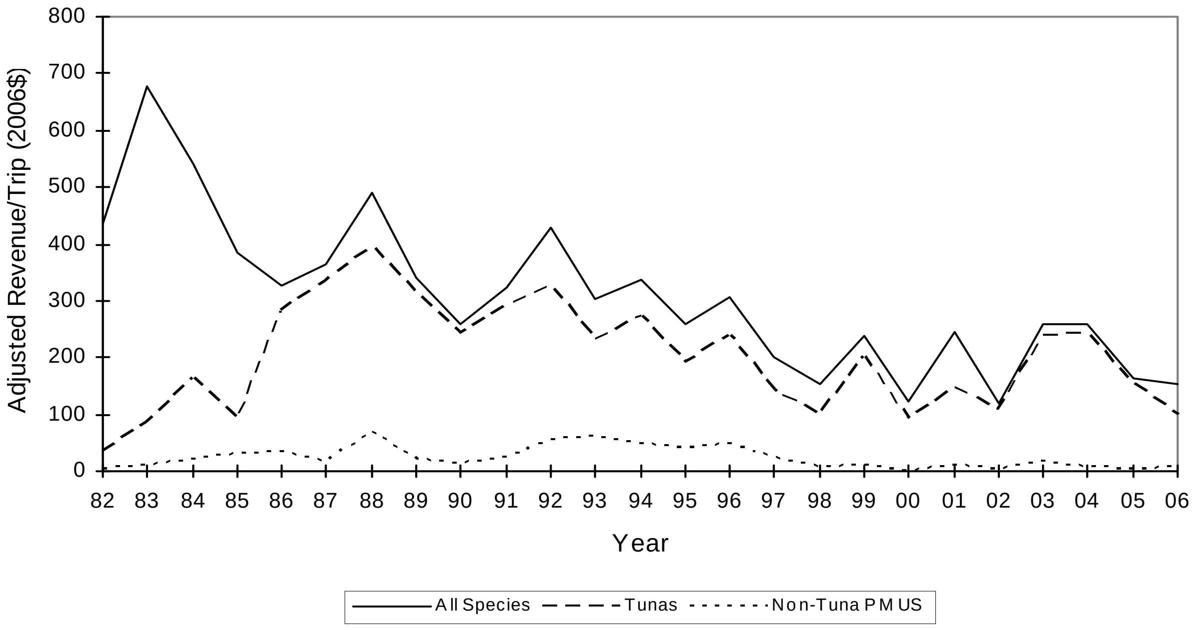
	Average Price/Pound ($)			
	Tunas		Non-Tuna PMUS	
Year	Unadjust.	Adjusted	Unadjust.	Adjusted
1982	$0.86	$1.74	$1.01	$2.05
1983	$0.69	$1.38	$1.31	$2.64
1984	$0.59	$1.16	$1.18	$2.34
1985	$0.95	$1.86	$1.53	$2.99
1986	$0.82	$1.54	$1.51	$2.86
1987	$0.83	$1.51	$1.09	$1.97
1988	$0.83	$1.46	$2.10	$3.68
1989	$0.97	$1.64	$1.14	$1.93
1990	$1.12	$1.75	$1.05	$1.64
1991	$1.63	$2.43	$1.06	$1.58
1992	$1.55	$2.23	$1.80	$2.58
1993	$1.94	$2.79	$1.68	$2.41
1994	$1.79	$2.52	$1.43	$2.02
1995	$1.13	$1.56	$1.33	$1.83
1996	$1.26	$1.68	$1.45	$1.92
1997	$1.17	$1.51	$1.54	$2.00
1998	$1.11	$1.42	$1.54	$1.97
1999	$1.07	$1.36	$1.39	$1.76
2000	$1.01	$1.22	$1.27	$1.54
2001	$1.06	$1.27	$1.29	$1.55
2002	$0.89	$1.06	$1.09	$1.31
2003	$0.94	$1.07	$1.02	$1.16
2004	$0.99	$1.07	$0.98	$1.06
2005	$0.98	$1.02	$0.97	$1.01
2006	$0.98	$0.98	$0.77	$0.77
Average	**$1.09**	**$1.57**	**$1.30**	**$1.94**
Std. Dev.	**$0.32**	**$0.47**	**$0.30**	**$0.66**

still close to the lowest price ever obtained last year. The price per pound for non–tuna PMUS is the lowest ever obtained..

Calculation: The unadjusted price/pound for Tunas and Non-Tuna PMUS were calculated by dividing the sum of the values for the species in these categories as defined by Table 2 by the sum of their commercial landings or pounds.

The unadjusted price/pound values for the pelagic species subgroups above were adjusted for inflation by multiplying the given year's price/pound by the 2000 consumer price index (CPI) divided by the CPI for that year.

Figure 22. American Samoa average inflation-adjusted revenue per trolling trip landing pelagic species



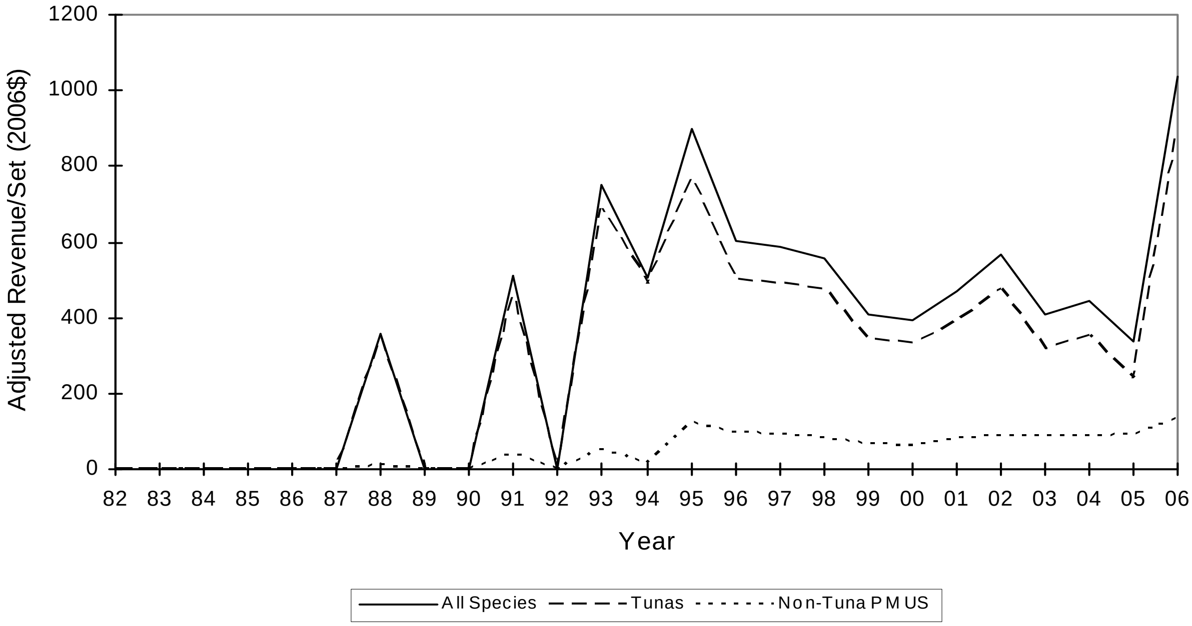
Interpretation: Since 1992 there has been a gradual decrease in revenue per trolling trip to 28% of the 1992 value in 2002 with a 114% jump in 2003 due to a jump in CPUE. This gradual decrease in revenue per trip tracks a decrease in hours per trip from 7.40 in 1992 to 3.37 in 2003 as the troll fishery has become less of a commercial fishery and more of a recreational fishery. This transition to a recreational fishery is also seen in the number of trips that sell their fish commercially declining from 90% in 1992 to 19% in 2003.

Calculation: The purely trolling interviews in the offshore creel survey system landing any of the species listed in Table 1 and selling part or all of their catch are first counted for the given year to get the number of trips. The unadjusted revenue/trip for Tunas and Non-Tuna PMUS is calculated by first summing the value of the species in these pelagic subgroups caught and sold by purely trolling methods and then dividing this by the number of pure trolling trips. The unadjusted revenue/trip for all species is the sum of the value of all species, in Table 1 or not, caught by the purely trolling trips that sold all or part of their catch divided by the number of such trips.

The unadjusted revenue/trip values for the pelagic species subgroups above and for all species were adjusted for inflation by multiplying the given year's revenue/trip by the 2003 consumer price index (CPI) divided by the CPI for that year.

Year	All Species		Tunas		Non-Tuna PMUS	
	Adj.	**Unadj.**	**Adj.**	**Unadj.**	**Adj.**	**Unadj.**
1982	$434	$214	$32	$16	$2.6	$1.3
1983	$679	$338	$87	$43	$10.4	$5.2
1984	$540	$274	$162	$82	$20.7	$10.5
1985	$383	$196	$91	$47	$30.9	$15.8
1986	$328	$173	$283	$150	$32.9	$17.4
1987	$364	$201	$335	$185	$16.5	$9.1
1988	$489	$278	$395	$225	$67.8	$38.6
1989	$340	$202	$312	$185	$21.0	$12.5
1990	$259	$166	$241	$154	$12.2	$7.8
1991	$322	$215	$294	$196	$25.4	$17.0
1992	$428	$298	$328	$228	$52.9	$36.8
1993	$303	$211	$232	$162	$59.8	$41.7
1994	$339	$241	$273	$194	$47.4	$33.7
1995	$258	$187	$192	$139	$40.9	$29.7
1996	$306	$231	$239	$180	$46.5	$35.0
1997	$202	$156	$143	$110	$25.5	$19.7
1998	$153	$119	$100	$78	$7.8	$6.1
1999	$237	$187	$200	$158	$9.4	$7.4
2000	$122	$100	$93	$76	$1.0	$0.8
2001	$246	$206	$145	$121	$10.7	$8.9
2002	$120	$100	$109	$91	$4.5	$3.8
2003	$259	$227	$239	$209	$16.1	$14.1
2004	$258	$239	$242	$223	$6.7	$6.2
2005	$165	$158	$153	$147	$4.5	$4.3
2006	$154	$154	$99	$99	$5.7	$5.7
Average	**$307**	**$203**	**$201**	**$140**	**$23.2**	**$15.6**
Std. Dev.	**$132**	**$56**	**$93**	**$60**	**$19.0**	**$12.5**

Figure 23. American Samoa average inflation-adjusted revenue per longline set by alias landing pelagic species.



Interpretation: The longline revenue per set has seen a gradual decrease since 1995 until 2001 and 2002. The decrease of revenue per set in 2003 (28.4% compared to 2002) was the result of the decrease in pounds landed this year

Calculation: The longline interviews in the offshore creel survey system catching any of the species listed in Table 1 and selling all or part of their catch are counted and adjusted for multiset trips for the given year to get the number of sets. The unadjusted revenue/set for Tunas and Non-Tuna PMUS is calculated by first summing the value of the species in these pelagic subgroups caught by these sets and then dividing this by the number of sets. The unadjusted revenue/set for all species is the sum of the value of all species, listed in Table 1 or not, caught by these longline sets divided by the number of such sets.

The unadjusted revenue/set values for the pelagic species subgroups above and for all species were adjusted for inflation by multiplying the given year's revenue/set by the 2003 consumer price index (CPI) divided by the CPI for that year.

Year	All Species		Tunas		Non-Tuna PMUS	
	Adj.	Unadj.	Adj.	Unadj.	Adj.	Unadj.
1982	$0	$0	$0	$0	$0.0	$0.0
1983	$0	$0	$0	$0	$0.0	$0.0
1984	$0	$0	$0	$0	$0.0	$0.0
1985	$0	$0	$0	$0	$0.0	$0.0
1986	$0	$0	$0	$0	$0.0	$0.0
1987	$0	$0	$0	$0	$0.0	$0.0
1988	$357	$203	$348	$198	$9.5	$5.4
1989	$0	$0	$0	$0	$0.0	$0.0
1990	$0	$0	$0	$0	$0.0	$0.0
1991	$513	$343	$461	$308	$42.8	$28.6
1992	$0	$0	$0	$0	$0.0	$0.0
1993	$752	$524	$691	$481	$49.9	$34.8
1994	$505	$359	$492	$349	$13.0	$9.2
1995	$896	$651	$770	$559	$121	$87.9
1996	$604	$455	$501	$378	$99.5	$74.9
1997	$589	$455	$490	$378	$91.6	$70.7
1998	$558	$437	$476	$372	$80.9	$63.3
1999	$409	$323	$341	$269	$67.2	$53.0
2000	$393	$323	$331	$272	$61.8	$50.9
2001	$468	$390	$386	$322	$80.6	$67.2
2002	$566	$473	$476	$398	$88.6	$74.0
2003	$408	$358	$319	$279	$85.9	$75.3
2004	$445	$411	$351	$325	$88.7	$82.0
2005	$336	$323	$241	$232	$92.9	$89.3
2006	$1036	$1036	$893	$893	$131	$131
Average	**$465**	**$372**	**$398**	**$317**	**$63.4**	**$52.5**
Std. Dev.	**$266**	**$232**	**$233**	**$201**	**$40.6**	**$36.3**

B. Guam

Introduction and Summary

Pelagic fishing vessels based on Guam are classified into two general groups: distant-water purse seiners and longliners that fish outside Guam's economic exclusive zone (EEZ) and transship through the island, and small, primarily recreational, trolling boats that are either towed to boat launch sites or berthed in marinas and fish only within local waters, either within Guam's EEZ or on some occasions in the adjacent EEZ of the Northern Mariana Islands. This annual report covers primarily the local, Guam-based, small-boat pelagic fishery.

The estimated annual pelagic landings have varied widely, ranging between 322,000 and 937,000 pounds in the 25-year time series. The 2006 total pelagic landings were approximately 510,608 pounds, an increase of 14% compared with 2005. Landings consisted primarily of five major species: mahimahi (*Coryphaena hippurus*), wahoo (*Acanthocybium solandri*), bonita or skipjack tuna (*Katsuwonus pelamis*), yellowfin tuna (*Thunnus albacares*), and Pacific blue marlin (*Makaira mazara*). Other minor species caught include rainbow runner (*Elagatis bipinnulatus*), great barracuda (*Sphyraena barracuda*), kawakawa (*Euthynnus affinis*), dogtooth tuna (*Gymnosarda unicolor*), double-lined mackerel *(Grammatorcynus bilineatus*), oilfish (*Ruvettus pretiosus*), and three less common species of barracuda. Sailfish and sharks were also caught during 2006. However, these species were not encountered during offshore creel surveys and was not available for expansion for this year's report. While sailfish is kept, sharks are often discarded as bycatch. In addition to the above pelagic species, approximately half a dozen other species were landed incidentally this year.

The number of boats involved in Guam's pelagic or open ocean fishery gradually increased from 193 in 1983 to 469 in 1998. This number decreased until 2001, but has generally been increasing since that year. There were 386 boats involved in Guam's pelagic fishery in 2006, an increase of 8% from 2005. A majority of the fishing boats are less than 10 meters (33 feet) in length and are usually owner-operated by fishermen who earn a living outside of fishing. Most fishermen sell a portion of their catch at one time or another and it is difficult to make a distinction between recreational, subsistence, and commercial fishers. A small, but significant, segment of the pelagic group is made up of marina-berthed charter boats that are operated primarily by full-time captains and crews. Data and graphs for non-charters, charters, and bycatch are represented in this report.

There are general wide year-to-year fluctuations in the estimated landings of the five major pelagic species. Catch amounts for all five common species showed an increase from 2005 levels. 2006 mahimahi catch increased more than 52% from 2005, wahoo catch totals increased 141% from 2005, and Pacific blue marlin catch increased 217% from 2005.

Aggregate landings of all pelagics, tuna, and non-tuna Pelagic Management Unit Species (PMUS) increased substantially in 2006 from 2005 levels. Landings of all pelagics increased 68%, with tuna PMUS increasing 48% and non-tuna PMUS increasing 88%. The number of trolling boats increased by 8%, the number of trolling trips increased by 1% and hours spent trolling increased by 11%. More boats making more trips may indicate an increase in good weather days, or increased effort due to an abundance of fish. Trolling catch rates (pounds per hour fished) showed a significant increase compared with 2005. Total CPUE was up 47%, with wahoo, marlin, and mahimahi showing the greatest increases. Wahoo CPUE increased by 112%, marlin CPUE increased by 150%, and mahimahi CPUE increased by 37%.

Commercial landings and revenues decreased in 2006, with total adjusted revenues decreasing 24%. The adjusted average price for all pelagics decreased 9%, with tuna PMUS prices decreasing 13%, and non-tuna PMUS decreasing 8%. Adjusted revenue per trolling trip decreased 10% for all pelagics, decreased 6% for tuna PMUS, and decreased 12% for non-tuna PMUS. Commercial landings have shown a decreasing trend over the past six years. While some of this decrease may be attributed to major storm events of the past several years, the reason for the most recent decline may be the increased cost of fuel. The adjusted average price of pelagic species has declined each year for the past eight years while revenue per trolling trip has declined slightly over the same time period. Despite decreasing revenues with decreased commercial landings, pelagic fishing continues, as a majority of trollers do not rely on the catch or selling of fish as their primary source of income. Additionally, Guam law required the government of Guam to provide locally caught fish to food services in government agencies, such as Department of Education and Department of Corrections. In 2002, the government of Guam began implementing cost-saving measures, including privatization of food services. The requirement that locally fish be used for food services, while still a part of private contracts, is not being enforced. This has allowed private contractors to import cheaper foreign fish, and reduced the sales of vendors selling locally caught fish. This represented a substantial portion of sales of locally caught pelagic fish. The decrease in commercial sales seen following 2002 may be, in part, due to this change.

One boat jigging for pelagics at the FADs and along current lines sold more than 34,100 dollars worth of pelagic fish last year, accounting for 10.5% of total commercial sales in 2006.

In October, 2005, one 35 foot boat began short lining for sharks at the southern banks, with the expectation to sell shark meat to Mexico. After this venture failed, the vessel tried vertical long lining, short lining, and deep bottom fishing, all without commercial success. The fisherman has since switched his operation to shallow bottom fishing at offshore banks.

The shortage of staff biologists has been significant in the past several years. DAWR staff biologists continue to oversee several projects simultaneously, while providing on-going training to ensure the high quality of data being collected by all staff. All fisheries staff are trained to identify the most commonly caught fish to the species level. New staff are mentored by biologists and senior technicians in the field before conducting creel surveys on their own.

The makeshift ramp at Ylig Bay provides access to boating and fishing resources along the windward coast of Guam. These fishing areas are not accessible most of the year due to rough seas, with most of the coast inaccessible for public shore-based fishing. However, as many as ten vehicles with trailers can be seen at Ylig during periods of calm weather. These fishermen are primarily trolling during the day, and bottom fishing and spear fishing during the evenings. Participation and effort at Ylig may be significant during the summer months when compared to

the three offshore creel census sites. Also, a wave buoy deployed south of Ylig Bay is reported to aggregate pelagic fish. However, surveying this ramp remains challenging. Inadequate lighting, no public phone, return fishing times well after midnight, and other safety issues make fishery data collecting challenging. A lack of freshwater for rinsing and large catches which can require substantial time to sample discourage fishermen from being interviewed as they prefer not to stay long after trailering their boats. Currently, creel census data cannot regularly be obtained at this site. An educational outreach and modifying current sampling techniques addressing all the above challenges is necessary before adding Ylig as a creel census site.
In December, 2006, a new launch ramp and facility was opened in Acfayan Bay, located in the village on Inarajan on the southeast coast of Guam. Monitoring of this ramp for pelagic fishing activity began at the start of 2007.

Several factors in recent years have negatively affected trolling activity and may affect fishing activity in the future. The price of fuel has increased significantly; making it more costly to fish and also more attractive to sell fish to recoup costs. More than two-thirds of the FADS are offline, and difficulties with procurement have prevented timely redeployment of these systems. Trolling activity occurs regularly at FADs, and reported to have occurred significantly at offshore banks. At offshore banks, fishermen also reported more interaction with sharks.

For more information, the WESPAC website is www.wpcouncil.org.

2007 Recommendations

1. Explore the possibility of expanding the offshore survey to include Ylig. This opportunistic fishery can provide information on otherwise poorly known areas of Guam.
2. Expand the offshore monitoring program to include the new ramp at Acfayan bay
3. Streamline the procurement process to facilitate the redeployment of FADS.

Table 1. Guam 2006 Creel Survey - Pelagic Species Composition

Species	Total Landing (Lbs)	Non-Charter	Charter
Skipjack Tuna	146,658	126,042	20,616
Yellowfin Tuna	28,049	25,419	2,630
Kawakawa	3,518	3,305	213
Albacore	0	0	0
Bigeye Tuna	0	0	0
Other Tuna PMUS	0	0	0
Tuna PMUS	**178,225**	**154,766**	**23,459**
Mahimahi	162,512	139,365	23,147
Wahoo	105,879	91,713	14,166
Blue Marlin	29,222	23,217	6,005
Black Marlin	0	0	0
Striped Marlin	0	0	0
Sailfish	3,032	3,032	0
Shortbill Spearfish	0	0	0
Swordfish	0	0	0
Oceanic Sharks	630	630	0
Pomfrets	321	321	0
Oilfish	1,703	1,703	0
Moonfish	0	0	0
Misc. Longline Fish	0	0	0
Non-tuna PMUS	**303,299**	**259,981**	**43,318**
Dogtooth Tuna*	14,022	14,022	0
Rainbow Runner*	9,083	8,867	216
Barracudas	5,981	5,870	111
Oceanic Sharks	0	0	0
Misc. Troll Fish	0	0	0
Non-PMUS Pelagics	**29,086**	**28,759**	**327**
Total Pelagics	**510,610**	**443,506**	**67,104**

Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel survey data. This table includes several species of barracuda and the double-lined mackerel, species that may not be included in other tables in this report. Pelagic totals may slightly differ in those tables.

Table2: Guam 2006 Annual Commercial Average Price of Pelagic Species

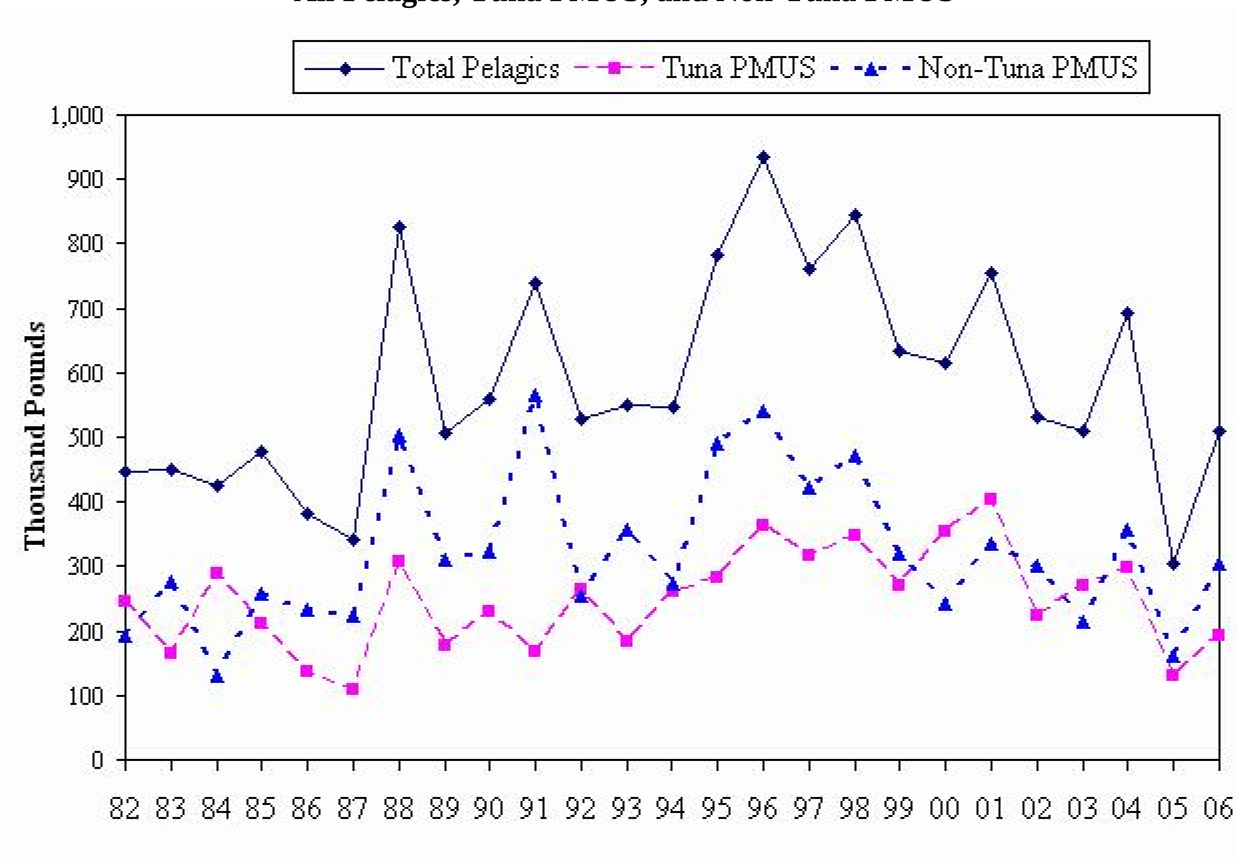
Species	Average Price ($/Lb)
Tunas (misc)	1.00
Yellowfin Tuna	2.18
Bonita/skipjack Tuna	**1.13**
Tunas **Subtotal**	1.48
Monchong	2.23
Sharks	2.50
Swordfish	2.50
Spearfish	1.10
Sailfish	1.45
Marlin	**1.17**
Wahoo	1.99
Mahi / Dolphinfish	1.55
Non-tuna PMUS **Subtotal**	1.61
Barracuda	**1.90**
Rainbow Runner	1.83
Dogtooth Tuna	**1.23**
Non-PMUS Pelagic Subtotal	**1.61**
Pelagic Total	**1.57**

Source: The WPacFIN-sponsored commercial landings system.

Table 3. Annual Consumer Price Indexes and CPI Adjustment Factors

Year	Consumer Price Index	CPI Adjust Factor
1980	134.0	4.97
1981	161.4	4.13
1982	169.7	3.93
1983	175.6	3.79
1984	190.9	3.49
1985	198.3	3.36
1986	203.7	3.27
1987	212.7	3.13
1988	223.8	2.98
1989	248.2	2.68
1990	283.5	2.35
1991	312.5	2.13
1992	344.2	1.94
1993	372.9	1.79
1994	436.0	1.53
1995	459.2	1.45
1996	482.0	1.38
1997	491.4	1.36
1998	488.9	1.36
1999	497.9	1.34
2000	508.1	1.31
2001	501.2	1.33
2002	504.5	1.32
2003	521.4	1.28
2004	563.2	1.18
2005	585.6	1.14
2006	**666.1**	**1.00**

Figure 1a. Guam Annual Estimated Total Landings:
All Pelagics, Tuna PMUS, and Non-Tuna PMUS



Interpretation: The estimated total pelagic, tuna, and non-tuna PMUS have exhibited a cyclic trend, with a peak year followed by one or two down years. Total pelagic catch peaked in 1996, and has been decreasing since. Factors relating to this cycle may have to do with the biology of the fish or be weather related. Additionally, decreasing returns on fish catch, and increasing fuel prices may affect the amount of fish being caught. There is also anecdotal evidence from the average fishermen that pelagic fish are not caught consistently year round around Guam.

Compared with 2005, total pelagic and non-tuna PMUS increased 68% and 88% respectively, while tuna landings increased 48%. Generally, tuna species are consistently caught year round, with the other major pelagic species being more seasonal.

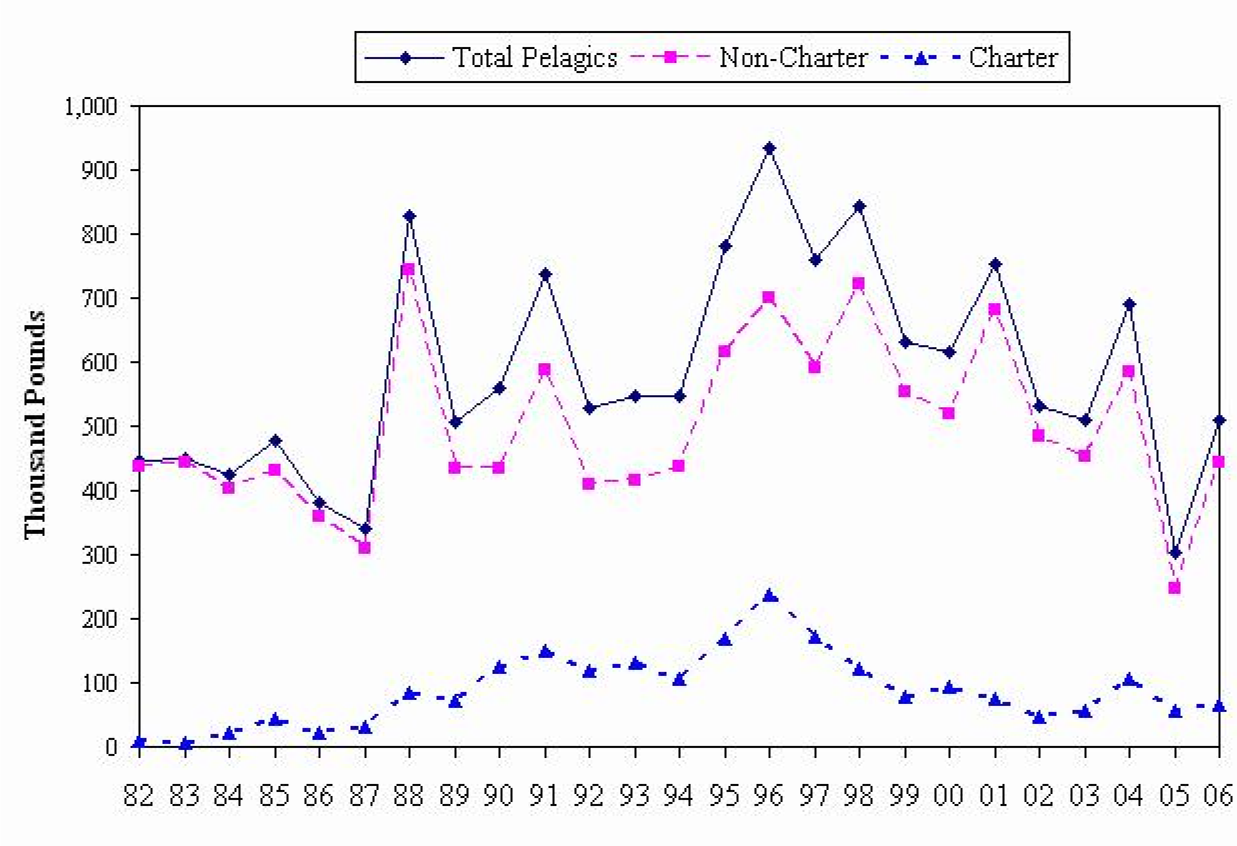
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel survey.

Calculation: A 365-day (366 days during leap years) quarterly expansion is run for each calendar year of survey data to produce catch and effort estimates for the pelagic fishery to avoid over-estimating seasonal pelagic species. Percent species composition is calculated by weight for the sampled catch for each method to produce catch estimates for each species for the expanded period. The annual catch for all pelagic species and the PMUS separately are summed across all methods to obtain the numbers plotted above.

Estimated Total Landings (Pounds)

Year	All Pelagics	Tuna PMUS	Non-Tuna PMUS
1982	446,995	245,076	192,007
1983	450,823	166,105	277,179
1984	424,856	288,958	130,249
1985	477,154	210,620	258,045
1986	381,350	138,072	231,862
1987	341,385	109,757	224,471
1988	827,287	308,303	504,149
1989	506,184	176,973	311,339
1990	559,365	230,318	321,769
1991	737,898	168,800	566,353
1992	528,211	265,025	254,796
1993	548,295	184,394	357,787
1994	545,917	262,181	273,167
1995	781,389	282,586	490,234
1996	935,809	364,651	541,551
1997	759,932	316,548	420,967
1998	844,081	347,754	471,180
1999	632,354	270,744	321,178
2000	614,710	355,374	242,774
2001	753,988	403,265	336,036
2002	531,568	222,659	300,227
2003	508,770	269,046	215,261
2004	691,063	297,619	355,679
2005	303,344	129,614	161,358
2006	**510,608**	**192,247**	**303,297**
Average	585,733	248,268	322,517
Standard Deviation	166,584	78,280	117,750

**Figure 1b. Guam Annual Estimated Total Pelagic Landings:
Total Pelagics, Non-Charter, and Charter**



Interpretation: Non-charter trolling trips have always accounted for the bulk of the pelagic catch, although charter boats, which make up less than 5% of the troll fleet, account for a high proportion of trolling effort and catch. Prior to 1988, non-charter boats accounted for over 90% of the troll catch. In 1988, this percentage decreased due to an increase in charter boat activity catering specifically to Asian visitors. Beginning in 1996 however, a downturn in Japan's economy caused a significant decrease in charter trips and subsequent landings. No such trend is observed for non-charters. In 2006, total pelagic and non-charter landings increased 68% and 81% respectively, while charter landings increased 16%. Non-charter boats landed 87% of all pelagics in 2006.

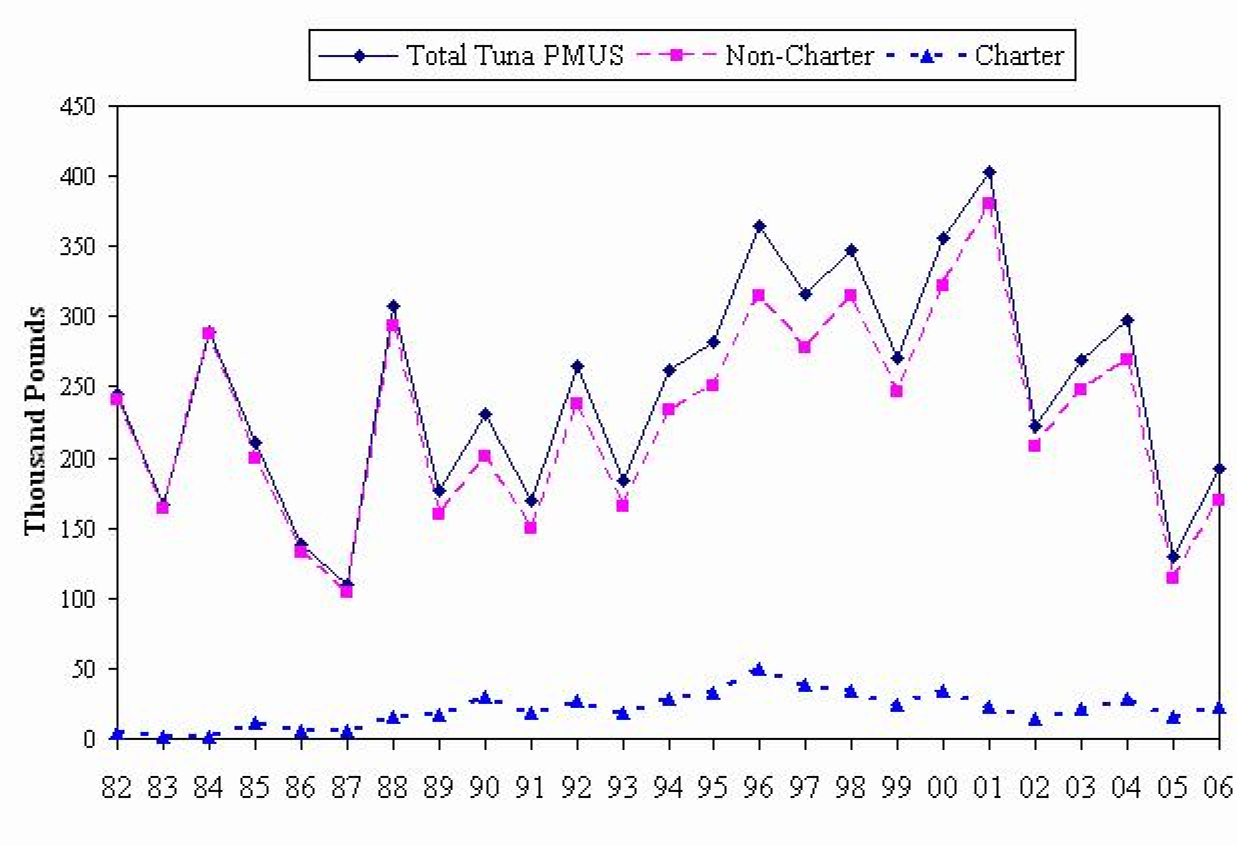
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel survey data.

Calculation: A 365-day (366 days during leap years) quarterly expansion is run for each calendar year of survey data to produce catch and effort estimates for trolling. Percent species composition is calculated by weight for the sampled catch for each method to produce catch estimates for each species for the expanded period. The annual catch for all pelagic species and the PMUS separately are summed across all methods to obtain the numbers plotted above.

Estimated Total Landings (Pounds)

Year	Total Pelagics	Non-Charter	Charter
1982	446,995	437,860	9,135
1983	450,823	445,116	5,707
1984	424,856	402,245	22,612
1985	477,154	432,283	44,871
1986	381,350	359,027	22,323
1987	341,385	310,378	31,007
1988	827,287	743,442	83,845
1989	506,184	435,206	70,978
1990	559,365	433,954	125,411
1991	737,898	587,400	150,498
1992	528,211	409,544	118,667
1993	548,295	416,340	131,955
1994	545,917	438,677	107,239
1995	781,389	614,137	167,251
1996	935,809	699,054	236,755
1997	759,932	589,085	170,847
1998	844,081	722,107	121,974
1999	632,354	553,486	78,868
2000	614,710	519,679	95,032
2001	753,988	680,236	73,753
2002	531,568	483,916	47,651
2003	508,770	452,696	56,074
2004	691,063	584,534	106,529
2005	303,344	245,662	57,681
2006	**510,608**	**443,504**	**67,104**
Average	585,733	497,583	88,151
Standard Deviation	166,584	128,172	56,514

Figure 1c. Guam Annual Estimated Tuna PMUS Landings: Total, Non-Charter, and Charter



Interpretation: The general trend of the estimated total tuna landings shows an increasing trend between 1987 and 2001. Non-charter boats account for the bulk of the total tuna catch, up to 95% in the 1980's. This decreased when charter boat activity began increased from the late 1980's until the mid 1990's. In 2006, 88% of tuna were caught by non-charter boats. In 2006, total tuna, non-charter, and charter tuna landings increased 48%, 49%, and 45% respectively. Despite these increases, the 2006 estimated tuna PMUS landings were 29% lower than the 25 year average.

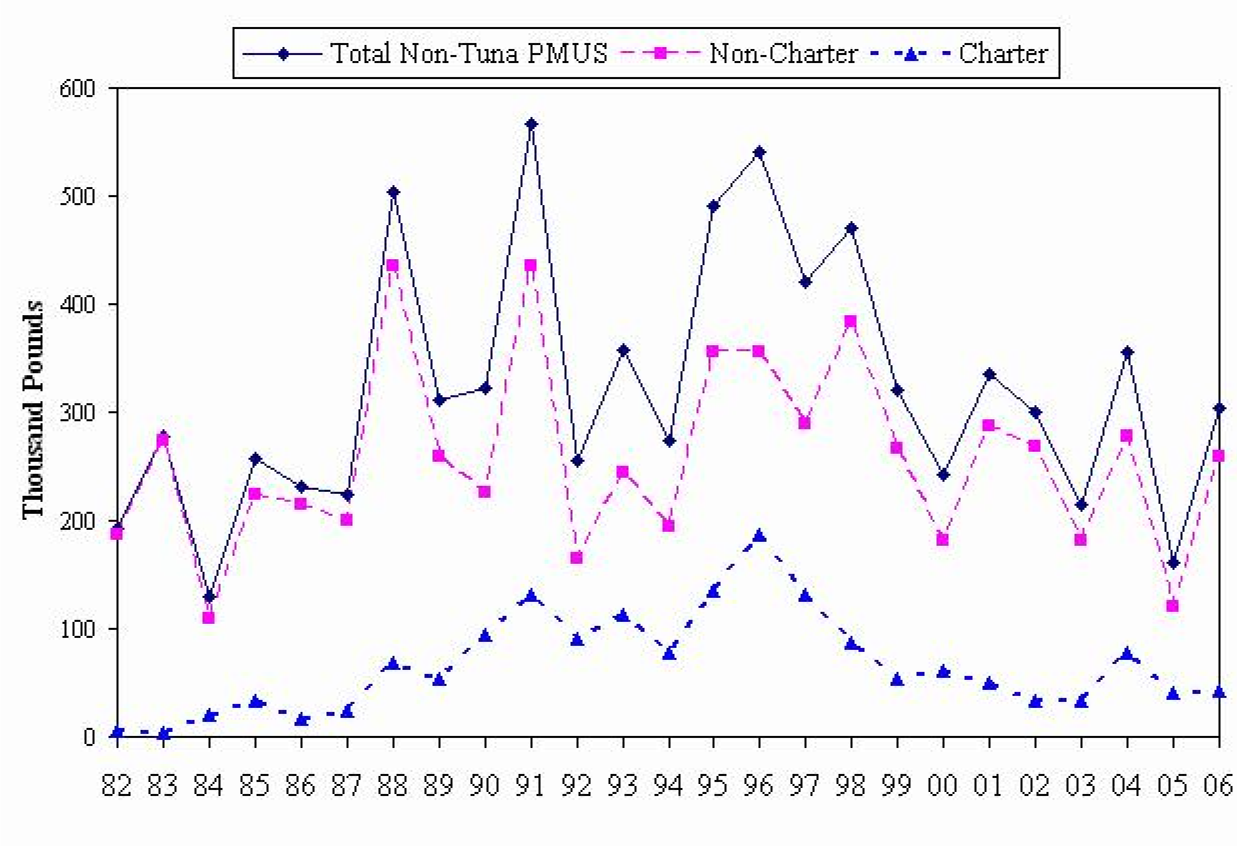
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program, expanded with the assistance of NMFS.

Calculation: A 365-day (366 days during leap years) quarterly expansion is run for each calendar year of survey data to produce catch and effort estimates for trolling. Percent species composition is calculated by weight for the sampled catch for each method to produce catch estimates for each species for the expanded period. The annual catch for all pelagic species and the PMUS separately are summed across all methods to obtain the numbers plotted above.

Estimated Total Landings (Pounds)

Year	Total Tunas	Non-Charter	Charter
1982	245,076	241,086	3,990
1983	166,105	164,377	1,729
1984	288,958	287,375	1,582
1985	210,620	199,270	11,350
1986	138,072	132,354	5,718
1987	109,757	103,971	5,787
1988	308,303	293,340	14,963
1989	176,973	159,302	17,671
1990	230,318	200,780	29,538
1991	168,800	149,735	19,065
1992	265,025	237,890	27,135
1993	184,394	165,609	18,786
1994	262,181	233,223	28,959
1995	282,586	250,219	32,366
1996	364,651	315,268	49,383
1997	316,548	277,983	38,566
1998	347,754	314,221	33,533
1999	270,744	246,792	23,952
2000	355,374	321,546	33,828
2001	403,265	379,838	23,427
2002	222,659	207,945	14,714
2003	269,046	247,501	21,545
2004	297,619	268,771	28,848
2005	129,614	113,466	16,148
2006	**192,247**	**168,788**	**23,459**
Average	248,268	227,226	21,042
Standard Deviation	78,280	71,364	12,139

**Figure 1d. Guam Annual Estimated Non-Tuna PMUS Landings:
Total, Non-Charter, and Charter**



Interpretation: The estimated total PMUS landings showed a general increase between 1984 and 1996, corresponding with an increase in boats entering the fishery. Non-charter trolling trips accounts for the bulk of the other PMUS catch. Up until the mid-1980's, non-charter boats accounted for up to 90% of the non-PMUS species. This percentage began decreasing in the late 1980’s when charter fishing activity began increasing, associated with an increase in tourism. Charter PMUS harvest began gradually decreasing after 1996. Non-charter PMUS landings also began decreasing after 1996, but exhibit year to year fluctuations. In 2006, total non-tuna PMUS and non-charter non-tuna PMUS increased 88% and 115% respectively, compared with 2005. Charter non-tuna PMUS increased 7%. Non-charter boats accounted for 86% of non-tuna PMUS catch in 2006.

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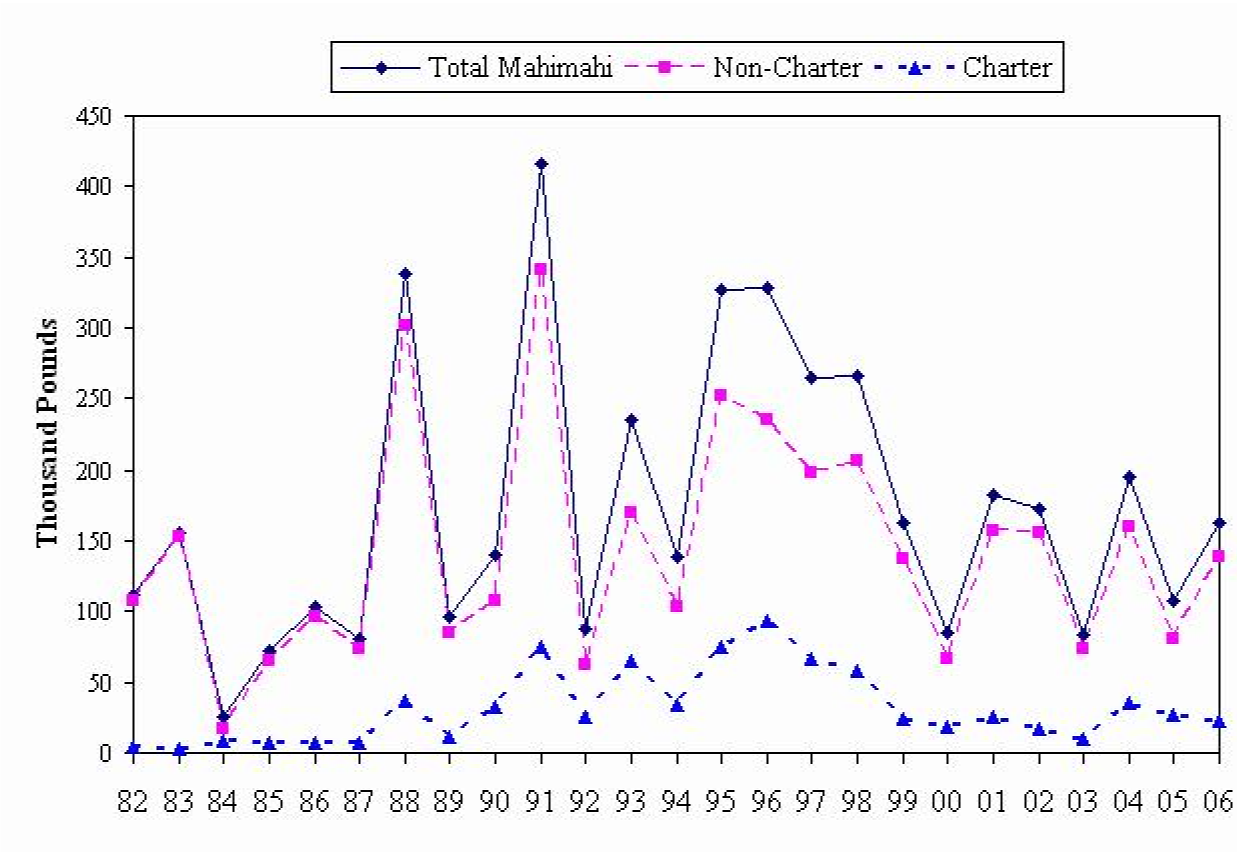
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program, expanded with the assistance of NMFS.

Calculation: A 365-day (366 days during leap years) expansion is run for each calendar year of survey data to produce catch and effort estimates for each fishing method surveyed. Percent species composition is calculated by weight for the sampled catch for each method to produce catch estimates for each species for the expanded period. The annual catch for all pelagic species and the PMUS separately are summed across all methods to obtain the numbers plotted above.

Estimated Total Landings (Pounds)

Year	Total Non-Tuna PMUS	Non-Charter	Charter
1982	192,007	187,219	4,788
1983	277,179	273,201	3,978
1984	130,249	109,220	21,029
1985	258,045	224,539	33,506
1986	231,862	215,344	16,518
1987	224,471	199,531	24,940
1988	504,149	435,477	68,672
1989	311,339	258,378	52,961
1990	321,769	226,418	95,350
1991	566,353	435,148	131,205
1992	254,796	164,396	90,400
1993	357,787	245,139	112,648
1994	273,167	195,134	78,032
1995	490,234	355,964	134,271
1996	541,551	354,763	186,788
1997	420,967	289,596	131,371
1998	471,180	383,251	87,929
1999	321,178	267,112	54,066
2000	242,774	181,972	60,802
2001	336,036	286,816	49,221
2002	300,227	267,709	32,517
2003	215,261	181,488	33,773
2004	355,679	278,382	77,297
2005	161,358	120,813	40,545
2006	**303,297**	**259,979**	**43,318**
Average	322,517	255,880	66,637
Standard Deviation	117,750	86,097	46,056

Figure 2a. Guam Annual Estimated Total Mahimahi Landings: Total, Non-Charter, and Charter



Interpretations: Historically, mahimahi catches have fluctuated wildly, with a good year followed by one or two down years. Catch peaked in 1996, and has been lower since, although still demonstrating the cyclical nature. Non-charter trips account for the bulk of the mahimahi catch, with charter activity harvesting proportionally more beginning in the late 1980's as tourist arrivals to Guam increased. A drop in charter catch corresponds to decreasing tourist arrivals in the late 1990's. In 2006, mahimahi landings increased, with total and non-charter landings increasing 52% and 74%, respectively. Charter landings, however, decreased by 17%. Mahimahi season generally occurs during the first quarter of the year. Guam was in a mild El Nino condition the last quarter of 2004 and the first quarter of 2005 The 2004 total mahimahi harvest was the highest across all categories since 1998, which was the year of the last major El Nino event on Guam. This suggests a possible link between ENSO events and mahimahi harvest around Guam. El Nino events also corresponded to elevated mahimahi harvests of 1995-6, 1991, and 1987-8. (NOAA website). Guam experienced El Nino conditions in 2006. This may result in an increased mahimahi catch for 2007.

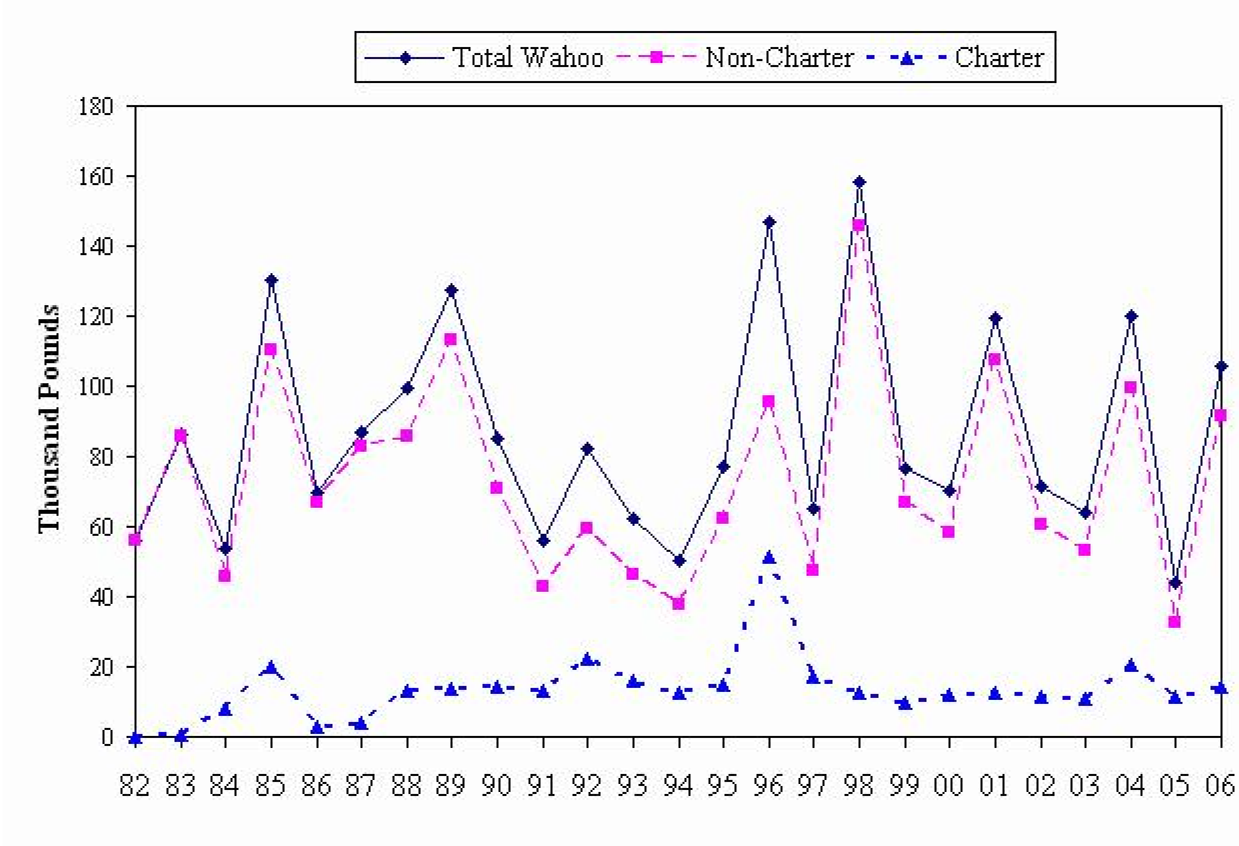
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files, expanded with the assistance of NMFS.

Calculation: Totals by species are summed across all fishing methods as described in Figures 1a to 1d.

Estimated Total Landings (Pounds)

Year	Total Mahimahi	Non-Charter	Charter
1982	112,202	107,501	4,701
1983	156,340	153,158	3,183
1984	26,080	17,372	8,707
1985	72,699	65,658	7,041
1986	102,921	96,065	6,856
1987	80,275	73,028	7,247
1988	338,413	301,732	36,680
1989	96,039	84,563	11,476
1990	140,293	107,740	32,553
1991	416,053	341,358	74,695
1992	87,620	61,765	25,856
1993	234,979	169,662	65,317
1994	138,014	103,648	34,367
1995	327,394	251,782	75,611
1996	327,604	234,507	93,097
1997	265,157	198,344	66,813
1998	265,388	207,239	58,149
1999	162,223	137,811	24,413
2000	85,585	66,499	19,086
2001	182,967	157,293	25,674
2002	172,317	155,477	16,839
2003	84,113	74,141	9,973
2004	194,802	159,410	35,392
2005	107,179	79,990	27,189
2006	**162,512**	**139,365**	**23,147**
Average	173,567	141,804	31,762
Standard Deviation	100,073	79,288	25,842

Figure 2b. Guam Annual Estimated Total Wahoo Landings: Total, Non-charter, and Charter



Interpretations: The wide fluctuations in wahoo landings are probably due to the high variability in the year-to-year abundance and availability of the stocks. Until 1987, non-charter landings accounted for over 95% of the total catch. In 1988, this percentage decreased due to an increase in charter boat activity. In 1996, wahoo charter landings peaked, accounting for 35% of the total catch. In 2006, total, non-charter, and charter harvest of wahoo increased 141%, 182%, and 24% respectively from 2005. Non-charter boats harvested 87% of the total wahoo harvest.

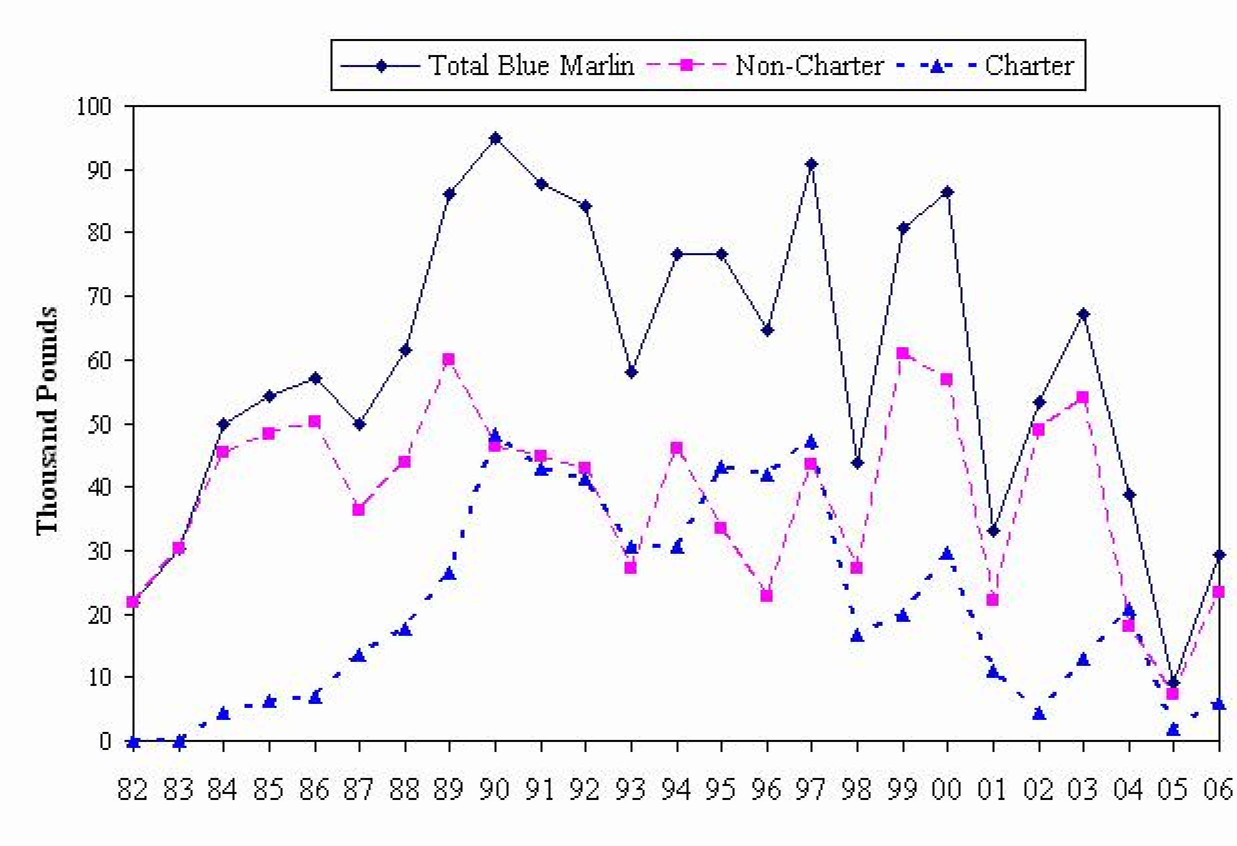
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files, expanded with the assistance of NMFS.

Calculation: Totals by species are summed across all fishing methods as described in Figures 1a to 1d.

Estimated Total Landings (Pounds)

Year	Total Wahoo	Non-Charter	Charter
1982	55,909	55,822	87
1983	86,530	85,735	795
1984	53,847	45,943	7,905
1985	130,304	110,046	20,258
1986	69,583	66,815	2,768
1987	86,967	82,903	4,065
1988	99,149	85,764	13,385
1989	127,183	113,250	13,933
1990	85,280	71,131	14,149
1991	55,952	42,681	13,270
1992	82,244	59,681	22,563
1993	62,550	46,532	16,018
1994	50,457	37,766	12,691
1995	77,369	62,255	15,114
1996	146,926	95,545	51,381
1997	65,034	47,693	17,341
1998	158,538	145,928	12,610
1999	76,477	66,673	9,804
2000	70,484	58,429	12,056
2001	119,647	107,150	12,497
2002	71,654	60,505	11,150
2003	63,851	53,090	10,761
2004	119,942	99,617	20,325
2005	43,926	32,521	11,405
2006	**105,878**	**91,713**	**14,166**
Average	86,627	73,008	13,620
Standard Deviation	31,443	27,969	9,674

Figure 3a. Guam Annual Estimated Total Blue Marlin Landings: Total, Non-charter, and Charter



Interpretations: During the 1980's, non-charter boats accounted for the bulk of the blue marlin catch. In the early 1990's, charters share of the marlin catch began to increase, peaking at 64% in 1996. The increases were due to an increase in charter boat activity and the active targeting of blue marlin by charter boats during the summer months. The decrease in charter landings after 1997 corresponded to the decrease in tourist charter trips. In 2006, the overall, and non-charter blue marlin landings increased 217%, and 220% respectively. Charter blue marlin catch increased by 208%, and accounted for 21% of the total blue marlin harvest. Despite these increases, blue marlin landings were below the 25 year average in all categories.

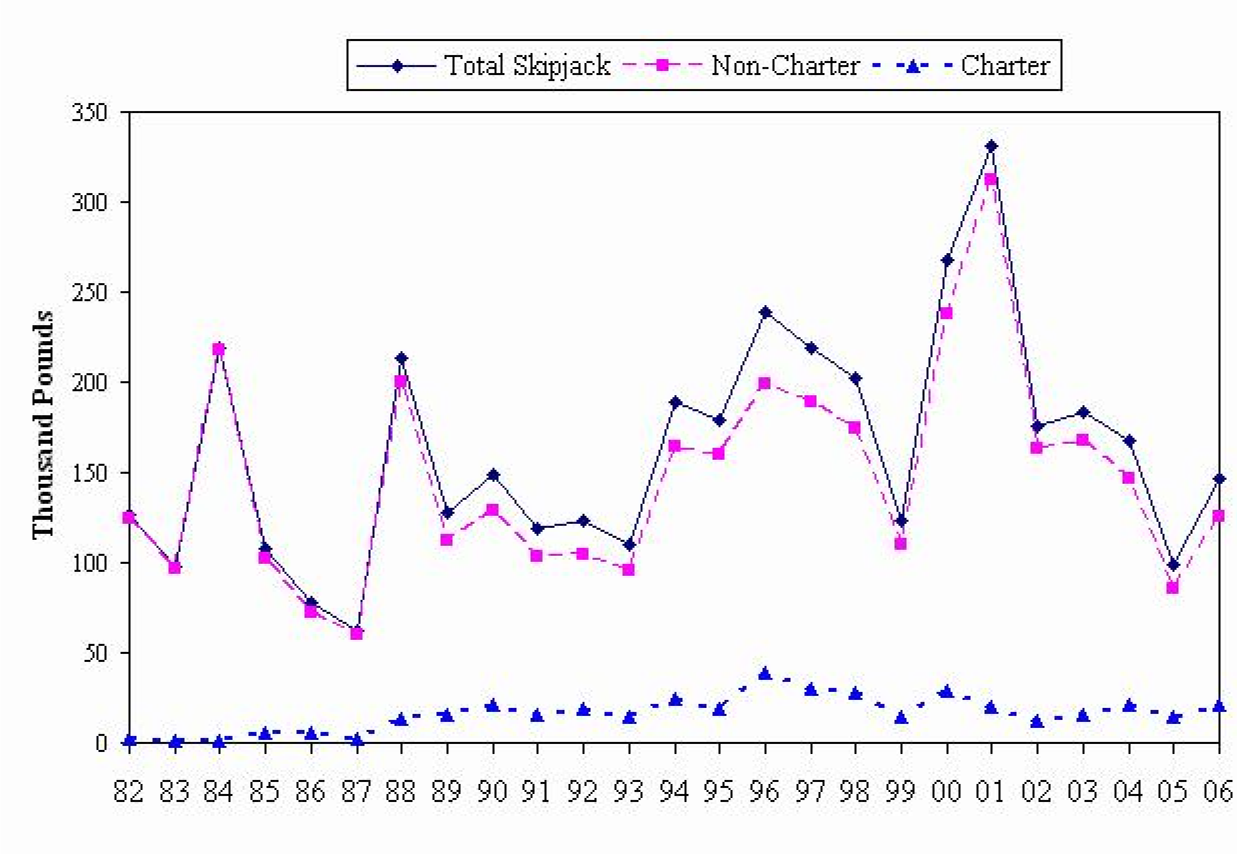
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files, expanded with the assistance of NMFS.

Calculation: Totals by species are summed across all fishing methods as described in Figures 1a to 1d.

Estimated Total Landings (Pounds)

Year	Total Blue Marlin	Non-Charter	Charter
1982	21,787	21,787	
1983	30,402	30,402	
1984	49,711	45,293	4,417
1985	54,319	48,113	6,207
1986	57,105	50,211	6,894
1987	49,979	36,351	13,629
1988	61,647	43,989	17,657
1989	86,238	59,886	26,352
1990	94,796	46,411	48,385
1991	87,838	44,941	42,897
1992	84,358	42,939	41,419
1993	57,992	27,280	30,713
1994	76,633	46,057	30,576
1995	76,703	33,450	43,252
1996	64,527	22,597	41,930
1997	90,777	43,559	47,217
1998	43,912	27,051	16,860
1999	80,760	61,032	19,728
2000	86,565	56,905	29,660
2001	33,196	22,148	11,049
2002	53,466	48,938	4,528
2003	67,035	53,996	13,039
2004	38,829	18,020	20,809
2005	9,208	7,258	1,950
2006	**29,222**	**23,217**	**6,005**
Average	59,480	38,473	22,834
Standard Deviation	23,766	14,356	15,489

Figure 4a. Guam Annual Estimated Total Skipjack Landings: Total, Non-charter, and Charter



Interpretations: Skipjack tuna catch has fluctuated over the reporting period, peaking in 2001. A drop in skipjack tuna during 2002 may be due to direct hits by two super typhoons, though the catch for 2002 is still above the 24 year average. The reason for the high numbers of 2001 is not clear. It could have to do with the biology of the species.

Total skipjack tuna landings and non-charter landings increased in 2006 by 48% and 48% respectively, while charter landings increased by 44%. Charter landings are higher than the 25-year average, while the other two categories are slightly below the 25-year averages.

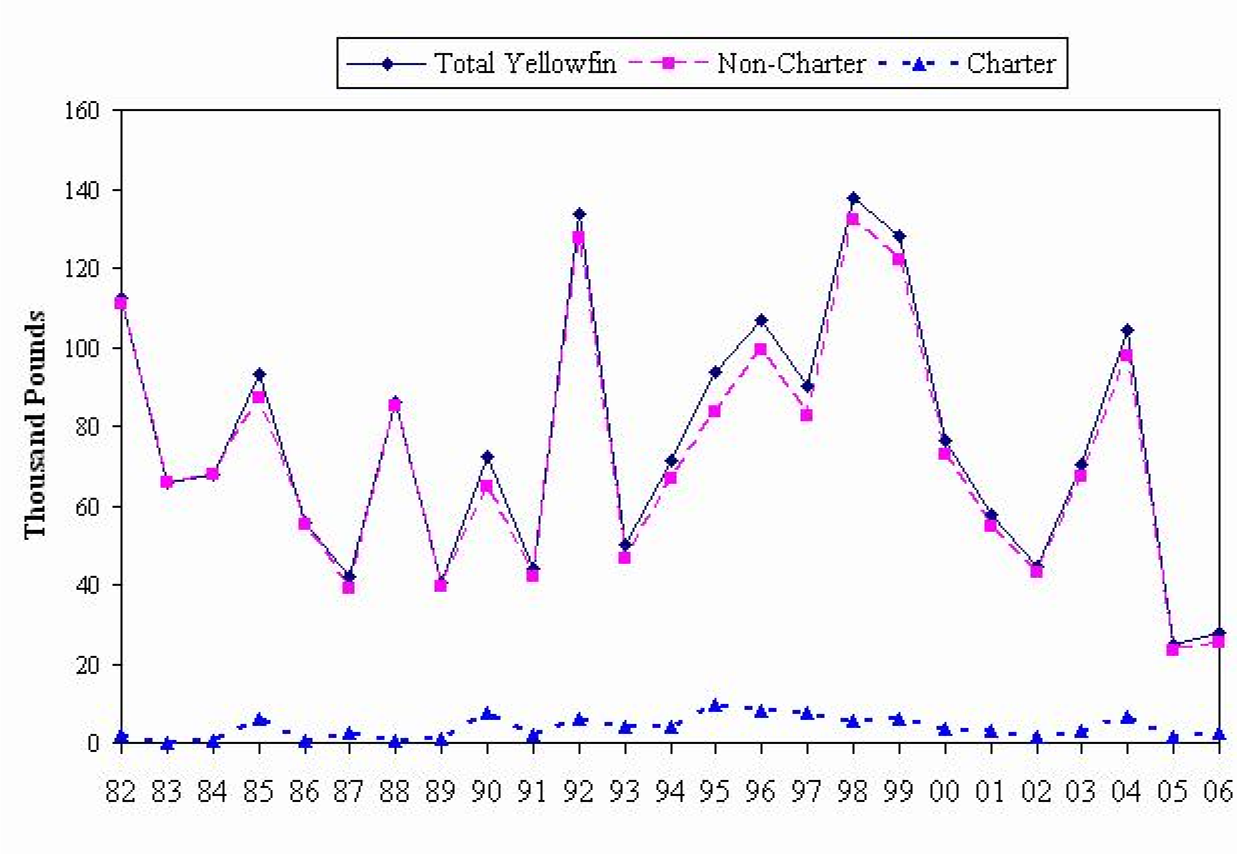
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files, expanded with the assistance of NMFS.

Calculation: Totals by species are summed across all fishing methods as described in Figures 1a to 1d.

Estimated Total Landings (Pounds)

Year	Total Skipjack	Non-Charter	Charter
1982	126,652	124,476	2,176
1983	97,802	96,142	1,660
1984	218,556	217,388	1,168
1985	107,815	102,616	5,199
1986	77,735	72,652	5,083
1987	62,296	59,600	2,696
1988	213,469	200,395	13,074
1989	128,134	112,037	16,097
1990	149,312	128,747	20,566
1991	118,799	102,967	15,832
1992	123,766	104,539	19,227
1993	109,582	95,081	14,502
1994	188,784	164,288	24,496
1995	178,635	160,275	18,360
1996	238,409	199,431	38,978
1997	219,177	189,211	29,966
1998	202,482	174,763	27,718
1999	123,720	109,696	14,024
2000	267,541	238,304	29,237
2001	331,516	312,001	19,515
2002	175,501	162,796	12,705
2003	183,247	168,024	15,223
2004	167,596	146,205	21,391
2005	99,357	85,008	14,349
2006	**146,658**	**126,042**	**20,616**
Average	162,262	146,107	16,154
Standard Deviation	63,404	58,350	9,715

Figure 4b. Guam Annual Estimated Total Yellowfin Landings: Total, Non-charter, and Charter



Interpretations: The overall yellowfin landings show wide fluctuations during the 25-year time series, although the total and non-charter estimated landings showed a significant decrease from 1998 to 2002. Charter landings of yellowfin tuna peaked in 1985, 1990, and 1995, and then showed a general decrease until 2002. Yellowfin tuna catch was up slightly in 2006, with total catch, non-charter catch, and charter catch up 13%, 10%, and 52%, respectively. Non-charter boats harvested 95% of the total yearly catch of yellowfin. All three categories are well below their 25-year averages.

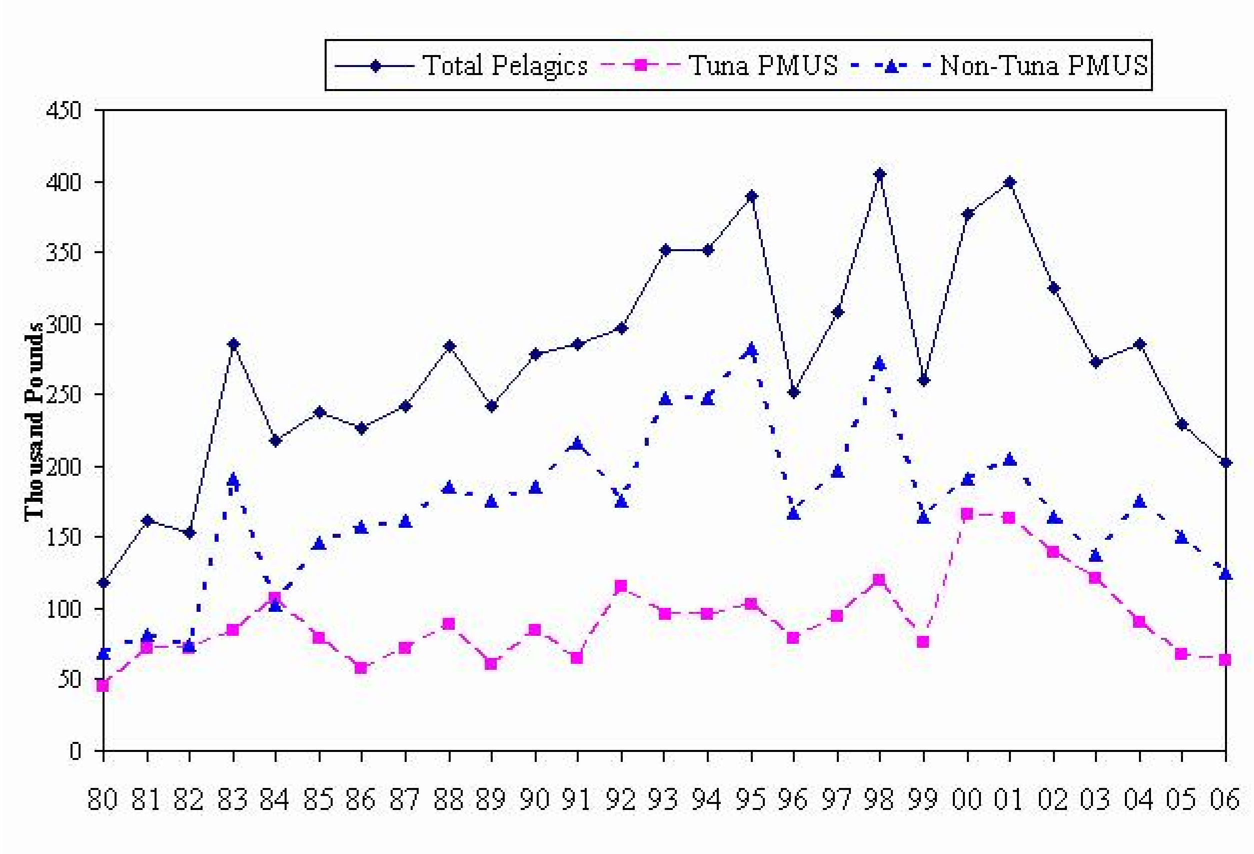
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files, expanded with the assistance of NMFS.

Calculation: Totals by species are summed across all fishing methods for all years except 1992-93 as described in Figure 1.

Estimated Total Landings (Pounds)

Year	Total Yellowfin	Non-Charter	Charter
1982	112,654	110,841	1,813
1983	65,996	65,996	
1984	68,048	67,769	279
1985	93,018	87,129	5,889
1986	55,611	55,063	549
1987	41,810	39,052	2,758
1988	85,828	85,245	582
1989	40,382	39,354	1,028
1990	72,314	64,782	7,532
1991	44,073	41,865	2,208
1992	133,429	127,539	5,889
1993	50,350	46,444	3,906
1994	71,221	67,022	4,199
1995	93,424	83,791	9,633
1996	107,023	99,127	7,896
1997	90,167	82,408	7,759
1998	137,707	132,353	5,354
1999	128,048	122,204	5,844
2000	76,606	72,905	3,702
2001	57,910	54,668	3,242
2002	44,810	43,075	1,735
2003	70,236	67,183	3,053
2004	104,479	97,779	6,700
2005	24,911	23,177	1,733
2006	**28,049**	**25,419**	**2,630**
Average	75,924	72,088	3,996
Standard Deviation	32,143	30,722	2,660

Figure 5. Guam Annual Estimated Commercial Landings:
All Pelagics, Tuna PMUS, and Non-tuna PMUS



Interpretations: Commercial pelagic fishery landings have shown a general increase for the first 20 years in the 27-year time series. In 2002, the estimated commercial landings decreased overall by 17%, with a 15% decrease for tuna landings and a 20% decrease for landings of other PMUS, possibly due to direct hits by two super typhoons, resulting in boat damage, lack of tourist for the commercial charter boats, and unavailability of ice for fishermen. After a small increase in catch for 2004, the downward trend continued in 2006.

Landings for all pelagics and non-tuna PMUS decreased by 12% and 17%, respectively, while commercial tuna PMUS landings decreased by 5%. All three categories were below the 27 year averages.

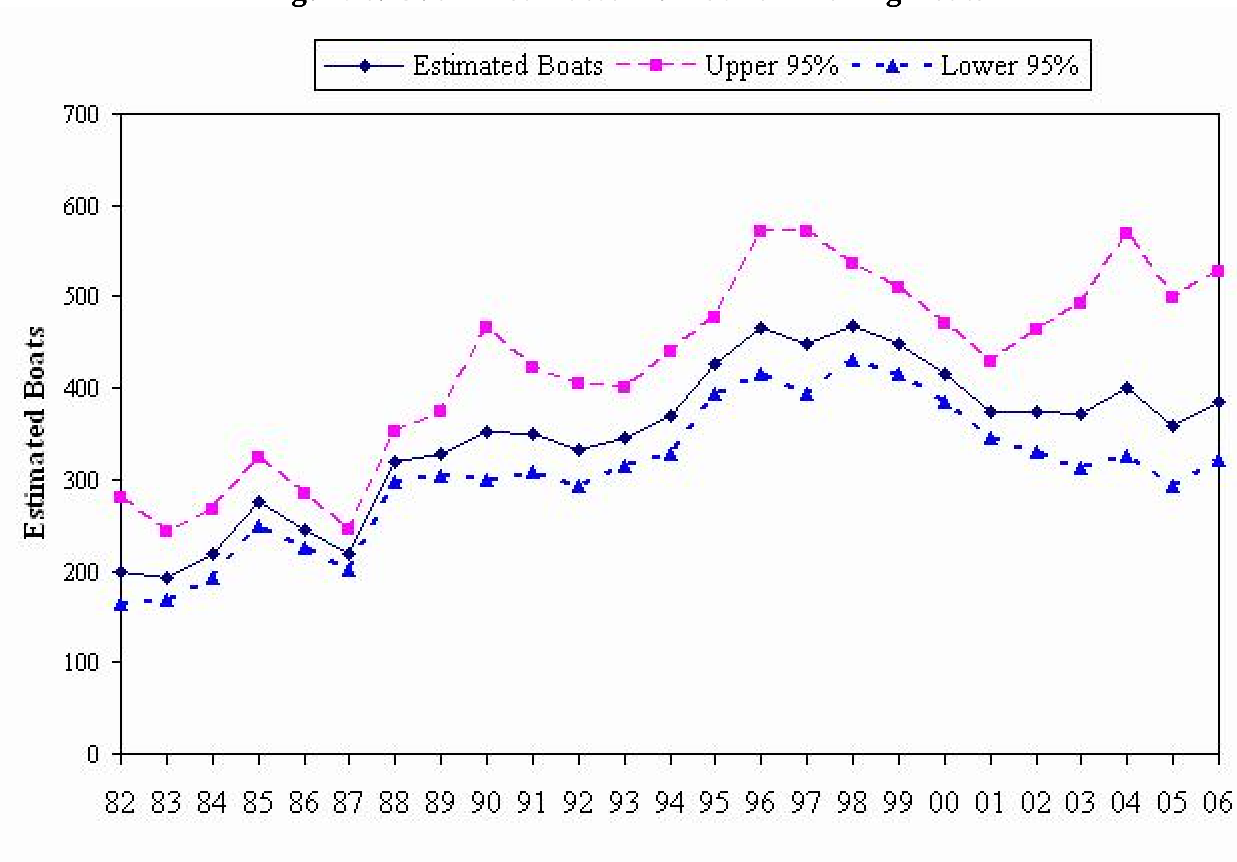
Source: The WPACFIN-sponsored commercial landings system.

Calculation: Total commercial landings were estimated by summing the weight fields in the commercial landings database from the principle fish wholesalers on Guam, and then multiplying by an estimated percent coverage expansion factor. The annual expansion factor was subjectively created based on as much information as possible depending on the year, including: an analysis of the "disposition of catch" data available from the DAWR offshore creel survey; an evaluation of the fishermen in the fishery and their entry/exit patterns; general "dock side" knowledge of the fishery and the status of the marketing conditions and structure; the overall number of records in the data base; and a certain measure of best guesses.

Estimated Commercial Landings (Pounds)

Year	All Pelagics	Tuna PMUS	Non-Tuna PMUS
1980	118,251	45,043	69,062
1981	162,186	72,229	81,808
1982	153,577	72,347	74,832
1983	285,118	83,764	191,676
1984	218,028	107,568	102,398
1985	237,695	79,028	146,477
1986	226,138	57,689	157,377
1987	242,444	72,004	161,657
1988	284,408	88,093	185,451
1989	242,554	59,825	175,667
1990	279,121	84,176	185,934
1991	285,696	64,694	216,611
1992	296,809	114,765	175,751
1993	351,201	96,289	248,070
1994	351,187	95,321	246,860
1995	389,849	102,236	282,468
1996	252,075	78,636	166,702
1997	307,754	93,825	196,324
1998	405,666	120,186	272,882
1999	260,669	75,346	164,082
2000	376,192	165,898	190,761
2001	399,471	163,369	205,648
2002	325,299	139,009	164,853
2003	272,633	121,326	138,160
2004	285,545	89,479	175,777
2005	228,936	66,804	150,770
2006	**202,570**	**63,328**	**125,659**
Average	275,595	91,566	172,360
Standard Deviation	73,744	30,308	54,247

Figure 6. Guam Estimated Number of Trolling Boats



Interpretations: Since 1982, the general trend on Guam has been an increase in the number of boats participating in the pelagic fishery, especially since the addition of two marinas to the offshore sampling program. There appears to be a general increase in the number of small boats participating in Guam's pelagic fishery, while the number of charter vessels has remained fairly constant for several years. In 2006, the number of boats was 386, an increase of 8% from 2005.

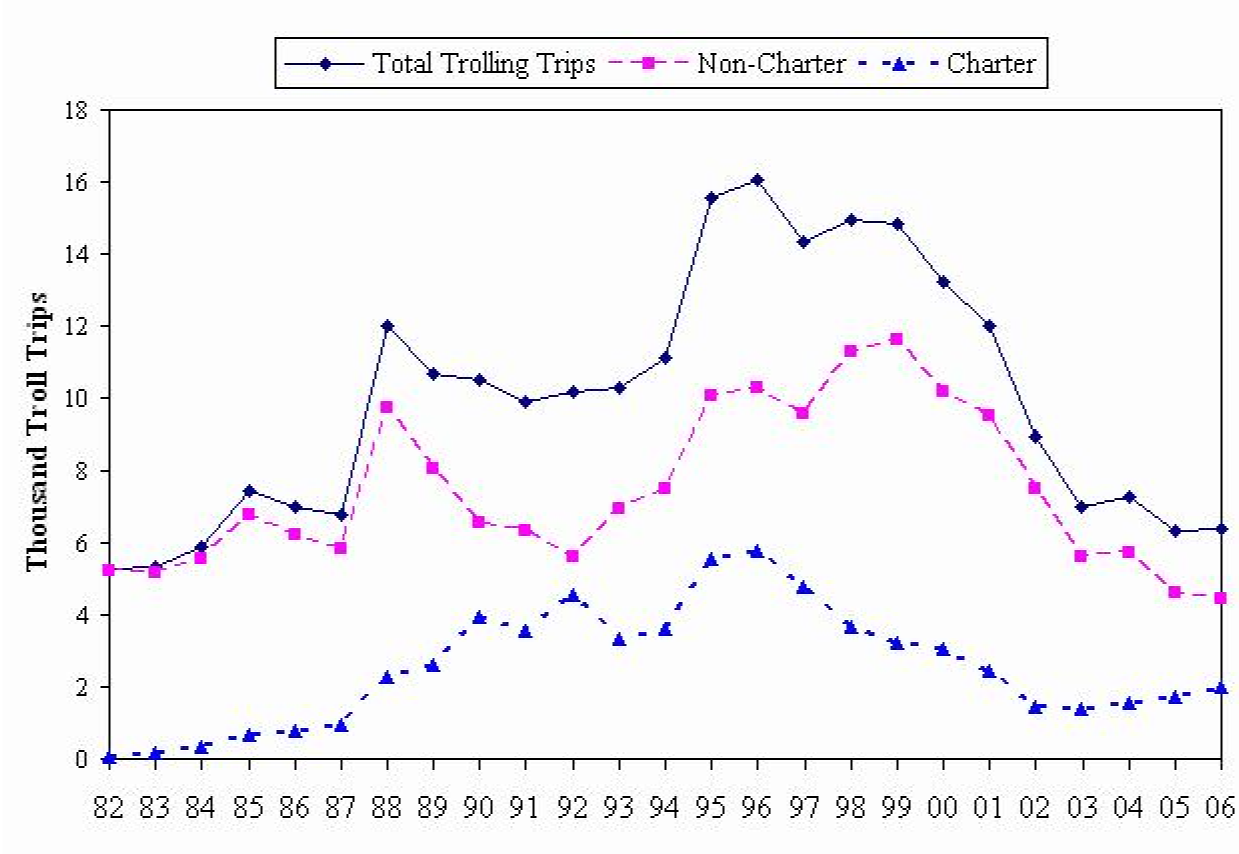
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files, expanded with the assistance of NMFS.

Calculation: Since only a fraction of the days of the year are sampled, it is not possible to know the exact number of boats participating in the fishery. The 2006 trolling boat log was converted and processed through a boat estimator model 1,000 times.

Estimated Number of Trolling Boats

Year	Estimated Boat	Upper 95%	Lower 95%
1982	199	280	165
1983	193	242	168
1984	219	267	193
1985	276	323	249
1986	246	284	226
1987	219	244	201
1988	320	353	297
1989	329	374	303
1990	352	467	299
1991	349	422	309
1992	332	405	294
1993	346	401	316
1994	369	439	329
1995	427	476	393
1996	466	572	415
1997	449	572	393
1998	469	537	430
1999	449	510	415
2000	416	470	385
2001	375	429	345
2002	375	464	330
2003	371	492	312
2004	401	568	326
2005	358	498	293
2006	**386**	**527**	**321**

Figure 7a. Guam Annual Estimated Number of Troll Trips: Total, Non-charter, Charter



Interpretations: Non-charter and charter troll trips generally increased for the first 15 years of the 24-year time series. The number of troll trips began to decline in 1999, due to a number of factors including a continuing economic recession on the island, a decline in Asian visitors for charter boats, and an increase in cost to maintain, repair, and fuel boats for the average fishermen compared with fish caught for sale to make up for expenses. In 2006, the total number of troll trips increased by 1%, and the number of charter trips increased by 13%. The number of non-charter trips decreased, by3%. The increase in charter trips can also be attributed to an increase in tourism to Guam, as well as an increasing military presence on Guam. Despite the increases, all three categories are below the 25-year averages.

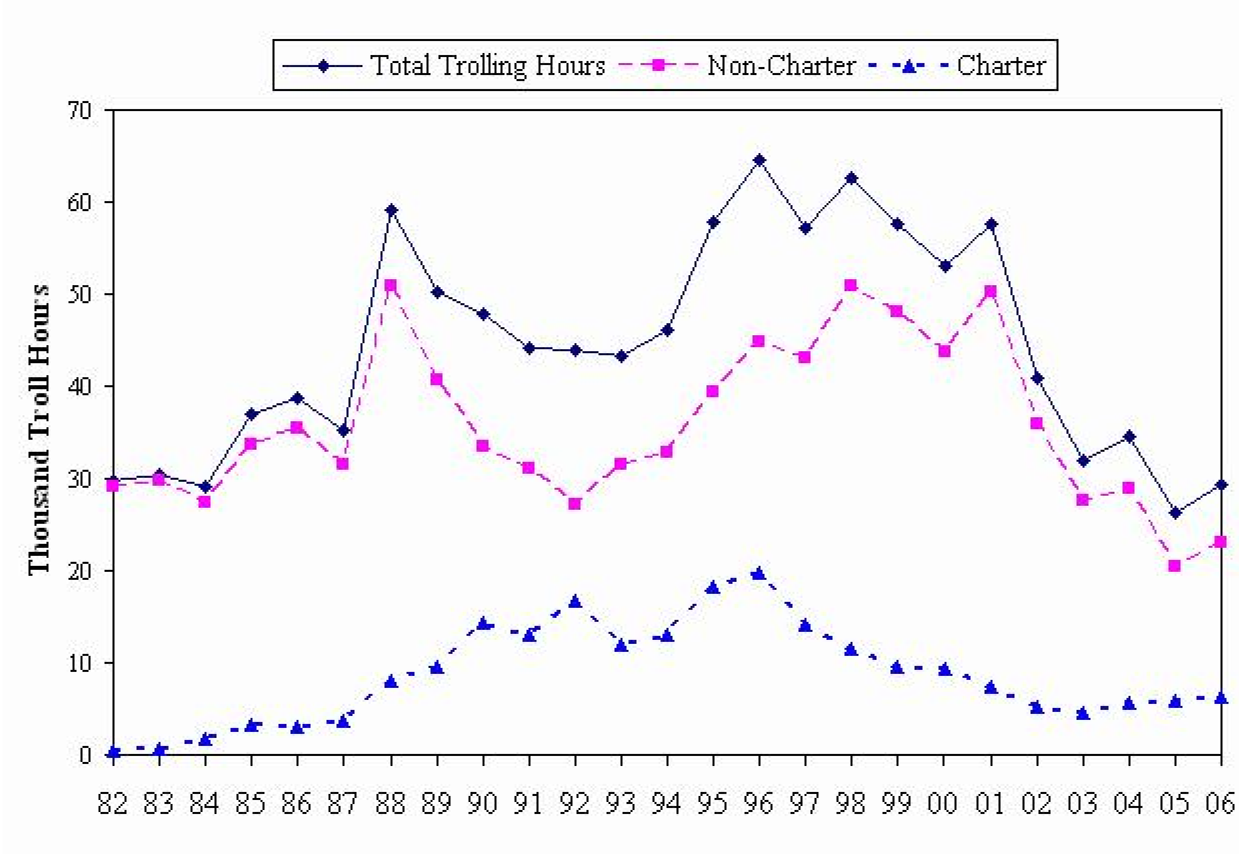
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files.

Calculation: The data expansion system is run on a calendar year's worth of survey data to produce catch and effort estimates for each fishing method surveyed. These plots are of the estimated number of trips for the trolling method as taken directly from creel survey expansion system printouts.

Estimated Number of Trolling Trips

Year	Estimated Trips	Non-Charter	Charter
1982	5,292	5,230	62
1983	5,339	5,187	151
1984	5,913	5,554	359
1985	7,454	6,783	671
1986	6,999	6,227	772
1987	6,776	5,818	958
1988	11,981	9,727	2,254
1989	10,669	8,057	2,612
1990	10,523	6,563	3,960
1991	9,870	6,325	3,545
1992	10,167	5,617	4,551
1993	10,295	6,971	3,324
1994	11,125	7,515	3,610
1995	15,562	10,030	5,532
1996	16,066	10,289	5,776
1997	14,313	9,555	4,758
1998	14,944	11,304	3,641
1999	14,848	11,610	3,239
2000	13,203	10,154	3,049
2001	11,977	9,522	2,456
2002	8,917	7,497	1,420
2003	6,991	5,622	1,368
2004	7,296	5,743	1,553
2005	6,344	4,596	1,748
2006	**6,414**	**4,440**	**1,973**
Average	9,971	7,437	2,534
Standard Deviation	3,444	2,197	1,652

Figure 7b. Guam Annual Estimated Number of Troll Hours: Total, Non-charter, Charter



Interpretations: Trolling hours for non-charters and charters have generally increased over the past 20 years. Beginning in 1996, charter troll hours began to decrease. This corresponded to a downturn in Asian economies, which resulted in fewer charter trolling hours. After 2001, charter activity dropped off dramatically. Tourism was also down, due to the 9/11 attacks, the SARS scare, and two typhoons striking Guam in 2002. In 2006, total, non-charter, and charter totals increased by 11%, 12%, and 8%, respectively. The increase in hours trolling may be attributed to an increase in the number of good fishing days, as well as an increase in the number of fish being caught. All three totals are below the 25-year average.

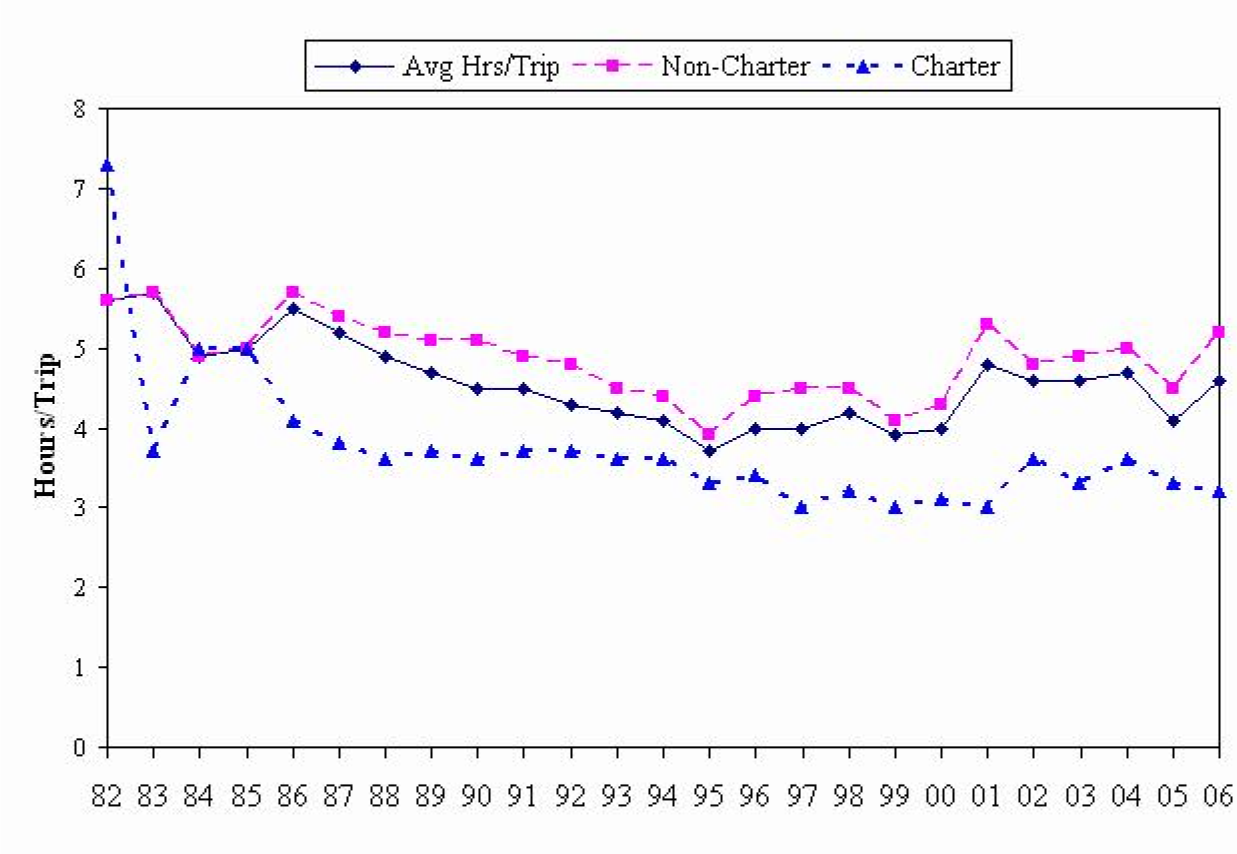
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files.

Calculation: The data expansion system is run on a calendar year's worth of survey data to produce catch and effort estimates for each fishing method surveyed. These plots are of the estimated boat hours spent fishing for the trolling method as taken directly from creel survey expansion system printouts.

Estimated Number of Trolling Hours

Year	Estimated Hours	Non-Charter	Charter
1982	29,678	29,226	453
1983	30,363	29,803	560
1984	29,074	27,291	1,783
1985	36,967	33,630	3,337
1986	38,621	35,489	3,132
1987	35,112	31,441	3,671
1988	59,043	50,971	8,073
1989	50,262	40,728	9,535
1990	47,824	33,527	14,298
1991	44,151	31,016	13,135
1992	43,865	27,080	16,785
1993	43,354	31,465	11,889
1994	46,017	32,903	13,113
1995	57,767	39,409	18,359
1996	64,461	44,787	19,675
1997	57,122	42,965	14,157
1998	62,587	50,969	11,618
1999	57,533	47,973	9,560
2000	53,072	43,743	9,329
2001	57,572	50,231	7,341
2002	40,950	35,787	5,162
2003	31,974	27,511	4,463
2004	34,565	28,957	5,608
2005	26,290	20,487	5,802
2006	**29,250**	**22,987**	**6,263**
Average	44,299	35,615	8,684
Standard Deviation	11,908	8,825	5,491

Figure 7c. Guam Annual Estimated Trip Length:
Overall Average Hours/Trip, Non-charter, Charter



Interpretations: The overall average trolling trip increased slightly from 2005. The redeployment of fish aggregating devices (FADs) still provide charter boats and non-charter fishermen with a prescribed route for trolling activity, although many boats have been observed to be making longer trips to the banks located north and south of Guam. Overall trolling trip length appears to have remained fairly constant throughout the 25-year time series. In 2006, non-charter vessels showed a slight increase in average trip length, up 16%, while charter vessels show a slight decrease in the number of hours per trip, down 3%. This decrease in trip length may be due to a smaller number of 6 hour charters, due to more budget minded tourist activity on Guam.

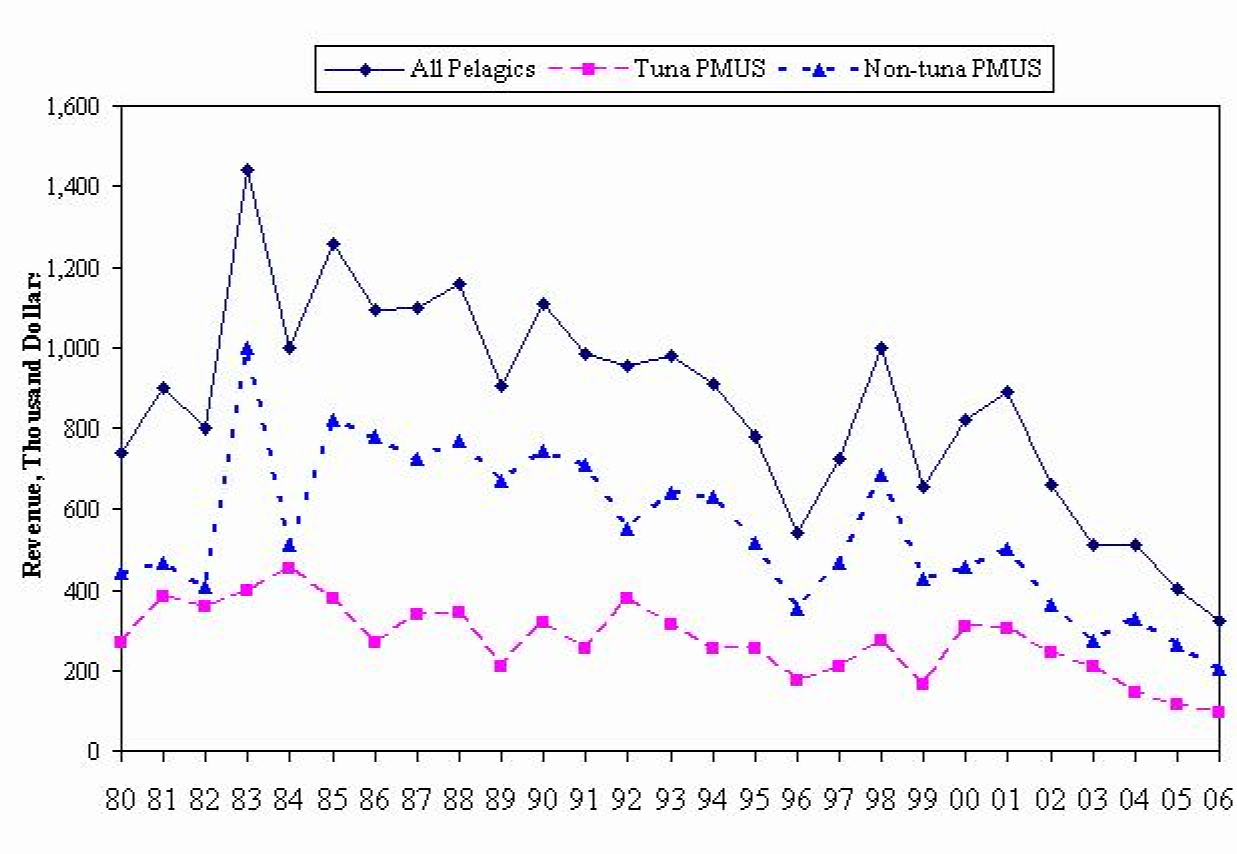
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files.

Calculation: The data expansion system is run on a calendar year's worth of survey data to produce catch and effort estimates for each fishing method surveyed. These plots are of the estimated boat hours spent fishing and number of trips for the trolling method, as taken directly from creel survey, expansion system printouts.

Estimated Trip Length (Hours/trip)

Year	Average Length	Non-Charter	Charter
1982	5.6	5.6	7.3
1983	5.7	5.7	3.7
1984	4.9	4.9	5.0
1985	5.0	5.0	5.0
1986	5.5	5.7	4.1
1987	5.2	5.4	3.8
1988	4.9	5.2	3.6
1989	4.7	5.1	3.7
1990	4.5	5.1	3.6
1991	4.5	4.9	3.7
1992	4.3	4.8	3.7
1993	4.2	4.5	3.6
1994	4.1	4.4	3.6
1995	3.7	3.9	3.3
1996	4.0	4.4	3.4
1997	4.0	4.5	3.0
1998	4.2	4.5	3.2
1999	3.9	4.1	3.0
2000	4.0	4.3	3.1
2001	4.8	5.3	3.0
2002	4.6	4.8	3.6
2003	4.6	4.9	3.3
2004	4.7	5.0	3.6
2005	4.1	4.5	3.3
2006	**4.6**	**5.2**	**3.2**
Average	4.6	4.9	3.7
Standard Deviation	0.5	0.5	0.9

Figure 8. Guam Annual Estimated Inflation-Adjusted Commercial Revenues: All Pelagics, Tuna PMUS, and Non-tuna PMUS



Interpretations: The estimated inflation-adjusted commercial revenues for 2006 decreased 82% for tuna PMUS, decreased 19% for total, and 23% for non-tuna PMUS. Overall, commercial revenues have shown a gradual decrease since the early 1980's. A large drop occurring after 2003 can partly be attributed to a change in government policy (see introduction). This trend continued in 2006, with all three adjusted revenue categories well below the 27-year averages.

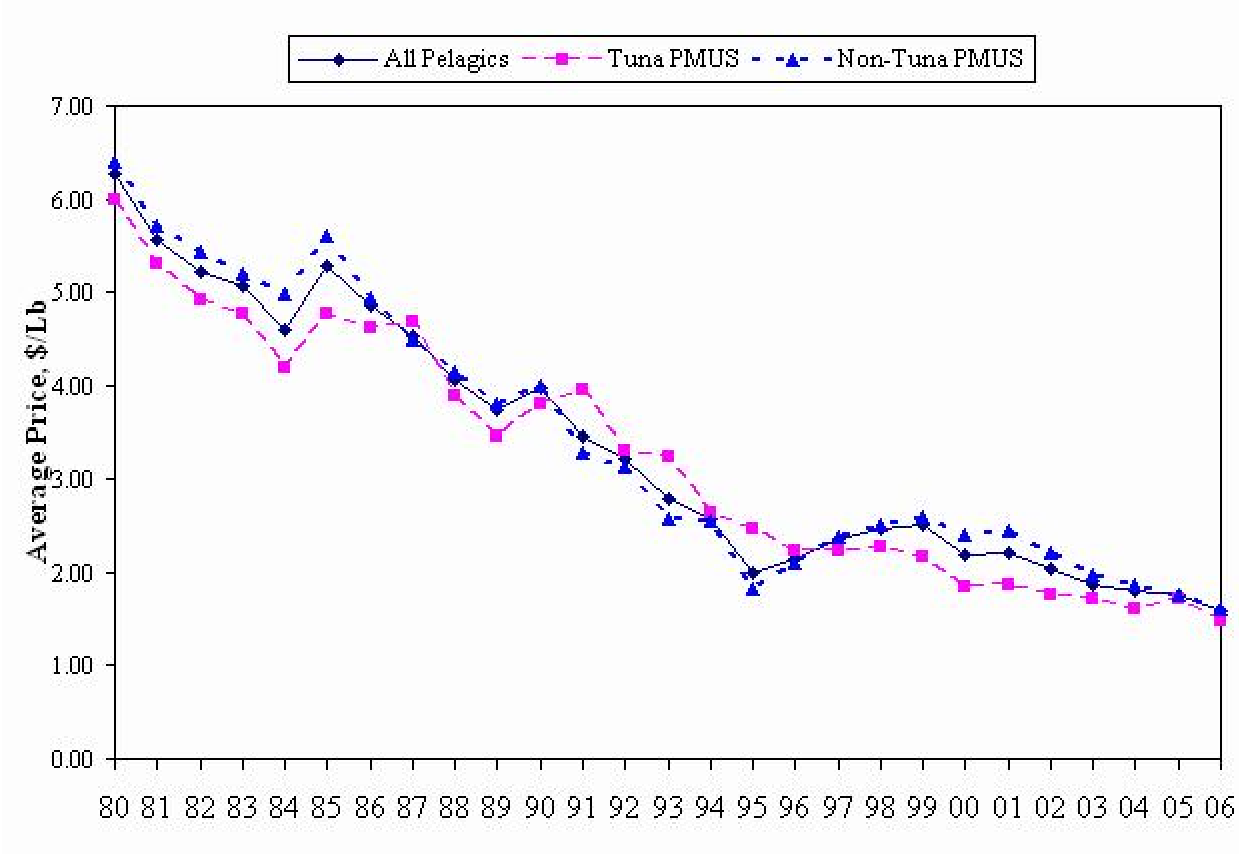
Source: The WPACFIN-sponsored commercial landings system.

Calculation: Commercial revenues were estimated by summing the revenue fields in the commercial landings database from the principle fish wholesalers on Guam, and then multiplying by the same percent coverage expansion factor, as in figure 5. Inflation-adjusted total revenue per trip is derived from the Guam Annual Consumer Price Index (CPI).

Inflation-Adjusted Commercial Revenues ($)

Year	All Pelagics		Tuna PMUS		Non-Tuna PMUS	
	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
1980	149,124	741,295	54,353	270,187	88,775	441,302
1981	218,384	901,272	92,914	383,458	113,212	467,227
1982	203,847	800,101	90,719	356,072	103,459	406,076
1983	380,231	1,442,214	105,308	399,434	262,817	996,865
1984	286,490	999,564	129,389	451,439	146,339	510,578
1985	373,796	1,255,579	112,286	377,167	244,423	821,018
1986	334,955	1,095,303	81,299	265,849	237,826	777,691
1987	350,828	1,098,793	107,642	337,135	231,451	724,904
1988	388,630	1,156,562	115,243	342,964	258,203	768,413
1989	337,586	906,081	76,865	206,307	249,421	669,445
1990	471,241	1,107,418	136,321	320,354	316,491	743,754
1991	462,191	985,390	119,640	255,073	333,096	710,161
1992	492,707	953,389	195,547	378,383	284,546	550,597
1993	547,835	978,434	175,360	313,194	358,592	640,445
1994	593,838	907,385	165,296	252,572	411,832	629,279
1995	537,889	780,477	173,629	251,936	356,256	516,928
1996	392,442	542,355	127,375	176,032	254,063	351,115
1997	534,352	724,582	154,819	209,934	344,972	467,782
1998	733,101	998,483	201,639	274,632	502,801	684,816
1999	489,605	655,092	122,023	163,267	319,342	427,280
2000	626,803	821,738	234,735	307,738	349,312	457,948
2001	667,648	887,304	228,652	303,878	379,174	503,922
2002	500,777	661,025	184,705	243,811	274,929	362,907
2003	399,989	511,186	163,423	208,854	214,143	273,675
2004	433,911	513,317	122,098	144,442	278,721	329,727
2005	353,131	401,509	100,720	114,519	232,336	264,166
2006	**323,591**	**323,591**	**93,600**	**93,600**	**202,232**	**202,232**
Average	429,071	857,387	135,763	274,157	272,177	544,454
Standard Deviation	140,289	263,618	46,866	90,677	95,237	195,041

Figure 9. Guam Annual Estimated Inflation-Adjusted Average Prices: All Pelagics, Tuna PMUS, and Non-tuna PMUS



Interpretations: The inflation-adjusted price of tuna and other non-tuna PMUS has shown a dramatic decline since data on the pelagic fishery was first collected in 1980. In 2006, the adjusted price for all pelagics decreased 9%, 13% for tuna PMUS, and 8% for non-tuna PMUS species. All three prices are well below their 27 year averages. Locally caught pelagic fish continues to have to compete with cheaper pelagic fish caught by longliners. These are value-added products sold at several supermarkets and roadside vendors.

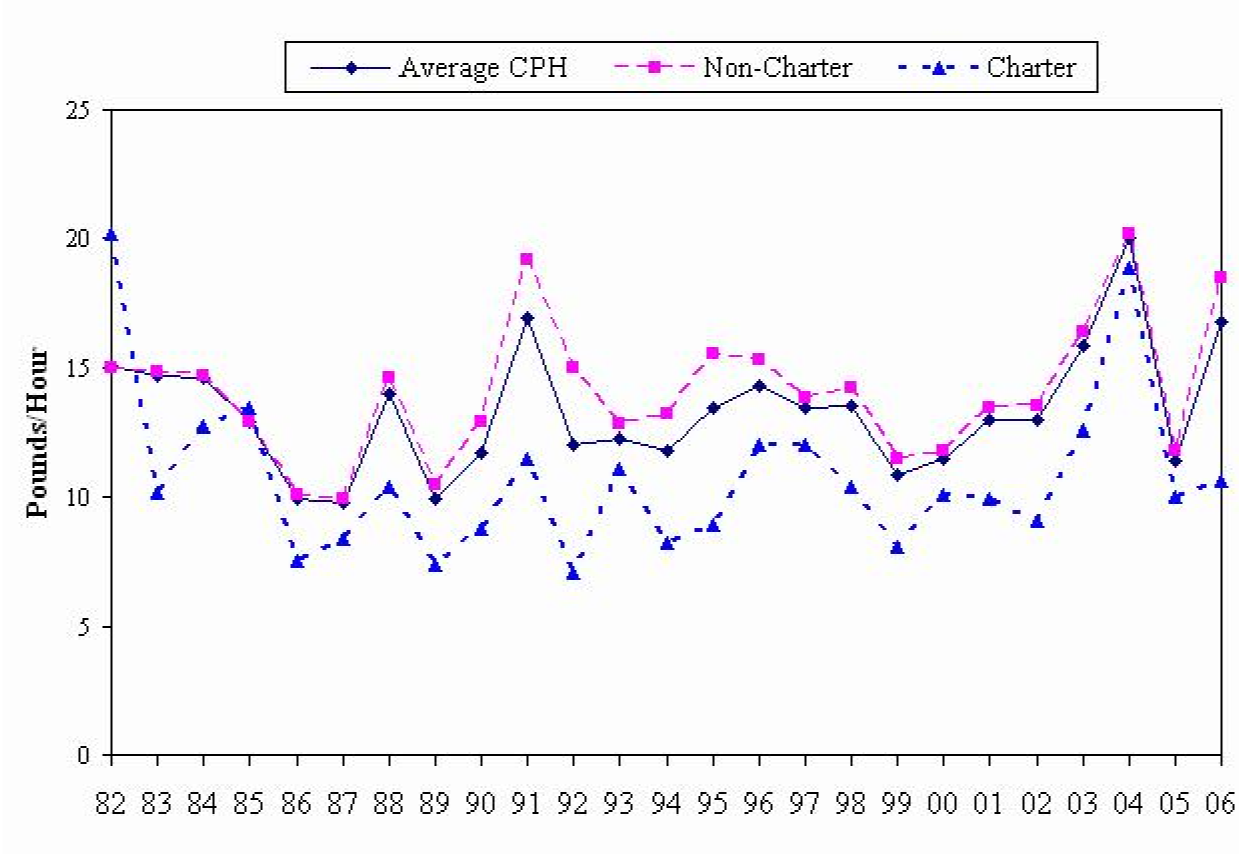
Source: The WPACFIN-sponsored commercial landings system.

Calculation: The average price of the Tunas and other PMUS groups are calculated by dividing the total revenue for each by the sold weight. The inflation adjustment is made by using the Consumer Price Index (CPI) for Guam and establishing the current year figure as the base from which to calculate expansion factors for all previous years (e.g., divide the current year CPI by the CPI of any given year), and then multiplying that factor by the unadjusted average price for the given year.

Inflation-Adjusted Average Price ($/Pounds)

Year	All Pelagics		Tuna PMUS		Non-Tuna PMUS	
	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
1980	1.26	6.27	1.21	6.00	1.29	6.39
1981	1.35	5.56	1.29	5.31	1.38	5.71
1982	1.33	5.21	1.25	4.92	1.38	5.43
1983	1.33	5.06	1.26	4.77	1.37	5.20
1984	1.31	4.58	1.20	4.20	1.43	4.99
1985	1.57	5.28	1.42	4.77	1.67	5.61
1986	1.48	4.84	1.41	4.61	1.51	4.94
1987	1.45	4.53	1.49	4.68	1.43	4.48
1988	1.37	4.07	1.31	3.89	1.39	4.14
1989	1.39	3.74	1.28	3.45	1.42	3.81
1990	1.69	3.97	1.62	3.81	1.70	4.00
1991	1.62	3.45	1.85	3.94	1.54	3.28
1992	1.66	3.21	1.70	3.30	1.62	3.13
1993	1.56	2.79	1.82	3.25	1.45	2.58
1994	1.69	2.58	1.73	2.65	1.67	2.55
1995	1.38	2.00	1.70	2.46	1.26	1.83
1996	1.56	2.15	1.62	2.24	1.52	2.11
1997	1.74	2.35	1.65	2.24	1.76	2.38
1998	1.81	2.46	1.68	2.29	1.84	2.51
1999	1.88	2.51	1.62	2.17	1.95	2.60
2000	1.67	2.18	1.41	1.85	1.83	2.40
2001	1.67	2.22	1.40	1.86	1.84	2.45
2002	1.54	2.03	1.33	1.75	1.67	2.20
2003	1.47	1.87	1.35	1.72	1.55	1.98
2004	1.52	1.80	1.36	1.61	1.59	1.88
2005	1.54	1.75	1.51	1.71	1.54	1.75
2006	**1.60**	**1.60**	**1.48**	**1.48**	**1.61**	**1.61**
Average	1.53	3.34	1.48	3.22	1.56	3.41
Standard Deviation	0.16	1.40	0.19	1.34	0.18	1.46

Figure 10a. Guam Trolling CPUE (Pounds/Hour):
Average, Non-charter, and Charter



Interpretations: The fluctuations in CPUE are probably due to variability in the year-to-year abundance and availability of the stocks. However, since it is not possible to allocate species-specific effort, effort used to target other species can also result in artificially high or low catch rates for a given species. This is especially true with charter boats targeting blue marlin during the summer months. In 2006, total overall, non-charter, and charter trolling catch rate increased 47%, 57%, and 6%, respectively. Charter catch rates have generally been lower than catch rates of non-charter boats, probably due to their shorter fishing time, and non-charter boats beginning earlier in the morning and ending as late as early evening.

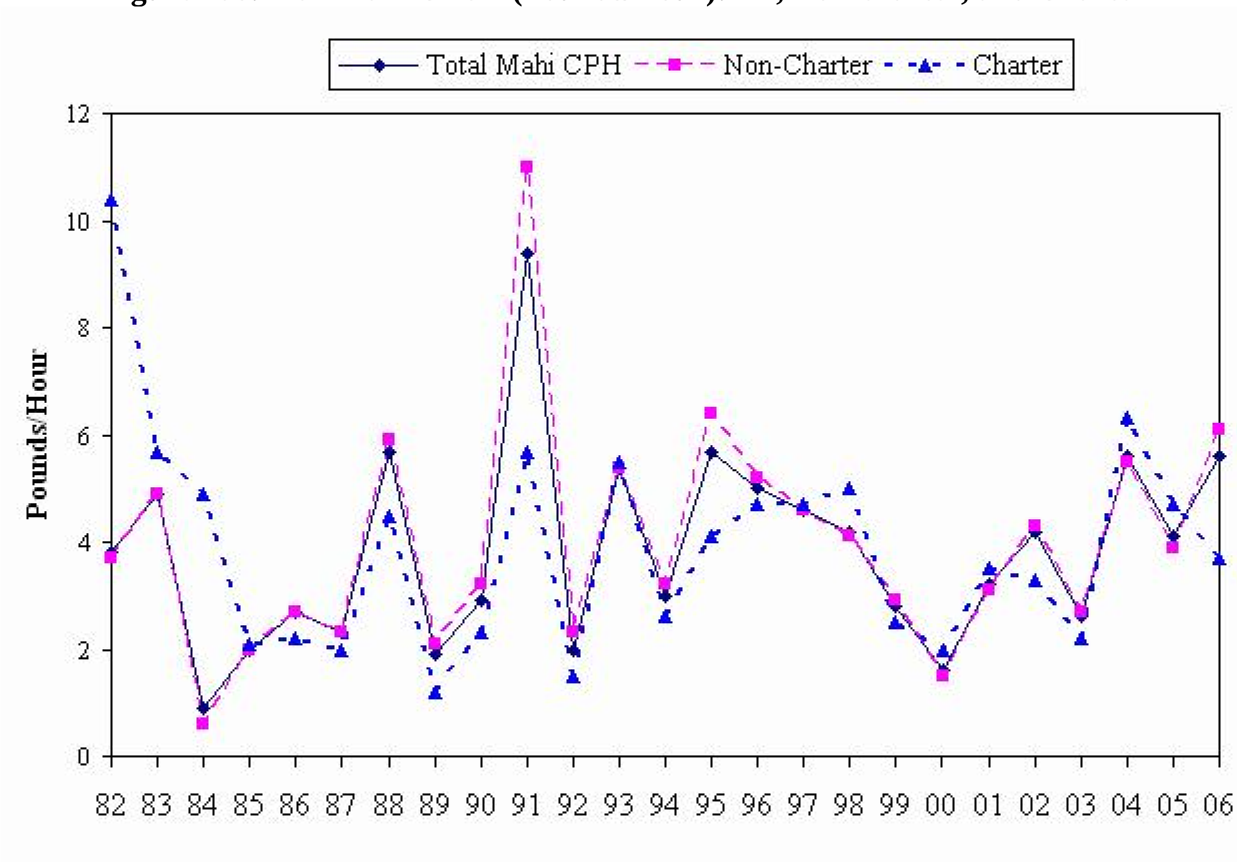
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files.

Calculation: The data expansion system is run on a calendar year's worth of survey data to produce catch and effort estimates for each fishing method. This plot and table of catch per unit of effort (CPUE) are based on the total annual landings of all troll catch, divided by the total number of hours spent fishing (gear in use).

Trolling Catch Rates (Pounds/Hour):

Year	Catch Rate	Non-Charter	Charter
1982	15.1	15.0	20.2
1983	14.7	14.8	10.2
1984	14.6	14.7	12.7
1985	12.9	12.9	13.4
1986	9.9	10.1	7.5
1987	9.8	9.9	8.4
1988	14.0	14.6	10.4
1989	9.9	10.5	7.4
1990	11.7	12.9	8.8
1991	16.9	19.2	11.5
1992	12.0	15.0	7.1
1993	12.3	12.8	11.1
1994	11.8	13.2	8.2
1995	13.4	15.5	8.9
1996	14.3	15.3	12.0
1997	13.4	13.8	12.0
1998	13.5	14.2	10.4
1999	10.9	11.5	8.1
2000	11.5	11.8	10.1
2001	13.0	13.4	9.9
2002	13.0	13.5	9.1
2003	15.8	16.4	12.6
2004	20.0	20.2	18.9
2005	11.4	11.8	10.0
2006	**16.8**	**18.5**	**10.6**
Average	13.3	14.1	10.8
Standard Deviation	2.4	2.6	3.2

Figure 10b. Mahimahi CPUE (Pounds/Hour): All, Non-charter, and Charter



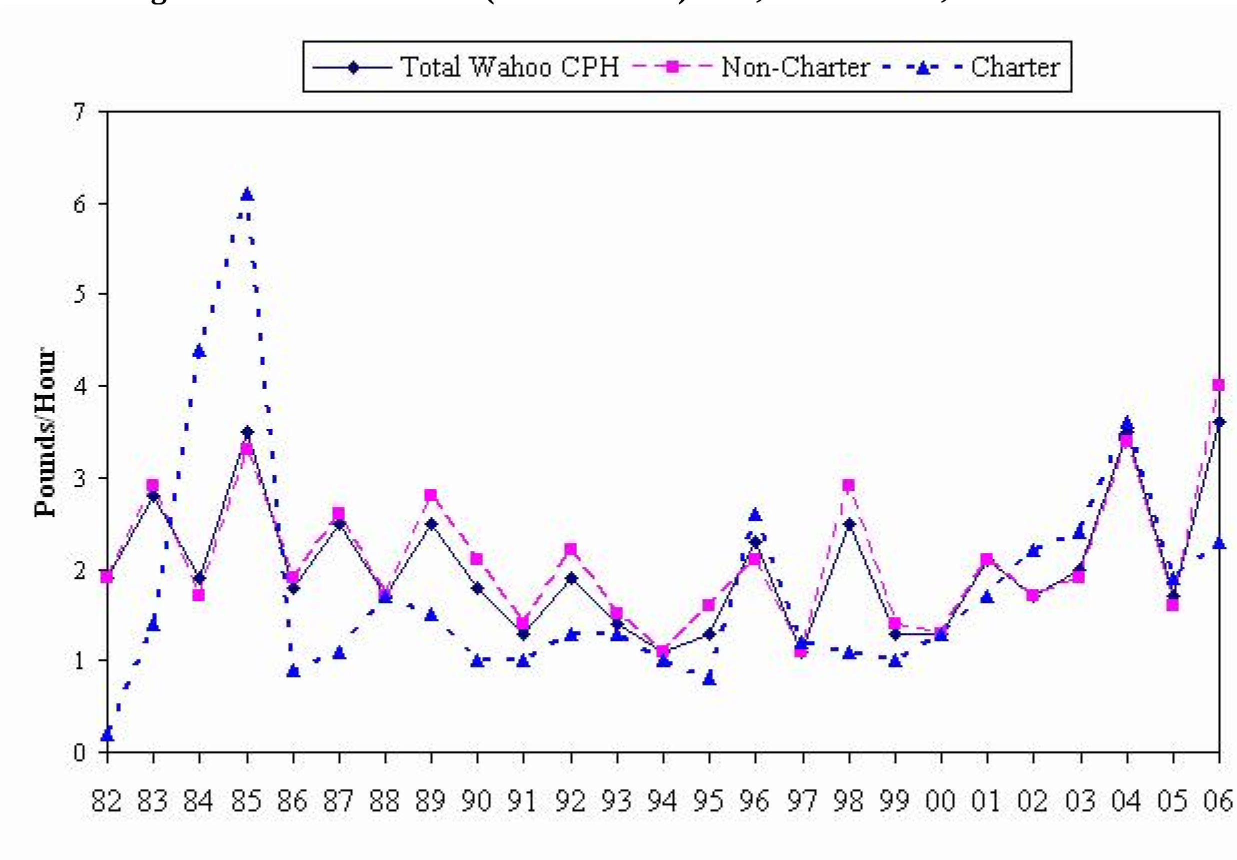
Interpretations: The wide fluctuations in mahimahi CPUE values are probably due to the high variability in the year-to-year abundance and availability of the stocks. It is not possible to allocate species-specific effort one particular species; effort used to target other species can result in artificially high or low catch rates for a given species. In 2006, the catch rate for total and non-charter mahimahi increased 37%, and 56%, while charter CPUE decreased by 21%.
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files.

Calculation: The data expansion system is run on a calendar year's worth of survey data to produce catch and effort estimates for each fishing method. This plot and table of catch per unit of effort (CPUE) are based on the total annual landings of mahimahi divided by the total number of hours spent fishing (gear in use).

Trolling Catch Rates (Pounds/Hour)

Year	Total Mahimahi	Non-Charter	Charter
1982	3.8	3.7	10.4
1983	4.9	4.9	5.7
1984	0.9	0.6	4.9
1985	2.0	2.0	2.1
1986	2.7	2.7	2.2
1987	2.3	2.3	2.0
1988	5.7	5.9	4.5
1989	1.9	2.1	1.2
1990	2.9	3.2	2.3
1991	9.4	11.0	5.7
1992	2.0	2.3	1.5
1993	5.4	5.4	5.5
1994	3.0	3.2	2.6
1995	5.7	6.4	4.1
1996	5.0	5.2	4.7
1997	4.6	4.6	4.7
1998	4.2	4.1	5.0
1999	2.8	2.9	2.5
2000	1.6	1.5	2.0
2001	3.2	3.1	3.5
2002	4.2	4.3	3.3
2003	2.6	2.7	2.2
2004	5.6	5.5	6.3
2005	4.1	3.9	4.7
2006	**5.6**	**6.1**	**3.7**
Average	3.8	4.0	3.9
Standard Deviation	1.9	2.1	2.0

Figure 10c. Wahoo CPUE (Pounds/Hour): All, Non-charter, and Charter



Interpretations: The wide fluctuations in CPUE are probably due to the high variability in the year-to-year abundance and availability of the stocks. In 2006, the total, non-charter, and charter catch rates for wahoo all increased. Total wahoo CPUE increased by 112%, with non-charter CPUE increasing by 150% and charter CPUE increasing by 21%. All three categories are well above their 25 year averages.

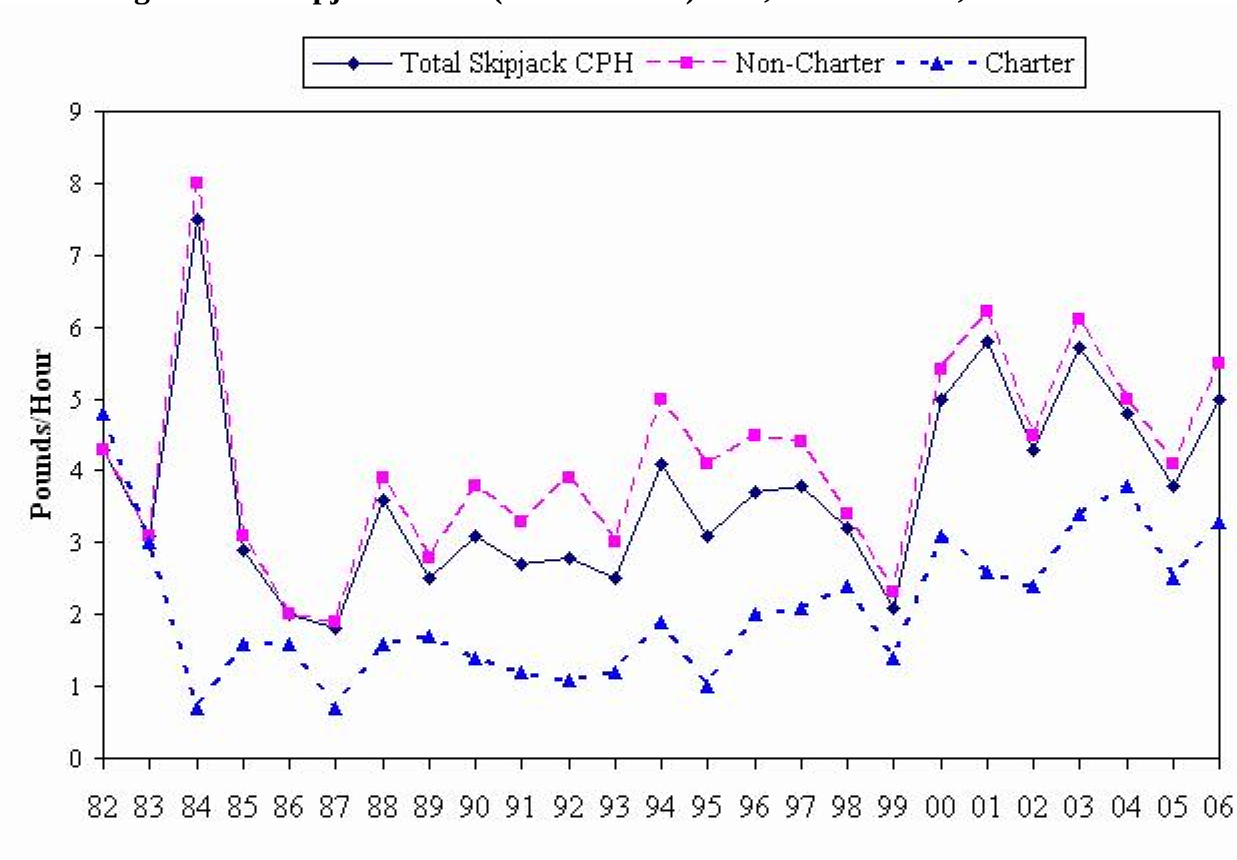
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files.

Calculation: The data expansion system is run on a calendar year's worth of survey data to produce catch and effort estimates for each fishing method. This plot and table of catch per unit of effort (CPUE) are based on the total annual landings of wahoo divided by the total number of hours spent fishing (gear in use).

Trolling Catch Rates (Pounds/Hour)

Year	Total Wahoo	Non-Charter	Charter
1982	1.9	1.9	0.2
1983	2.8	2.9	1.4
1984	1.9	1.7	4.4
1985	3.5	3.3	6.1
1986	1.8	1.9	0.9
1987	2.5	2.6	1.1
1988	1.7	1.7	1.7
1989	2.5	2.8	1.5
1990	1.8	2.1	1.0
1991	1.3	1.4	1.0
1992	1.9	2.2	1.3
1993	1.4	1.5	1.3
1994	1.1	1.1	1.0
1995	1.3	1.6	0.8
1996	2.3	2.1	2.6
1997	1.1	1.1	1.2
1998	2.5	2.9	1.1
1999	1.3	1.4	1.0
2000	1.3	1.3	1.3
2001	2.1	2.1	1.7
2002	1.7	1.7	2.2
2003	2.0	1.9	2.4
2004	3.5	3.4	3.6
2005	1.7	1.6	1.9
2006	**3.6**	**4.0**	**2.3**
Average	2.0	2.1	1.8
Standard Deviation	0.7	0.8	1.3

Figure 11a. Skipjack CPUE (Pounds/Hour): All, Non-Charter, and Charter



Interpretations: The wide fluctuations in CPUE for skipjack tuna are probably due to the high variability in the year-to-year abundance and availability of the stocks, although skipjack tuna is caught year round. However, it is not possible to allocate species-specific effort, since effort used to target other species can result in an artificially high or low catch rate for a given species. In 2006, the catch rates for total, non-charter, and charter skipjack tuna increased 32%, 34%, and 32% respectively. All three categories were above their 25-year averages.

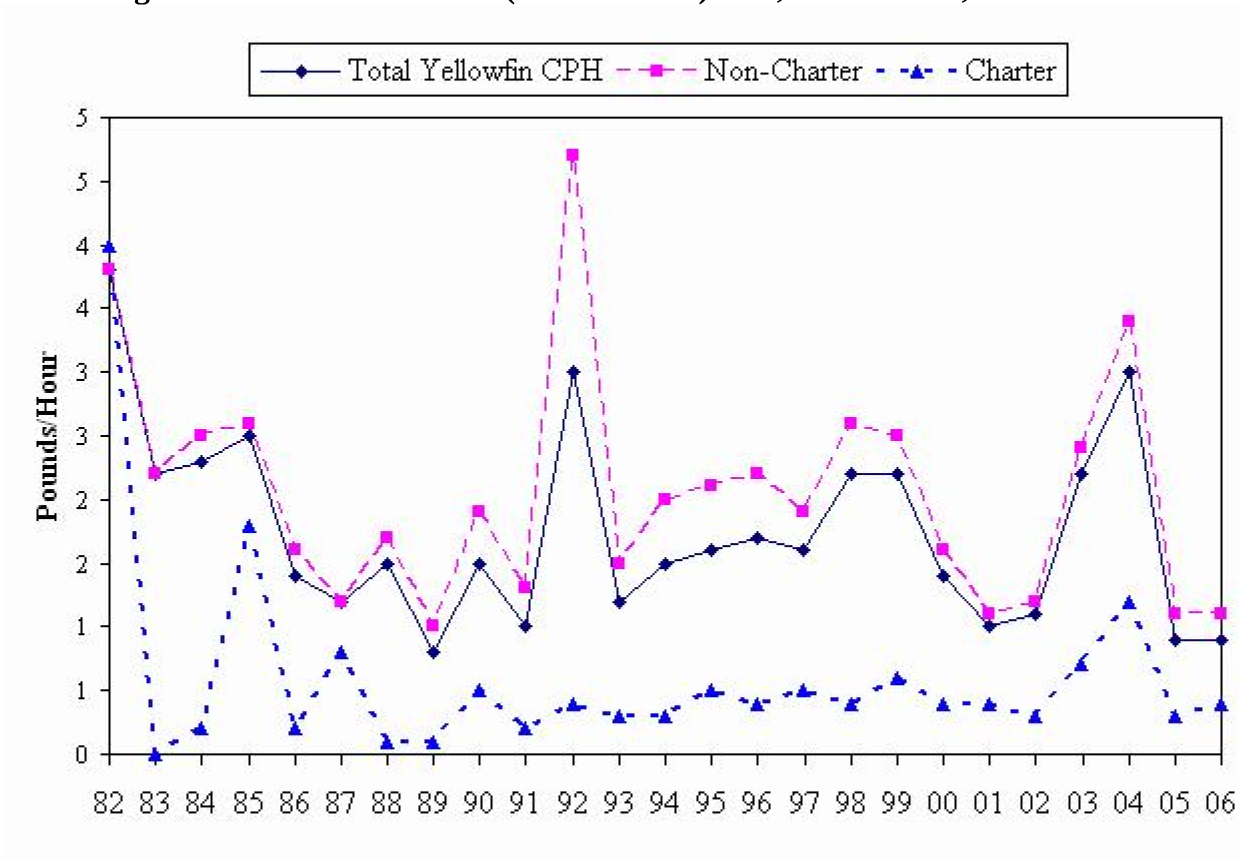
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files, expanded with the assistance of NMFS.

Calculation: The data expansion system is run on a calendar year's worth of survey data to produce catch and effort estimates for each fishing method surveyed. This plot and table of catch per unit of effort (CPUE) are based on the total annual landings of skipjack divided by the total number of hours spent fishing (gear in use).

Trolling Catch Rates (Pounds/Hour)

Year	Total Skipjack	Non-Charter	Charter
1982	4.3	4.3	4.8
1983	3.1	3.1	3.0
1984	7.5	8.0	0.7
1985	2.9	3.1	1.6
1986	2.0	2.0	1.6
1987	1.8	1.9	0.7
1988	3.6	3.9	1.6
1989	2.5	2.8	1.7
1990	3.1	3.8	1.4
1991	2.7	3.3	1.2
1992	2.8	3.9	1.1
1993	2.5	3.0	1.2
1994	4.1	5.0	1.9
1995	3.1	4.1	1.0
1996	3.7	4.5	2.0
1997	3.8	4.4	2.1
1998	3.2	3.4	2.4
1999	2.1	2.3	1.4
2000	5.0	5.4	3.1
2001	5.8	6.2	2.6
2002	4.3	4.5	2.4
2003	5.7	6.1	3.4
2004	4.8	5.0	3.8
2005	3.8	4.1	2.5
2006	**5.0**	**5.5**	**3.3**
Average	3.7	4.1	2.1
Standard Deviation	1.4	1.4	1.0

Figure 11b. Yellowfin CPUE (Pounds/Hour): All, Non-charter, and Charter



Interpretations: The wide fluctuations in CPUE for yellowfin tunas are probably due to the high variability in the year-to-year abundance and availability of the stocks. It is not possible to allocate species-specific effort, since effort used to target other species can also result in an artificially high or low catch rate for a given species. In 2006, the yellowfin catch rates for total, non-charter, and charter catch were virtually unchanged from 2005. All three categories are about half their 25-year averages.

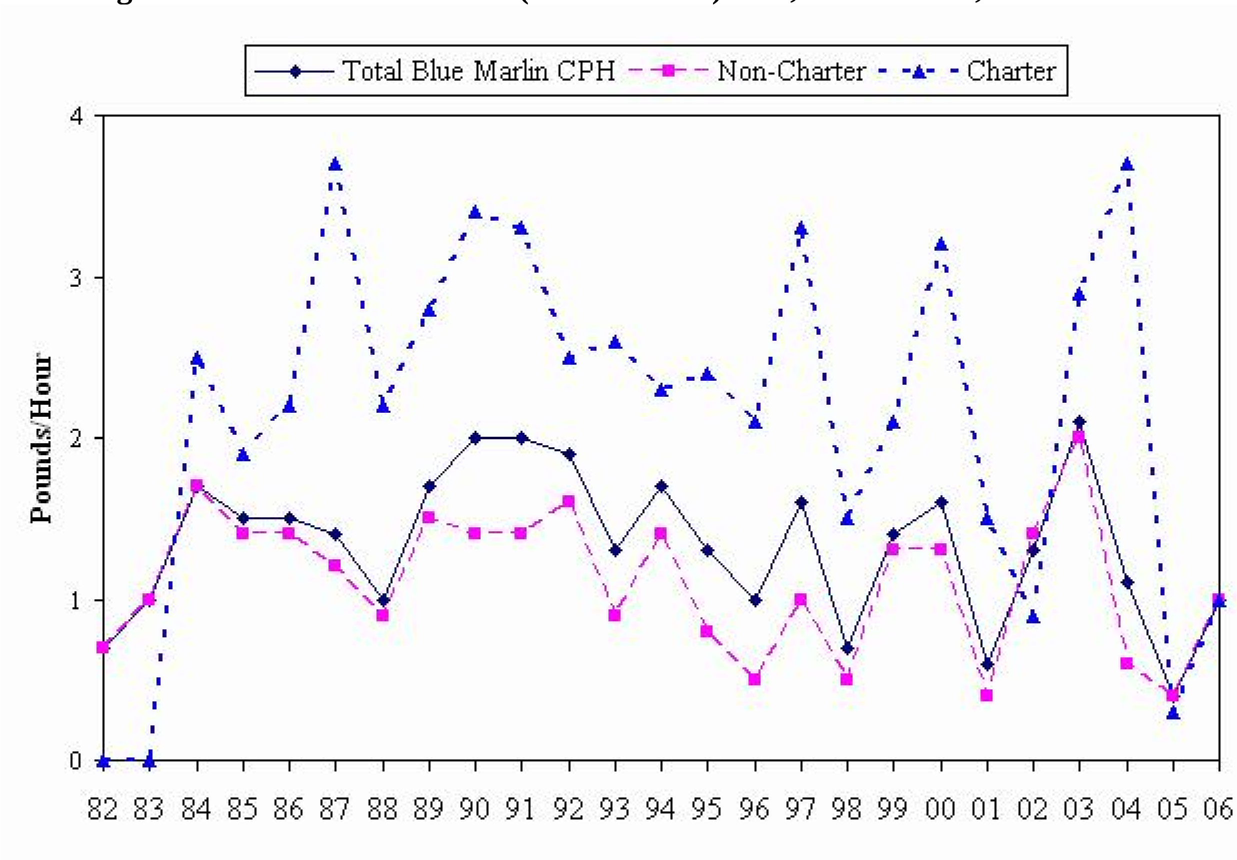
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files, expanded with the assistance of NMFS.

Calculation: The data expansion system is run on a calendar year's worth of survey data to produce catch and effort estimates for each fishing method surveyed. This plot and table of catch per unit of effort (CPUE) are based on the total annual landings of Yellowfin divided by the total number of hours spent fishing (gear in use).

Trolling Catch Rates (Pounds/Hour)

Year	Total Yellowfin	Non-Charter	Charter
1982	3.8	3.8	4.0
1983	2.2	2.2	0.0
1984	2.3	2.5	0.2
1985	2.5	2.6	1.8
1986	1.4	1.6	0.2
1987	1.2	1.2	0.8
1988	1.5	1.7	0.1
1989	0.8	1.0	0.1
1990	1.5	1.9	0.5
1991	1.0	1.3	0.2
1992	3.0	4.7	0.4
1993	1.2	1.5	0.3
1994	1.5	2.0	0.3
1995	1.6	2.1	0.5
1996	1.7	2.2	0.4
1997	1.6	1.9	0.5
1998	2.2	2.6	0.4
1999	2.2	2.5	0.6
2000	1.4	1.6	0.4
2001	1.0	1.1	0.4
2002	1.1	1.2	0.3
2003	2.2	2.4	0.7
2004	3.0	3.4	1.2
2005	0.9	1.1	0.3
2006	**0.9**	**1.1**	**0.4**
Average	1.7	2.0	0.6
Standard Deviation	0.8	0.9	0.8

Figure 11c. Blue Marlin CPUE (Pounds/Hour): All, Non-charter, and Charter



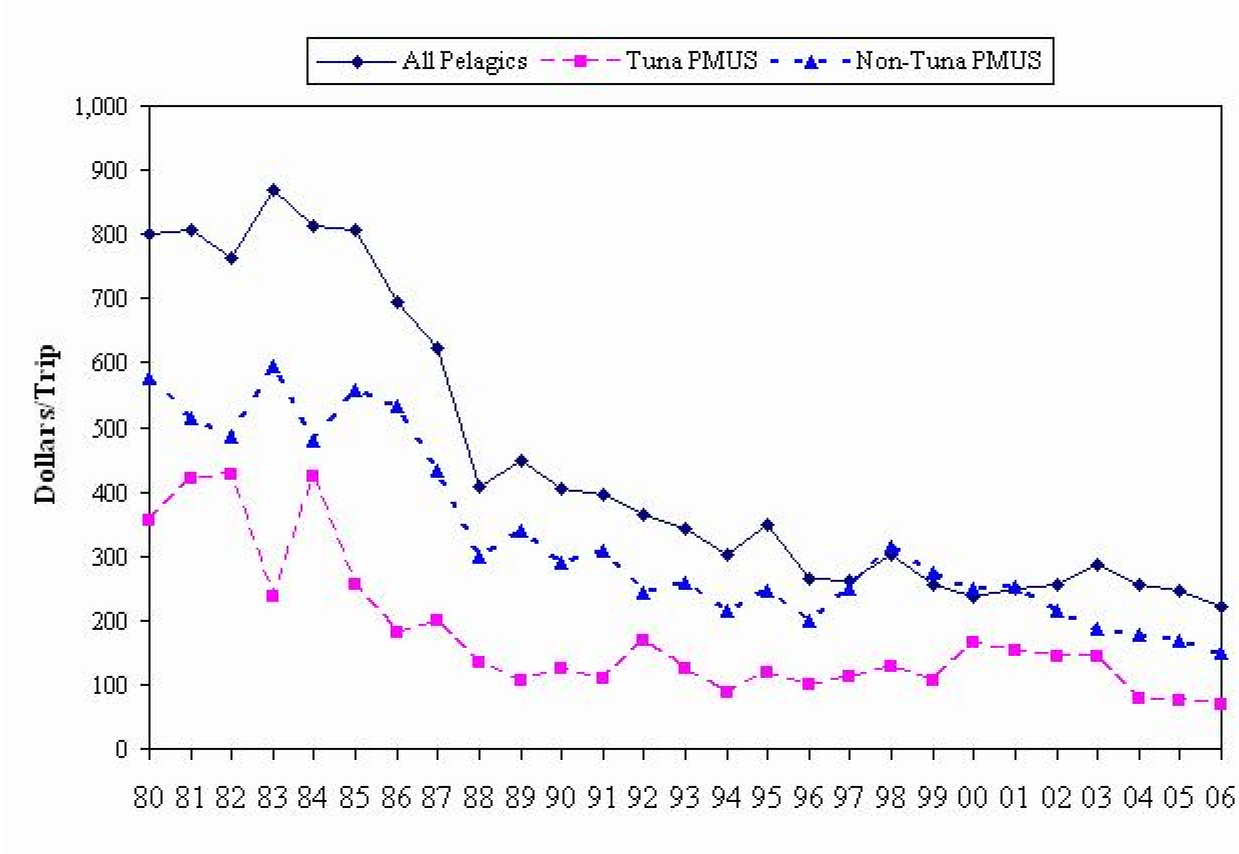
Interpretations: The wide fluctuations in CPUE are probably due to the high variability in the year-to-year abundance and availability of the stocks. Since it is not possible to allocate species-specific effort, effort used to target other species can also result in an artificially high or low catch rate for a given species. The 2006 blue marlin catch rates increased for total and non-charter by 150%. Charter blue marlin catch rate increased by 233%.
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files, expanded with the assistance of NMFS.

Calculation: The data expansion system is run on a calendar year's worth of survey data to produce catch and effort estimates for each fishing method surveyed. This plot and table of catch per unit of effort (CPUE) are based on the total annual landings of marlin divided by the total number of hours spent fishing (gear in use).

Trolling Catch Rates (Pounds/Hour)

Year	Total Blue Marlin	Non-Charter	Charter
1982	0.7	0.7	
1983	1.0	1.0	
1984	1.7	1.7	2.5
1985	1.5	1.4	1.9
1986	1.5	1.4	2.2
1987	1.4	1.2	3.7
1988	1.0	0.9	2.2
1989	1.7	1.5	2.8
1990	2.0	1.4	3.4
1991	2.0	1.4	3.3
1992	1.9	1.6	2.5
1993	1.3	0.9	2.6
1994	1.7	1.4	2.3
1995	1.3	0.8	2.4
1996	1.0	0.5	2.1
1997	1.6	1.0	3.3
1998	0.7	0.5	1.5
1999	1.4	1.3	2.1
2000	1.6	1.3	3.2
2001	0.6	0.4	1.5
2002	1.3	1.4	0.9
2003	2.1	2.0	2.9
2004	1.1	0.6	3.7
2005	0.4	0.4	0.3
2006	**1.0**	**1.0**	**1.0**
Average	1.3	1.1	2.4
Standard Deviation	0.5	0.4	0.9

Figure 12. Guam Annual Estimated Inflation-Adjusted Revenue per Trolling Trip: All Pelagics, Tuna PMUS, and Non-tuna PMUS



Interpretation: There has been a general decrease from 1980 in the adjusted revenues per trolling trip for all pelagics, tunas and other PMUS, although the revenue values have remained fairly constant for past 9 years. In 2006, the adjusted revenue per trip decreased for all pelagics, for tuna PMUS, and for non-tuna PMUS, by 11%, 6%, and 12%, respectively. Despite continual declines in revenues, trolling effort still occurs since most charter and non-charter trolling boats do not rely on selling fish caught as their primary source of income and a reliable market exists for members of the local fishermen's cooperative which provides additional income.

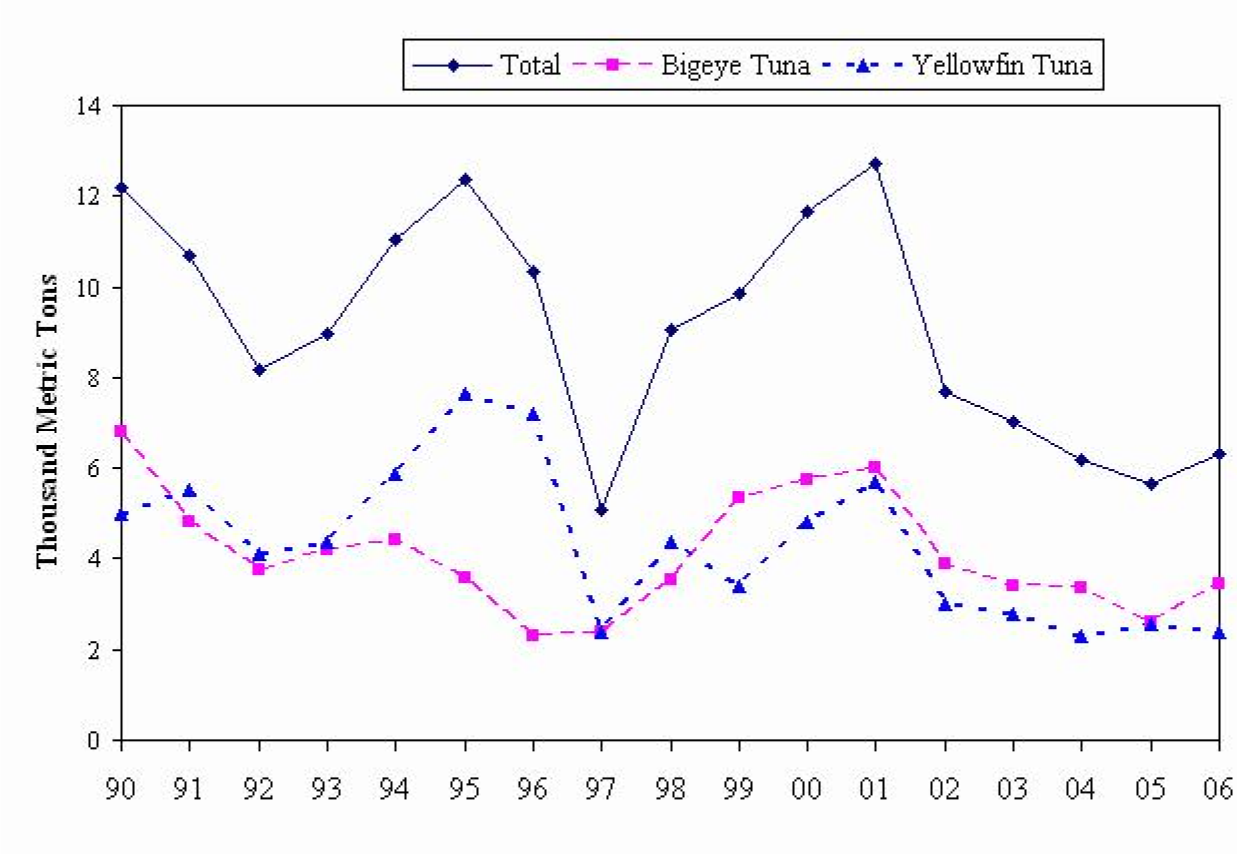
Source: The WPacFIN-sponsored commercial landings system.

Calculation: The average revenue per trip was calculated by summing the revenue of all species sold then dividing by the number of trips, and summing the revenue of tunas and other PMUS sold, and then dividing each by the number of trips, respectively, for any trip, which landed PMUS. Adjusted revenue per trip was derived from the Guam Annual Consumer Price Index (CPI).

Inflation-Adjusted Revenues per Trolling Trip ($/Trip)

Year	All Pelagics		Tuna PMUS		Non-Tuna PMUS	
	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
1980	161.31	801.87	71.14	353.64	116.20	577.63
1981	195.29	805.96	102.24	421.94	124.58	514.14
1982	194.29	762.59	108.45	425.67	123.68	485.44
1983	229.26	869.58	62.81	238.24	156.75	594.55
1984	233.01	812.97	121.56	424.12	137.48	479.67
1985	240.34	807.30	76.21	255.99	165.90	557.26
1986	212.25	694.06	55.68	182.07	162.89	532.65
1987	199.18	623.83	64.07	200.67	137.77	431.50
1988	137.30	408.60	44.98	133.86	100.78	299.92
1989	166.79	447.66	38.89	104.38	126.20	338.72
1990	172.68	405.80	53.19	125.00	123.50	290.23
1991	185.96	396.47	51.79	110.42	144.20	307.43
1992	188.33	364.42	86.72	167.80	126.18	244.16
1993	191.92	342.77	70.60	126.09	144.36	257.83
1994	197.09	301.15	56.32	86.06	140.32	214.41
1995	239.79	347.94	82.55	119.78	169.38	245.77
1996	191.10	264.10	72.55	100.26	144.71	199.99
1997	192.95	261.64	82.74	112.20	184.35	249.98
1998	221.01	301.02	92.81	126.41	231.44	315.22
1999	190.05	254.29	78.35	104.83	205.04	274.34
2000	179.42	235.22	127.01	166.51	189.00	247.78
2001	188.68	250.76	113.92	151.40	188.92	251.07
2002	193.42	255.31	109.41	144.42	162.85	214.96
2003	223.73	285.93	110.95	141.79	145.38	185.80
2004	215.73	255.21	65.56	77.56	149.66	177.05
2005	216.34	245.98	64.62	73.47	149.05	169.47
2006	**219.66**	**219.66**	**68.70**	**68.70**	**148.43**	**148.43**
Average	199.14	445.26	79.03	175.68	151.81	326.13
Standard Deviation	24.62	227.41	24.30	108.55	29.12	139.54

Figure 13. Annual Foreign Guam Longline Landings



Interpretation: Annual landings from a primarily foreign longline fishing fleet have ranged from a low of 5,093 metric tons in 1997 to a high of 12,627 metric tons in 2001. These vessels fish primarily outside Guam's EEZ, but transship their catch through Guam. The dramatic drop observed in 1997 was due to a large number of foreign fishing boats leaving the western Pacific that year for several reasons, including availability of fish stocks. Compared with 2005, the 2006 total longline landings increased 12%, with bigeye landings increasing 32%. Yellowfin landings decreased in 2006, down 8%.

Source: The Bureau of Statistics and Plans.

Calculation: Pre-1990 data was extracted directly from transshipment agents' files. Beginning in 1990, a mandatory data submission program was implemented.

Foreign Longline Landings (Metric tons)

Year	Total	Bigeye	Yellowfin
1990	12,198	6,793	5,011
1991	10,707	4,824	5,505
1992	8,157	3,754	4,104
1993	8,981	4,178	4,379
1994	11,023	4,400	5,878
1995	12,366	3,560	7,635
1996	10,356	2,280	7,214
1997	5,093	2,395	2,392
1998	9,032	3,533	4,379
1999	9,865	5,328	3,404
2000	11,664	5,725	4,795
2001	12,716	5,996	5,711
2002	7,691	3,904	3,011
2003	7,010	3,418	2,788
2004	6,190	3,375	2,287
2005	5,660	2,618	2,574
2006	**6,315**	**3,455**	**2,377**
Average	9,119	4,090	4,320
Standard Deviation	2,497	1,280	1,686

Table 4a: Trolling Bycatch: Non-charter and Charter

Species Name	Number Released			Caught All	Bycatch (%)
	Alive	Dead/Injured	Both		
Charter					
Tetrapterus angustirostris	1	0	1	2	50.00
Charter Bycatch Total	**1**	**0**	**1**	**2**	**50.00**
Compare with All Caught				**695**	**0.14**
Non Charter					
Katsuwonus pelamis	1	1	2	1766	0.11
Non Charter Bycatch Total	**1**	**1**	**2**	**1766**	**0.11**
Compare with All Caught				**2783**	**0.07**
All Bycatch Total	**2**	**1**	**3**	**1768**	**0.17**
Compare with All Caught				**3478**	**0.09**

*unexpanded total number of that species caught
**unexpanded total number of fish caught from non-charter trolling

4b. Trolling Bycatch: Summary

Year	Released alive	Released dead/injured	Total Number Released	Total Number Landed	Percent Bycatch*	Interviews with Bycatch	Total Number of Interviews	Percent of Interviews with Bycatch
2001	7	3	10	5,289	0.2	10	461	2.2
2002	1	2	3	3,443	0.1	3	258	1.2
2003	5	0	5	3,026	0.2	2	178	1.1
2004	0	0	0	4,292		0	91	0
2005	3	0	3	2,631	.11	3		
2006	2	1	3	3,478	.09	3	413	.7

*”percent bycatch” represents the number of pieces that were discarded compared to the total number of fish caught trolling. The bycatch information is from unexpanded data, taken only from actual interviews that reported bycatch.

Interpretation: Bycatch information was recorded beginning in 2000 as a requirement of the pelagic FMP. Historically, most fish that is landed by fishermen is kept regardless of size and species. Bycatch for this fishery are sharks, shark-bitten pelagics, small pelagics, or other pelagic species. In 2004 bycatch was not encountered by Fisheries staff when interviewing trollers.

Source: The DAWR creel survey data for boat based methods.

Calculations: Bycatch is obtained directly from trolling interviews where bycatch was voluntarily reported. The number of bycatch reported is from unexpanded data.

C. Hawaii

Introduction

Hawaii's pelagic fisheries, which include the longline, main Hawaiian Island (MHI) troll and handline, offshore handline, and aku boat (pole and line) fisheries, are the state's largest and most valuable. These pelagic fisheries landed an estimated 26 million pounds worth about $63 million (ex-vessel revenue) in 2006. The longline fishery was the largest of all commercial pelagic fisheries in Hawaii and represented 82% of the total commercial pelagic landings and 87% of the ex-vessel revenue. The MHI troll accounted for 9% and 8% of the landings and revenue, respectively. The MHI handline, aku boat, offshore handline and other gear types made up the remainder.

The target species for the Hawaii fisheries are tunas and billfishes, but a variety of other pelagic species are also landed with some regularity. The largest component of the pelagic landings was tunas, which comprised 59% of the total in 2006. Bigeye tuna alone accounted for 68% of the tunas and 40% of all pelagic landings. Billfish landings made up 22% of the total landings in 2006. Swordfish was the largest of these, at 46% of the billfish and 10% of the total landings. Landings of other pelagic species represented 19% of the total landings in 2006 with mahimahi being the largest component at 6% of the total and 30% of other pelagic landings.

Data Sources and Calculation Procedures

This report contains the most recently available information on Hawaii's commercial pelagic fisheries, as compiled from four data sources: The State of Hawaii's Division of Aquatic Resources (HDAR) Commercial Fish Catch data, HDAR Commercial Marine Dealer (Dealer) data, the National Marine Fisheries Service (NMFS) Pacific Islands Fisheries Science Center's (PIFSC) longline logbook data, and joint NMFS and HDAR Market Sample (Market Sample) data.[7] Landings and revenue were calculated for each Hawaii pelagic fishery. The data sources and estimation procedures are described below.

Hawaii-based Longline Fishery: The Market Sample data were used to estimate catch and revenue for the longline fishery from 1987 to 1991. Market Sample data was collected on five of six business days a week to approximate a coverage rate of about 80%. The Market Sample data were extrapolated to represent a full coverage rate.

The federal longline logbook system was implemented in December 1990 and served as the source of the data used to determine fish catches. Due to limited manpower, the market sampling data collection program was reduced to two business days in 1991 for a coverage rate of about 33%. The number of fish kept from the longline logbook data was multiplied by the

[7] Ito, Russell Y. and Machado, Walter A. 2001. Annual report of the Hawaii-based longline fishery for 2000. Southwest Fisheries Science Center administrative report H-01-07.

average weight per fish from the market sample data to estimate total landings. The estimated landings were then multiplied by the average price per pound from the market sampling data to estimate total revenue.

A system to submit Dealer data electronically was implemented in 1999; the first complete year of fish dealer data was 2000. The Dealer data coverage of the longline landings and revenue was near complete and replaced the Market Sample data as the data source for average weight and average price.

The longline purchases in the Dealer data was identified and separated out by matching specific vessel names and HDAR Commercial Marine License (CML) numbers. The estimation procedure for longline landings and revenue was done by multiplying the total number of each species kept from the Federal longline logbook data by the corresponding average weight of fish from Dealer data. The result was "Pounds Landed" for each species. This procedure was repeated on a monthly basis and summed over the year to get annual totals. There were exceptions though. When the sum of "Pounds Bought" for individual species from the Dealer data was greater than the calculation for "Pounds Landed", "Pounds Bought" was used as the final estimate for landings.

Aku Boat: This fishery includes pelagic species caught by the aku boat or pole-and-line method (HDAR gear code 1) for skipjack tuna in all HDAR statistical areas. Aku boat fishing vessel names and CML numbers were matched up with the corresponding vessel names and CMLs in the Dealer data. The landings and revenue summaries were produced by summing "Pounds Bought" and "Amount Paid" in the Dealer data. Aku boat landings were also summed from the Aku Boat Fishing report to yield "Pounds Landed". When the total of "Pounds Landed" from the Aku Boat Fishing data was greater than the "Pounds Bought" from the Dealer data, "Pounds Landed" was used as the catch. Contrarily, if "Pounds Bought" was greater than "Pounds Landed", the total from "Pounds Bought" was used as the catch. "Pounds Landed" was typically greater than Pounds Bought.

MHI Troll Fishery: The MHI troll fishery includes pelagic species caught by Miscellaneous Trolling Methods (HDAR gear code 6), Lure Trolling (61), Bait Trolling (62), Stick Trolling (63), Casting, Light Tackle, Spinners or Whipping (10) and Hybrid Methods (97) in HDAR statistical areas 100 through 642. These are areas that begin from the shoreline out to 20 minute squares around the islands of Hawaii, Maui, Kahoolawe, Lanai, Mokolai, Oahu, Kauai and Niihau.

MHI Handline Fishery: The MHI handline fishery includes pelagic species caught by Deep Sea or Bottom Handline Methods (HDAR gear code 3), Inshore Handline or Cowrie Shell (Tako) Methods (4), Ika_Shibi (8), Palu-Ahi, Drop Stone or Make Dog Methods (9), Drifting Pelagic Handline Methods (35) and Floatline Methods (91) in HDAR statistical areas 100 to 642 except areas 175, 176, and 181.

Offshore Handline Fishery: The offshore handline fishery includes pelagic species caught by Ika-Shibi (HDAR gear code 8), Palu-Ahi, Drop Stone or Make Dog Methods (9), Drifting

Pelagic Handline Methods (35), Miscellaneous Trolling Methods (6), Lure Trolling (61), and Hybrid Methods (97) in Areas 15217 (NOAA Weather Buoy W4), 15717 (NOAA Weather Buoy W2), 15815, 15818 (Cross Seamount) , 16019 (NOAA Weather Buoy W3), 16223 (NOAA Weather Buoy W1), 175, 176, 181, 804, 807, 816, 817, 825, 839, 842, 892, 893, 894, 898, 900, 901, 15416, 15417, 15423, 15523, 15718, 15918, 15819, and 16221. This fishery also includes pelagic species caught by Deep Sea or Bottom Handline Methods (3) in Area 16223.

Other Gear: Even though this category is not mentioned specifically in this report, the catch is included in the overall total. It represents pelagic species caught by methods or in areas other than those methods mentioned above. Catch and revenue from this category is primarily composed of pelagic species caught by trolling in areas outside of the MHI (the distant water albacore troll fishery) or pelagic species caught close to shore by diving, spearfishing, squidding, or netting inside of the MHI.

Calculations: Calculating catch by the MHI troll, MHI handline, offshore handline, and other gear involved processing of two data sets: the HDAR Commercial Fish Catch data collected and submitted by the aforementioned fishers, and Dealer data collected and submitted by seafood dealers. "Pounds Landed" from HDAR Commercial Fish Catch data was summed by species for each of the above fisheries. Total "Pounds Landed" for each species was then calculated by summing the catch of that particular species for the MHI troll, MHI handline, offshore handline fisheries and other gear category. The percent catch of each species by fishery was also calculated and later used in conjunction with the Dealer data.

Catch in the Dealer data, referred to as "Pounds Bought", by each fishery was not clearly differentiated; however, "Pounds Sold" by the longline and aku boat fisheries were identified by CML numbers or vessel names and excluded. The remaining "Pounds Bought" was presumed to be from the MHI troll, MHI handline, offshore handline fisheries or other gear category. "Pounds Bought" from this subset of the data was summed on a species specific basis with fishery specific landings of each particular species allocated based on the percent catch by fishery calculated from the Dealer data. The fishery specific allocation was then compared to the "Pounds Landed" from the HDAR Commercial Fish Catch total. The greater value of "Pounds Bought" from the Dealer data or the "Pounds Landed" from the HDAR Commercial Fish catch data was used as the catch. This process was repeated on a monthly basis.

Detailed data were not available for recreational fishers because they are not required to file catch reports (if they sell no fish during the year). In addition, there is no comprehensive creel survey of Hawaii anglers. JIMAR research reports describe aspects of the relationship between commercial and recreational pelagic fishing, but accurate estimates of total recreational participation and catch remain absent.[8] The NMFS Marine Recreational Fisheries Statistical

[8] Hamilton, Marcia S and Stephen W. Huffman, 1997. Cost-earnings study of Hawaii's small boat fishery, 1995-96. University of Hawaii SOEST 97-06/JIMAR 97-314. 102 p.
McConnell, Kenneth E. and Timothy C. Haab, 2001. Small boat fishing in Hawaii: choice and economic values. University of Hawaii SOEST 01-01, JIMAR 01-336, 62 p.

Survey (MRFSS) has reinitiated operations in Hawaii after a 20-year absence with the first full year of field surveys in 2002. The combined telephone-creel intercept survey is being conducted in collaboration with the HDAR. In the interim, a summary of what is known about recreational fisheries, including preliminary estimates of recreational catch are included in Appendix 6.

This module was prepared by Russell Ito of NMFS. Summaries from NMFS longline logbooks were provided by Frederick Dowdell of NMFS. HDAR Commercial Fish Catch and Dealer data used calculate the MHI troll, MHI handline, offshore handline, and other gear landings were compiled by Craig Graham from JIMAR. Information on HDAR CMLs was provided by Reginald Kokubun, HDAR.

Hawaii Commercial Marine License information

Any fisherman who takes marine species for commercial purposes is required by the State of Hawaii to have a Commercial Marine License (CML) and submit a monthly catch report to HDAR. An exception to this rule is that only one person per vessel is required to submit a catch report. This person is usually, but not necessarily, the captain. Crew members do not ordinarily submit catch reports. HDAR asks fishermen to identify their primary fishing gear or method on the CML at time of licensing. This does not preclude fishermen from using other gears or methods.

A total of 3,166 fishermen were licensed in 2006, including 2,135 (67%) who indicated that their primary fishing method and gear were intended to catch pelagic fish. Most licenses that indicated pelagic fishing as their primary method were issued to trollers (64%) and longline fishermen (28%). The remainder was issued to ika shibi and palu ahi (handline) (6%) and aku boat fishers (1%).

Primary Fishing Method	**Number of licensees required to report**	
	2005	**2006**
Trolling	1,406	1,367
Longline	489	606
Ika Shibi & Palu Ahi	147	133
Aku Boat (Pole and Line)	27	29
Total Pelagic	**2,069**	**2,135**
Total All Methods	**3,136**	**3,166**

<u>2006 Plan Team Recommendations</u>:

1. The Pelagics Plan Team recommends that the NMFS protected species workshops include instruction in pelagic fish identification, including a manual of photographs to aid in identification.

2. The PPT reiterates its previous recommendation that WPacFIN and DAR convene two workshops: the first to review the catch and effort reporting systems, review of DAR codes to assign fishery sectors and algorithms for the expansion of bigeye (BET) and yellowfin (YFT) landings; and the second to review the results of any changes in the application of these modified algorithms in estimating the BET and YFT landings in the troll and handline/mixed-line and offshore fisheries in Hawaii.

3. The PPT recommends that the Council consider methods to smooth the adverse markets effect of any seasonal closures of the Hawaii swordfish fishery, such as consideration of an interim trigger level of turtle takes by the Hawaii swordfish longline fishery that might be used to establish short term (1−4 week) temporary measures of fishery or area closures, that would avoid the fishery reaching its hard limit for loggerhead turtles and the fishery having to be closed prematurely.

4. Given the small size of the fishery, the PPT recommends the Council choose the simplest option for the NWHI sanctuary commercial pelagic fishery limited entry program, preferably one that is similar to existing systems and has low administrative costs.

5. The PPT recommends the Council consider an alternative for the NWHI sanctuary commercial pelagic fishery limited entry program that would combine alternatives 1 and 2 such that initial entry would be based on historical participation with permits transferable thereafter – however permits could only be transferred to those persons with some level of historical participation in the NWHI or MHI commercial pelagic fisheries.

6. The PPT recommends the Council consider beginning the NWHI sanctuary bottomfish/pelagic fishing year on July 1, as this is the fiscal year and would make it easier to compare new data to historical data

7. The PPT recommends that the section of the Pelagics Annual Report Hawaii module on longline bycatch contain observer data for the swordfish longline fishery discards and the expansion of the tuna longline fishery discards.

Table 1. Hawaii commercial pelagic landings, revenue, and average price by species, 2005-2006.

Species	2005 Pounds landed (x 1000)	2005 Ex-vessel revenue ($1000)	2005 Average price ($/lb)	2006 Pounds landed (x 1000)	2006 Ex-vessel revenue ($1000)	2006 Average price ($/lb)
Tuna PMUS						
Albacore	1,050	$1,595	$1.58	783	$1,284	$1.68
Bigeye tuna	11,681	$38,177	$3.49	10,520	$34,227	$3.38
Bluefin tuna	2	$1	$2.97	1	$0	-
Skipjack tuna	1,183	$1,199	$1.24	1,081	$1,196	$1.38
Yellowfin tuna	3,216	$7,803	$2.43	3,118	$7,929	$2.62
Tuna PMUS subtotal	**17,132**	**$48,775**	**$3.03**	**15,503**	**$44,636**	**$3.02**
Billfish PMUS						
Swordfish	3,546	$8,236	$2.39	2,599	$5,233	$2.01
Blue marlin	1,124	$1,030	$1.06	1,200	$970	$1.03
Striped marlin	1,220	$1,628	$1.34	1,466	$1,603	$1.09
Other marlins	508	$457	$0.96	417	$403	$1.03
Billfish PMUS subtotal	**6,397**	**$11,350**	**$1.86**	**5,683**	**$8,209**	**$1.34**
Other PMUS						
Mahimahi	1,587	$3,808	$2.65	1,479	$3,632	$2.71
Ono (wahoo)	884	$2,383	$2.92	984	$2,332	$2.61
Opah (moonfish)	1,094	$2,007	$1.85	1,084	$1,888	$1.74
Oilfish	386	$745	$1.93	417	$840	$2.02
Pomfrets	658	$1,525	$2.36	587	$1,329	$2.28
Sharks (whole weight)	393	$107	$0.39	337	$151	$0.56
Other PMUS subtotal	**5,001**	**$10,576**	**$2.26**	**4,886**	**$10,172**	**$2.21**
Other pelagics	77	$30	$0.83	66	$36	$1.03
Total pelagics	**28,607**	**$70,731**	**$2.63**	**26,138**	**$63,053**	**$2.53**

Interpretation: The total commercial pelagic landings in 2006 were 26.1 million pounds, down 9% (-2.5 million pounds) from 2005. Tunas represented 59% of the total landings. Bigeye tuna landings were 10.5 million pounds in 2006, down 1.2 million pounds from the previous year. Bigeye tuna was the largest component of the landings (40%). Yellowfin tuna (12%) was the next largest, followed by swordfish (10%).

Total Hawaii commercial ex-vessel revenue ($63.1 million) decreased by 11% in 2006. Tunas comprised 71% of this total. Bigeye tuna alone accounted for 54% of the total revenue at $34.2 million. Yellowfin tuna was the next highest contributor to total revenue at $7.9 million. Billfish revenue ($8.2 million) decreased by 28% due to lower swordfish revenue. Revenue of other PMUS species decreased modestly (down 4%) in 2006. The total pelagic fish price decreased slightly in 2006. Average prices for tuna and other PMUS was about the same while average price for billfish decreased by 28% in 2006.

Source and Calculations: NMFS longline logbook and HDAR Dealer data were used to produce longline catch, revenue, and average price estimates. The Main Hawaiian Islands (MHI) troll, MHI handline, offshore handline, and other gear catch, revenue, and average price estimates were produced from HDAR Commercial Fish Catch and Dealer data.

"Other Billfish" includes unclassified billfish, sailfish, spearfish and black marlin. "Sharks" includes unclassified sharks, hammerhead sharks, mako sharks, thresher sharks, tiger sharks, blue sharks and white-tipped sharks. "Other Pelagics" includes unclassified tunas, kawakawa, sting rays, barracudas, flying fish, oilfish, sunfish, frigate mackerel and pomfrets.

The revenue for the current year is an unadjusted value while the revenue for the previous year is adjusted by the CPI. The average price is the total revenue divided by the pounds sold for each species where pounds sold is equal to or less than the total catch for each species.

Table 2. Hawaii commercial pelagic landings, revenue, and average price by fishery, 2005-2006.

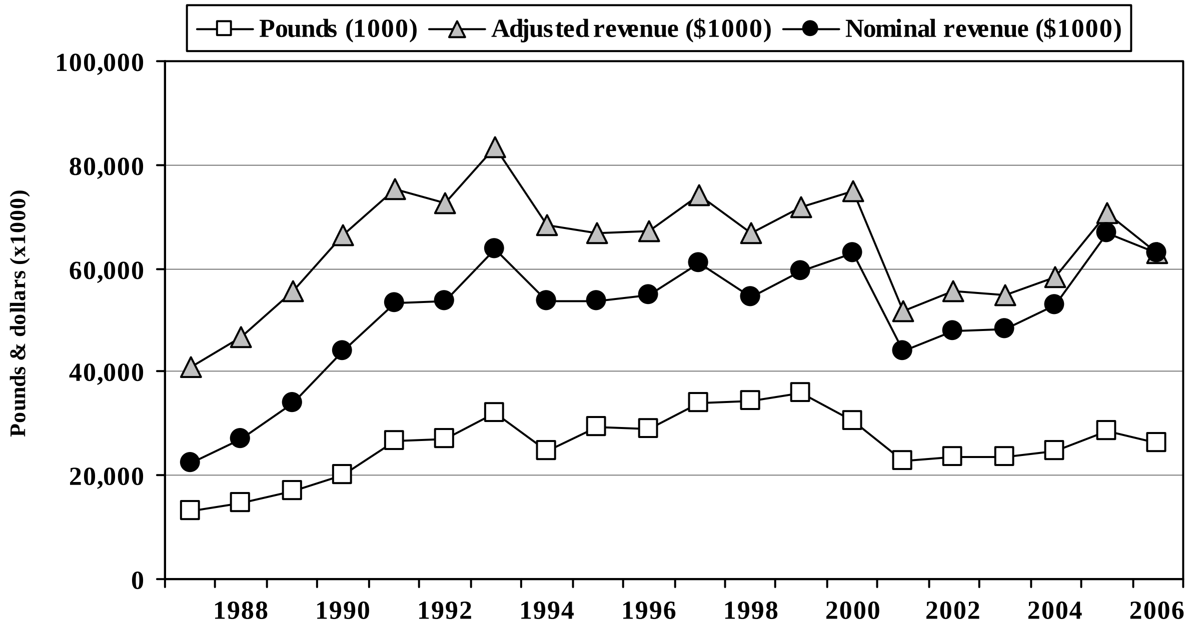
	2005			2006		
Fishery	**Pounds landed (x 1000)**	**Ex-vessel revenue ($1000)**	**Average price ($/lb)**	**Pounds landed (x 1000)**	**Ex-vessel revenue ($1000)**	**Average price ($/lb)**
Longline	23,334	$61,387	$2.76	21,551	$54,414	$2.62
MHI trolling	2,563	$5,333	$2.39	2,482	$5,161	$2.40
MHI handline	1,204	$2,135	$1.88	670	$1,304	$2.08
Offshore handline	392	$475	$2.06	487	$696	$1.87
Aku boat	931	$1,137	$1.23	661	$880	$1.34
Other gear	183	$264	$2.10	287	$598	$2.21
Total	**28,607**	**$70,731**	**$2.63**	**26,138**	**$63,053**	**$2.53**

Interpretation: The longline fishery is the largest commercial fishery in Hawaii. Longline landings and revenue were 21.6 million pounds and $54.4 million, respectively, in 2006. Landings decreased by 1.8 million pounds while revenue decreased by $7 million. The average price for the longline fishery was slightly lower in 2006. The MHI troll fishery is the second largest commercial fishery. It produced 2.5 million pounds worth $5.2 million in 2006. Landings and revenue decreased slightly from 2005. The MHI handline fishery produced 670,000 pounds of pelagic landings worth $1.3 million while the offshore handline fishery total landings were 487,000 pounds worth $696,000 in 2006. Aku boat fishery landings and revenue decreased by 661,000 pounds and $880,000, respectively, in 2006.

Source and Calculations: NMFS longline logbook and HDAR Commercial Marine Dealer data were used to produce longline catch, revenue, and average price estimates. The MHI troll, MHI handline, offshore handline, and other gear catch, revenue, and average price estimates were produced from HDAR Commercial Fish Catch and Marine Dealer data.

The catch and revenue for each fishery for each year is the sum of the catch and revenue for each of the species in that fishery for that year. The revenue for the current year is an unadjusted value while the revenue for the previous year is adjusted by the CPI. The average price is the total revenue divided by the pounds sold for each fishery where pounds sold is equal to or less than the total catch for each fishery.

Figure 1. Hawaii total commercial landings and revenue, 1987-2006.

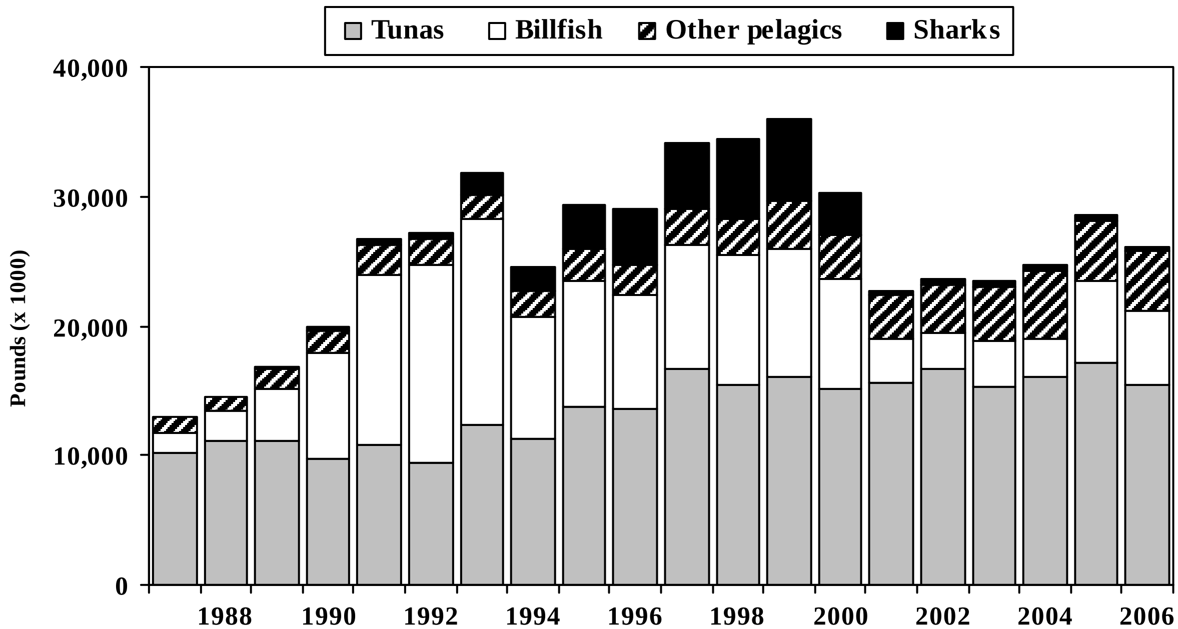


Interpretation: Commercial landings and revenue in 2006 were close to their respective long-term averages. The landings decreased by 2.5 million pounds while revenue decreased by $7.7 million in 2006. Gear and species specific changes over the 20-year period are explained in greater detail in the following figures and tables.

Source and Calculations: The pounds and nominal revenue values are obtained by adding the landings and revenue values for all species and all fisheries for each year. The adjusted revenue for each year is calculated by multiplying the nominal value by the Honolulu CPI for the current year and then dividing by the Honolulu CPI for that year.

Year	Pounds (1000)	Nominal revenue ($1000)	Adjusted revenue ($1000)	Honolulu CPI
1987	13,024	$22,493	$40,992	114.9
1988	14,566	$27,090	$46,612	121.7
1989	16,837	$34,166	$55,589	128.7
1990	20,249	$43,850	$66,489	138.1
1991	26,535	$53,170	$75,228	148.0
1992	27,167	$53,810	$72,649	155.1
1993	31,931	$63,680	$83,289	160.1
1994	24,565	$53,610	$68,243	164.5
1995	29,430	$53,720	$66,918	168.1
1996	29,149	$54,710	$67,113	170.7
1997	34,150	$60,840	$74,112	171.9
1998	34,447	$54,628	$66,700	171.5
1999	35,975	$59,320	$71,677	173.3
2000	30,342	$63,020	$74,852	176.3
2001	22,782	$43,939	$51,574	178.4
2002	23,611	$48,035	$55,788	180.3
2003	23,459	$48,308	$54,828	184.5
2004	24,705	$52,950	$58,173	190.6
2005	28,607	$66,813	$70,731	197.8
2006	26,138	$63,053	$63,053	209.4
Average	**25,883.5**	**$51,060.3**	**$64,230.6**	
SD	**6,339.3**	**$11,940.3**	**$10,733.9**	

Figure 2. Hawaii commercial tuna, billfish, shark, and other pelagic PMUS landings, 1987-2006.



<u>Interpretation:</u> Hawaii pelagic landings decreased by in 2005 was primarily attributed to billfish landings, which more than doubled relative to 2004. There was a small increase in tuna landings, but this was counterbalanced by decreases in landings of other pelagics and sharks. As shown previously, the increase in billfish landings was primarily attributable to swordfish from the shallow-set longline fishery. The increases in marlin landings were much smaller than that of swordfish.

<u>Source and Calculations:</u> The landings totals were obtained by adding the landings of individual species in their corresponding pelagic species groups. The groups were defined below.

Tunas: Albacore, Bigeye tuna, Bluefin tuna, Kawakawa, Skipjack tuna, Unclassified tuna, Yellowfin tuna

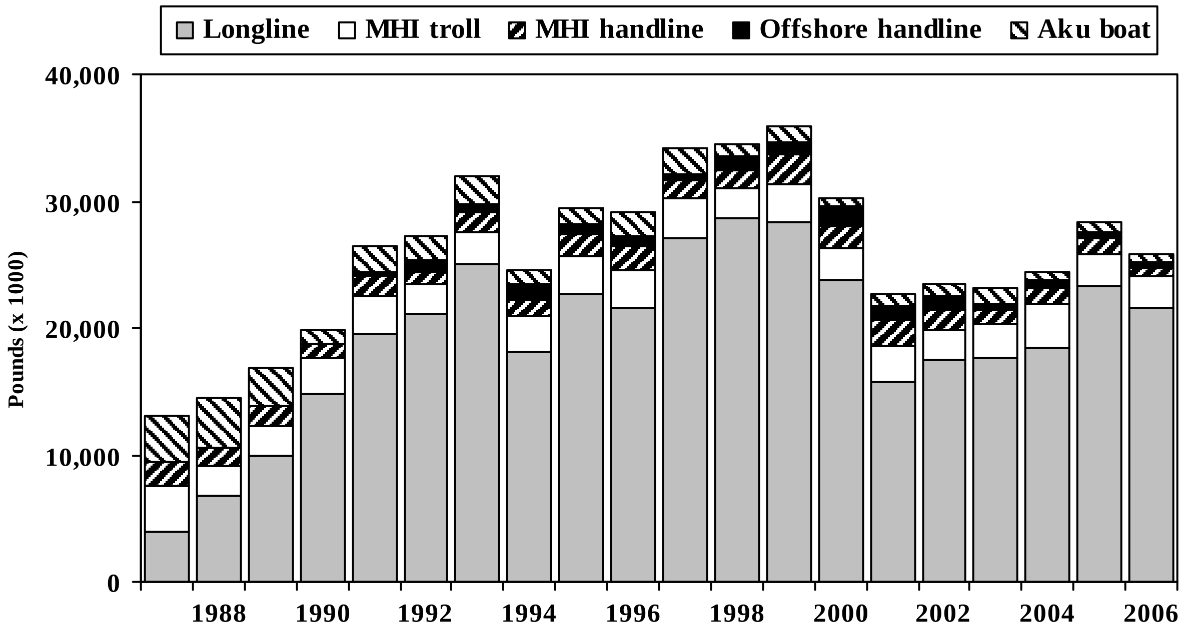
Billfishes: Blue marlin, Black marlin, Sailfish, Spearfish, Striped marlin, Swordfish Unclassified billfish

Other pelagics: Barracuda, Beltfish, Flying fish, Frigate mackeral, Mahimahi, Moonfish Oilfish, Pomfret, Stingrays, Sunfish, Wahoo

Sharks: Blue sharks, Hammerhead sharks, Mako sharks, Thresher sharks, Tiger sharks, Unclassified sharks, Oceanic white-tip sharks

	Hawaii pelagic landings (1000 pounds)				
Year	**Tunas**	**Billfish**	**Other pelagics**	**Sharks**	**Total**
1987	10,130	1,558	1,294	43	13,024
1988	11,173	2,301	978	94	14,566
1989	11,196	3,880	1,533	203	16,837
1990	9,697	8,278	1,655	222	20,197
1991	10,771	13,129	2,423	318	26,535
1992	9,352	15,355	2,026	410	27,167
1993	12,308	15,928	1,850	1,736	31,931
1994	11,232	9,526	1,977	1,757	24,565
1995	13,749	9,723	2,426	3,468	29,430
1996	13,627	8,796	2,349	4,327	29,149
1997	16,751	9,492	2,850	5,010	34,150
1998	15,507	9,923	2,782	6,212	34,447
1999	16,113	9,758	3,828	6,273	35,975
2000	15,141	8,546	3,347	3,267	30,342
2001	15,541	3,482	3,412	336	22,782
2002	16,743	2,738	3,738	366	23,611
2003	15,314	3,477	4,271	356	23,459
2004	16,040	3,013	5,165	418	24,705
2005	17,132	6,397	4,607	393	28,607
2006	15,503	5,683	4,594	337	26,138
Average	**13,651.0**	**7,549.1**	**2,855.3**	**1,777.3**	**25,880.8**
SD	**2,647.1**	**4,272.5**	**1,213.1**	**2,159.1**	**6,341.9**

Figure 3. Total commercial pelagic landings by gear type 1987-2006.

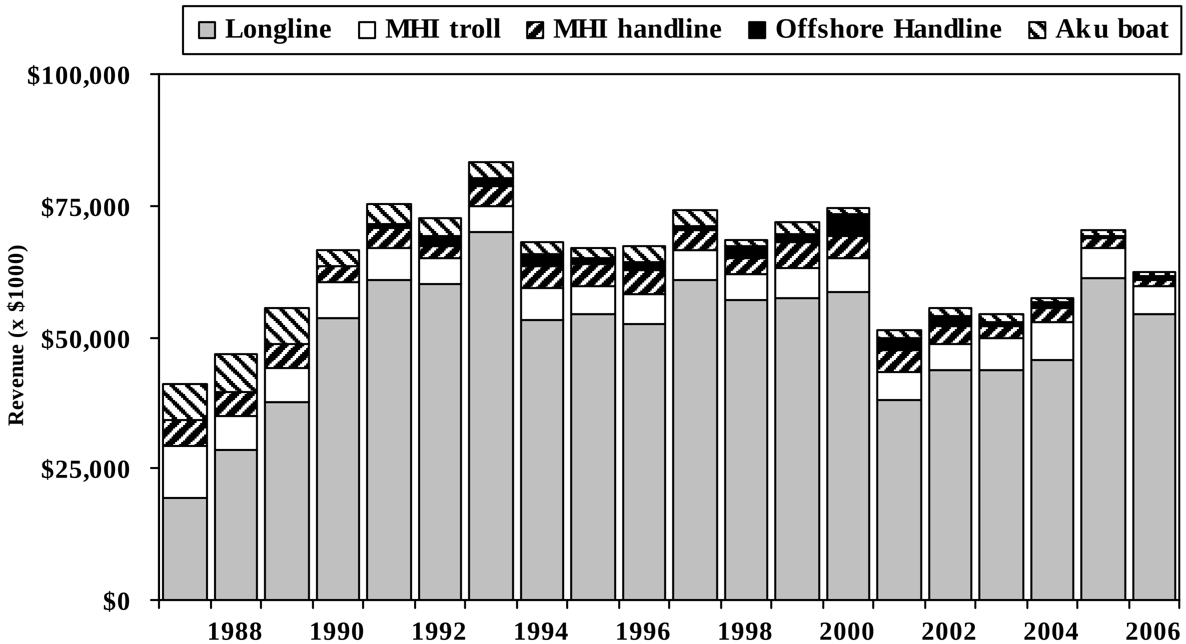


Interpretation: Hawaii commercial pelagic landings in 2006 were dominated by longline landings. Total landings decreased largely due to lower landings by the longline fishery whose landings decreased 9% in 2006. MHI troll and MHI handline fisheries are the next two largest fisheries in Hawaii. MHI troll landings have remained relatively constant since 1987 while MHI handline landings fluctuated. The offshore handline fishery grew in the early 1990s with landings leveling off from 2003. In contrast, aku boat landings have declined from the late 1980s due to attrition of an aging fleet.

	Hawaii pelagic total landings (1000 pounds)					
Year	Longline	MHI troll	MHI handline	Offshore handline	Aku boat	Total
1987	3,891	3,709	1,914	-	3,503	13,024
1988	6,710	2,445	1,470	-	3,940	14,566
1989	9,942	2,401	1,487	-	2,962	16,837
1990	14,738	2,901	1,060	66	1,116	20,249
1991	19,478	3,102	1,477	331	2,146	26,535
1992	21,105	2,395	946	987	1,735	27,167
1993	25,005	2,578	1,532	679	2,137	31,931
1994	18,134	2,810	1,287	1,175	1,159	24,565
1995	22,723	2,966	1,733	714	1,291	29,430
1996	21,553	2,994	1,962	793	1,844	29,149
1997	27,145	3,016	1,479	563	1,947	34,150
1998	28,629	2,470	1,368	1,134	845	34,447
1999	28,348	3,014	2,413	888	1,312	35,975
2000	23,818	2,559	1,728	1,482	708	30,342
2001	15,804	2,738	2,072	1,087	994	22,782
2002	17,405	2,388	1,702	1,059	932	23,611
2003	17,647	2,692	1,091	399	1,375	23,459
2004	18,483	3,353	1,386	485	656	24,705
2005	23,334	2,561	1,202	392	931	28,607
2006	21,552	2,482	668	487	661	26,138
Average	**19,272.2**	**2,778.7**	**1,498.9**	**636.1**	**1,609.7**	**25,883.5**
SD	**6,687.4**	**354.8**	**411.8**	**438.5**	**940.1**	**6,339.3**

Source and Calculations: The landings values are obtained by adding the landings values of all species of each fishery for each year. The total column is greater than the sum of the other five fisheries as it includes contributions from the "Other Gear" fishery.

Figure 4. Total commercial pelagic ex-vessel revenue by gear type 1987-2006.

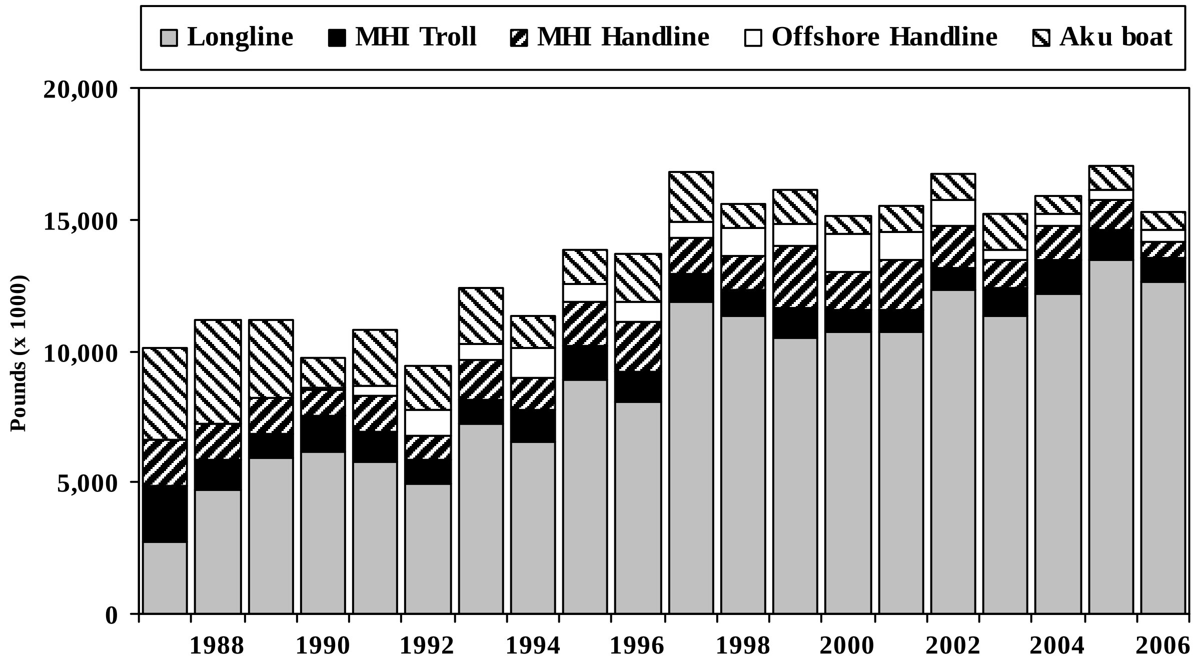


Interpretation: Ex-vessel revenue from Hawaii's pelagic fisheries decreased 10% in 2006 due lower revenue by the longline fishery. The MHI troll and MHI handline fisheries were ranked as the next two fisheries with the highest revenue. The offshore handline fishery grew in the early 1990s with revenue dropping below $1 million from 2003. Revenue from the aku boat fishery declined from the late 1980s due fleet attrition and lower landings.

Source and Calculations: The ex-vessel revenue values were obtained by adding the revenue for all species of each fishery for each year. Ex-vessel revenue was then adjusted for inflation using the Honolulu Consumer Price Index (CPI). The total column is greater than the sum of the the other five fisheries as it includes contributions from the "Other Gear" fishery.

	Hawaii pelagic total revenue ($1000)					
Year	**Longline**	**MHI troll**	**MHI handline**	**Offshore Handline**	**Aku boat**	**Total**
1987	$19,300	$10,089	$4,749	-	$6,840	$40,992
1988	$28,400	$6,667	$4,567	-	$6,990	$46,624
1989	$37,700	$6,344	$4,754	-	$6,750	$55,590
1990	$53,500	$6,814	$3,160	$147	$2,840	$66,490
1991	$60,700	$6,363	$3,582	$754	$3,830	$75,229
1992	$59,900	$5,079	$2,368	$1,994	$3,260	$72,649
1993	$69,800	$4,991	$3,824	$1,471	$3,160	$83,290
1994	$53,200	$6,234	$3,991	$2,478	$2,340	$68,243
1995	$54,300	$5,569	$3,910	$1,201	$1,930	$66,919
1996	$52,400	$5,704	$4,501	$1,597	$2,930	$67,132
1997	$61,000	$5,466	$3,708	$988	$2,920	$74,113
1998	$56,900	$4,897	$3,369	$2,071	$1,350	$68,700
1999	$57,300	$5,661	$5,197	$1,518	$2,020	$71,696
2000	$58,400	$6,505	$4,427	$3,985	$1,390	$74,852
2001	$38,100	$5,382	$4,123	$2,052	$1,640	$51,575
2002	$43,600	$5,219	$3,387	$1,913	$1,460	$55,788
2003	$43,800	$5,896	$2,389	$653	$1,510	$54,828
2004	$45,500	$7,433	$2,727	$945	$950	$58,173
2005	$61,400	$5,333	$2,135	$475	$1,140	$70,731
2006	$54,400	$5,161	$1,304	$696	$880	$63,053
Average	**$50,480.0**	**$6,040.5**	**$3,608.6**	**$1,246.9**	**$2,806.5**	**$64,333.3**
SD	**$12,333.2**	**$1,176.9**	**$1,017.5**	**$1,003.1**	**$1,936.5**	**$10,767.3**

Figure 5. Hawaii commercial tuna landings by gear type, 1987-2006.



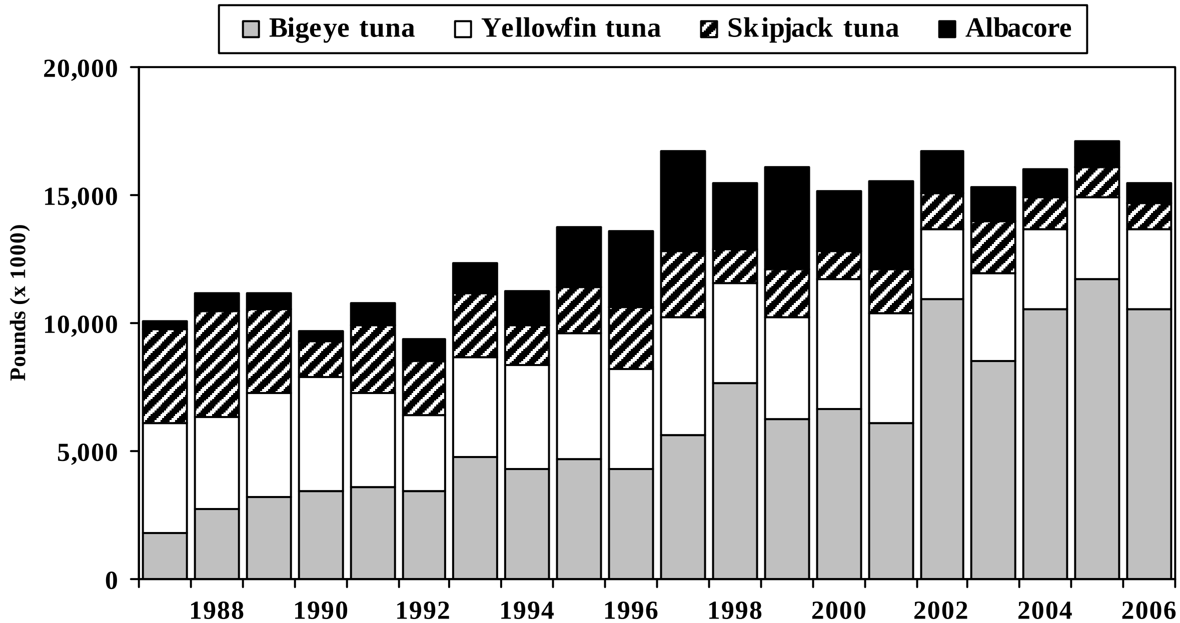
Interpretation: Longline gear was the largest single contributor to Hawaii commercial tuna landings since 1988 and reached a record level in 2005. Tuna landings by the MHI troll fishery were highest in 1987, dropped the following year, and remained around its long-term average thereafter. Landings by the MHI handline fishery was at a record low in 2006. Offshore handline tuna landings was up slightly in 2006 but well below its long-term average. The aku boat fishery was on a declining trend with landings below 1 million pounds in 6 of the past 7 years.

Hawaii tuna landings by gear type (1000 pounds)

Year	Longline	MHI Troll	MHI Handline	Offshore Handline	Aku boat	Total
1987	2,705	2,136	1,782	--	3,501	10,130
1988	4,725	1,141	1,395	--	3,936	11,197
1989	5,921	904	1,393	--	2,961	11,223
1990	6,162	1,401	981	66	1,116	9,726
1991	5,797	1,145	1,380	326	2,146	10,794
1992	4,908	980	885	966	1,721	9,461
1993	7,205	964	1,458	656	2,134	12,417
1994	6,540	1,240	1,213	1,157	1,158	11,309
1995	8,898	1,295	1,642	694	1,291	13,820
1996	8,074	1,146	1,845	776	1,844	13,685
1997	11,826	1,107	1,384	554	1,942	16,813
1998	11,359	933	1,298	1,121	845	15,556
1999	10,529	1,135	2,302	867	1,312	16,145
2000	10,694	878	1,444	1,403	707	15,160
2001	10,729	801	1,940	1,039	993	15,556
2002	12,349	804	1,598	1,011	932	16,771
2003	11,329	1,081	1,016	380	1,374	15,363
2004	12,179	1,304	1,267	461	654	16,108
2005	13,458	1,121	1,127	384	931	17,132
2006	12,628	926	613	469	661	15,503
Average	**8,900.8**	**1,122.1**	**1,398.1**	**725.3**	**1,608.0**	**13,693.5**
SD	**3,194.7**	**291.8**	**390.6**	**359.1**	**939.3**	**2,640.2**

Source and Calculations: Tuna landings by gear types were summarized for the longline, MHI troll, MHI handline, offshore handline, aku boat fisheries, and other gear. The tuna catch statistics for the longline fishery were derived from NMFS longline logbook, Joint NMFS and HDAR Market Sample, and HDAR Commercial Marine Dealer data. The HDAR Commercial Fish Catch and Marine Dealer data were used to calculate landings for other gear types.

Figure 6. Species composition of the tuna landings, 1987-2006.

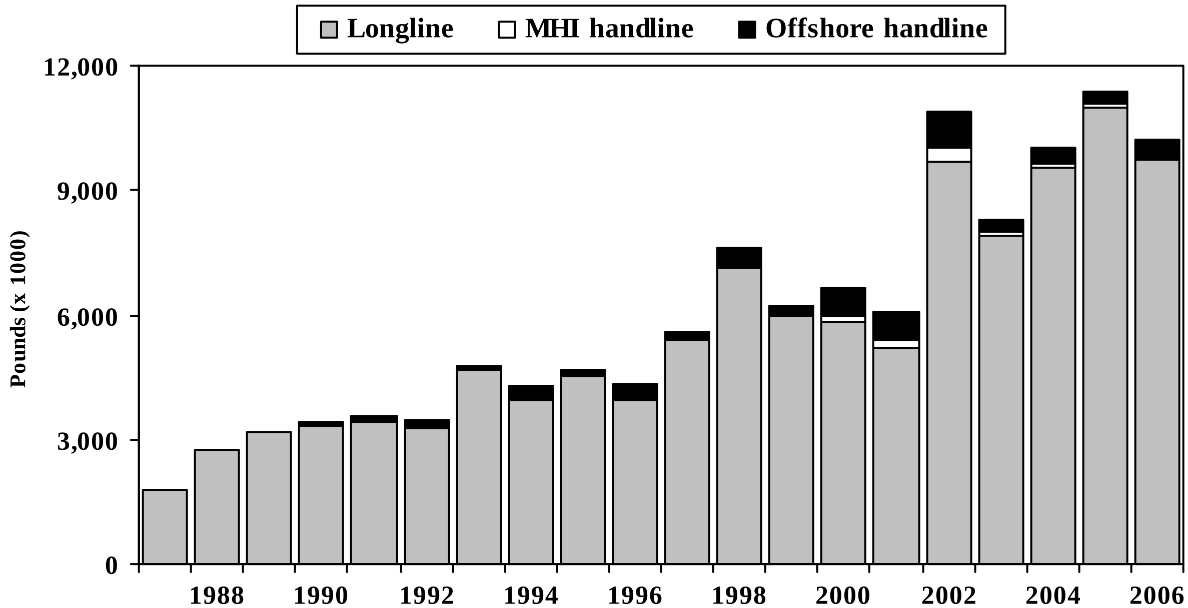


Interpretation: Bigeye tuna was the largest component of the tuna landings and reached a record level in 2005 and decreased 1.1 million pounds in 2006. Yellowfin tuna was the second largest component of the tuna landings. Yellowfin tuna landings were below its long-term average for the past 5 years. Skipjack tuna landings were near its lowest levels in 2004 and 2005. Albacore landings grew rapidly peaking in 1999 and declined thereafter.

Source and Calculations: The tuna landing statistics were derived from NMFS longline logbook, Joint NMFS and HDAR Market Sample, HDAR Commercial Fish Catch, and Marine Dealer data. The tuna landings were composed of albacore, bigeye tuna, bluefin tuna, kawakawa, skipjack tuna, and yellowfin tuna.

	Hawaii tuna landings (1000 pounds)				
Year	**Bigeye tuna**	**Yellowfin tuna**	**Skipjack tuna**	**Albacore**	**Total**
1987	1,813	4,316	3,633	344	10,130
1988	2,770	3,551	4,156	695	11,173
1989	3,208	4,064	3,298	626	11,196
1990	3,425	4,460	1,389	422	9,697
1991	3,573	3,661	2,691	846	10,771
1992	3,456	2,943	2,099	854	9,352
1993	4,768	3,872	2,546	1,122	12,308
1994	4,280	4,106	1,553	1,293	11,232
1995	4,667	4,940	1,814	2,328	13,749
1996	4,330	3,851	2,426	3,020	13,627
1997	5,595	4,628	2,608	3,920	16,751
1998	7,641	3,896	1,326	2,645	15,507
1999	6,212	4,012	1,909	3,979	16,113
2000	6,642	5,038	1,127	2,334	15,141
2001	6,113	4,315	1,694	3,419	15,541
2002	10,971	2,663	1,441	1,668	16,743
2003	8,506	3,472	1,988	1,348	15,314
2004	10,556	3,151	1,179	1,154	16,040
2005	11,681	3,216	1,183	1,050	17,132
2006	10,520	3,118	1,081	783	15,503
Average	**6,036.3**	**3,863.7**	**2,057.1**	**1,692.4**	**13,651.0**
SD	**3,004.8**	**651.8**	**879.5**	**1,164.8**	**2,647.1**

Figure 7. Hawaii bigeye tuna landings, 1987-2006.

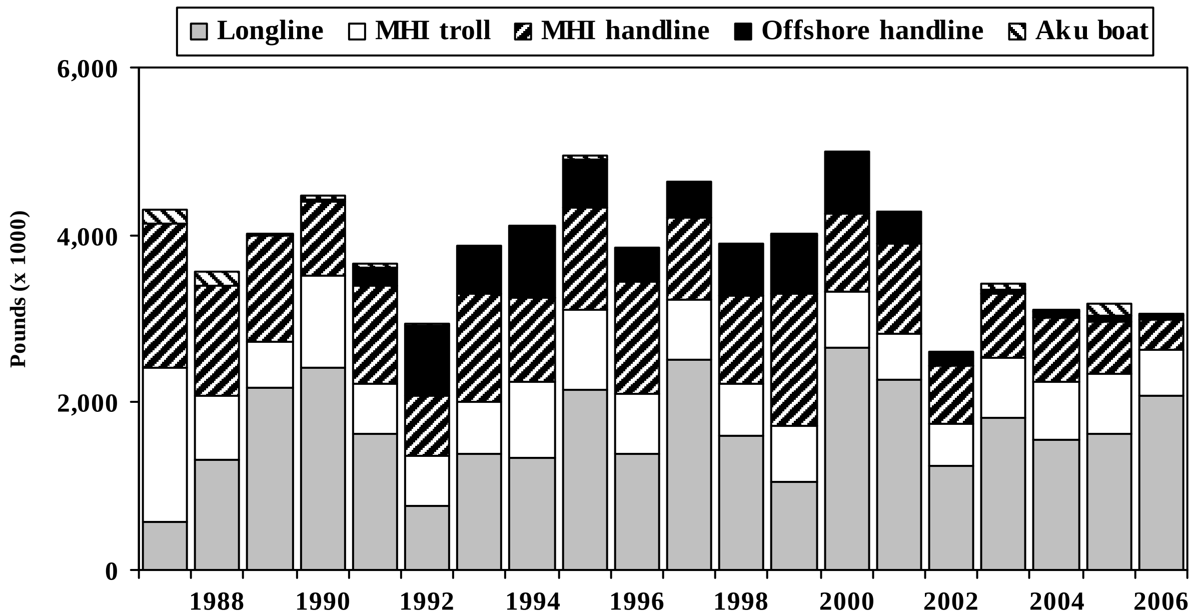


Interpretation: Annual bigeye tuna landings have increased more than six-fold over the 19 year period with a record 11.7 million pounds in 2005 declining 1.2 million pounds in 2006. The longline fishery typically produces over 90% of the bigeye tuna. Bigeye landings by this fishery reached a record 11.0 million pounds in 2005. The offshore handline fishery was the second largest producer of bigeye tuna in Hawaii accounting for 4% of the total in 2006. Combined MHI troll and MHI handline landings of bigeye tuna yielded 2% of the total.

Source and Calculations: Bigeye tuna catch statistics were derived from NMFS longline logbook, Joint NMFS and HDAR Market Sample, HDAR Commercial Fish Catch, and Marine Dealer data. The gear types summarized for catches of bigeye tuna included the longline, MHI troll, MHI handline, and offshore handline fisheries. The total column also contains small bigeye tuna catches by the aku boat fishery and other gear category.

	Hawaii bigeye tuna landings (1000 pounds)				
Year	**Longline**	**MHI troll**	**MHI handline**	**Offshore handline**	**Total**
1987	1,796	11	6	-	1,813
1988	2,732	10	28	-	2,770
1989	3,178	11	19	-	3,208
1990	3,338	15	41	31	3,425
1991	3,423	11	45	94	3,573
1992	3,277	9	19	151	3,456
1993	4,677	4	2	85	4,768
1994	3,940	6	10	324	4,280
1995	4,522	10	33	102	4,667
1996	3,940	4	11	375	4,330
1997	5,399	6	52	138	5,595
1998	7,113	5	15	508	7,641
1999	5,995	7	46	164	6,212
2000	5,830	15	141	656	6,642
2001	5,190	23	222	655	6,113
2002	9,679	86	354	851	10,971
2003	7,916	81	74	314	8,506
2004	9,532	328	125	385	10,556
2005	10,975	187	100	315	11,681
2006	9,754	149	46	414	10,520
Average	**5,610.3**	**48.9**	**69.4**	**327.1**	**6,036.3**
SD	**2,691.6**	**83.6**	**86.7**	**234.7**	**3,004.8**

Figure 8. Hawaii yellowfin tuna landings, 1987-2006.

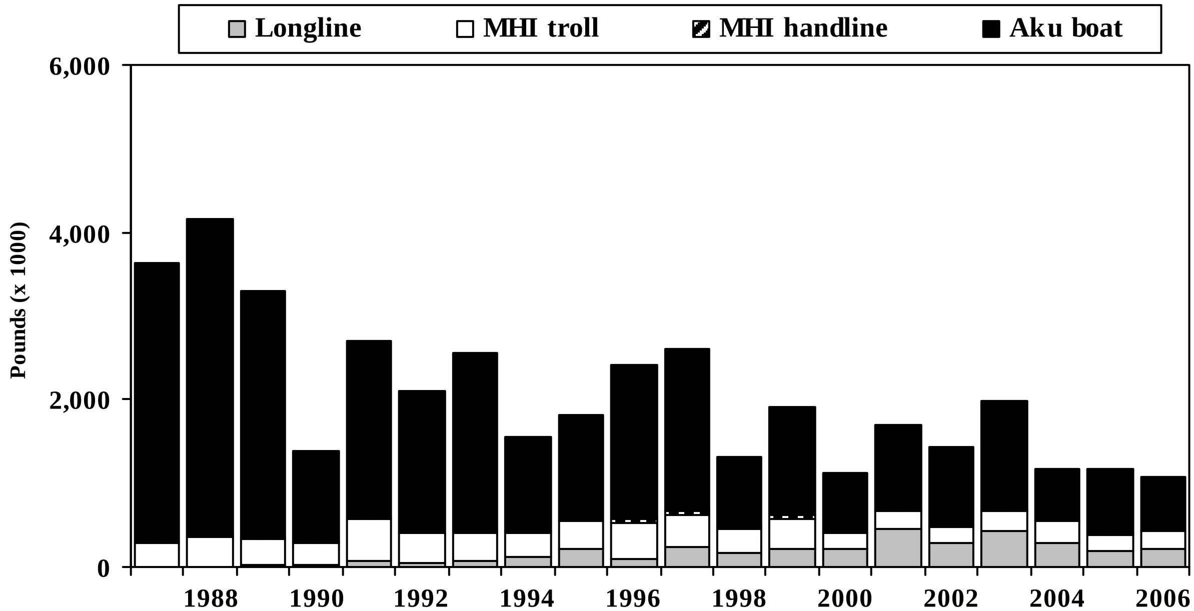


Interpretation: Annual landings of yellowfin tuna were low during the past five years. The longline fishery typically had the highest yellowfin tuna landings. The MHI troll fishery was the second largest producer of yellowfin tuna in the past two years followed by MHI handline and offshore handline fisheries, respectively. The aku boat fishery had small landings of yellowfin tuna. This species is usually caught by the aku boat fishery when landings of skipjack tuna are poor.

	Hawaii yellowfin tuna landings (1000 pounds)					
Year	**Longline**	**MHI troll**	**MHI handline**	**Offshore handline**	**Aku boat**	**Total**
1987	575	1,828	1,734	-	173	4,316
1988	1,309	764	1,310	-	168	3,551
1989	2,174	559	1,266	-	21	4,064
1990	2,421	1,089	876	35	39	4,460
1991	1,617	615	1,154	232	44	3,661
1992	763	606	722	816	36	2,943
1993	1,392	616	1,283	571	10	3,872
1994	1,336	914	1,003	834	19	4,106
1995	2,159	949	1,207	591	34	4,940
1996	1,389	707	1,352	401	2	3,851
1997	2,515	712	986	415	0	4,628
1998	1,592	636	1,052	613	3	3,896
1999	1,042	687	1,559	703	21	4,012
2000	2,656	670	937	739	2	5,038
2001	2,278	545	1,082	379	4	4,315
2002	1,235	499	711	151	5	2,663
2003	1,815	727	746	53	72	3,472
2004	1,559	681	762	75	38	3,151
2005	1,620	715	631	67	149	3,216
2006	2,087	549	357	52	6	3,118
Average	**1,676.7**	**753.4**	**1,036.5**	**395.7**	**42.3**	**3,863.7**
SD	**577.4**	**291.6**	**334.2**	**291.6**	**55.4**	**651.8**

Source and Calculations: Yellowfin tuna catch statistics were derived from NMFS longline logbook, Joint NMFS and HDAR Market Sample, HDAR Commercial Fish Catch, and Marine Dealer data. The gear types summarized for catches of yellowfin tuna included the longline, MHI troll, MHI handline, offshore handline and aku boat fisheries. The total column also contains small catches of yellowfin tuna from the other gear category.

Figure 9. Hawaii skipjack tuna landings, 1987-2006.

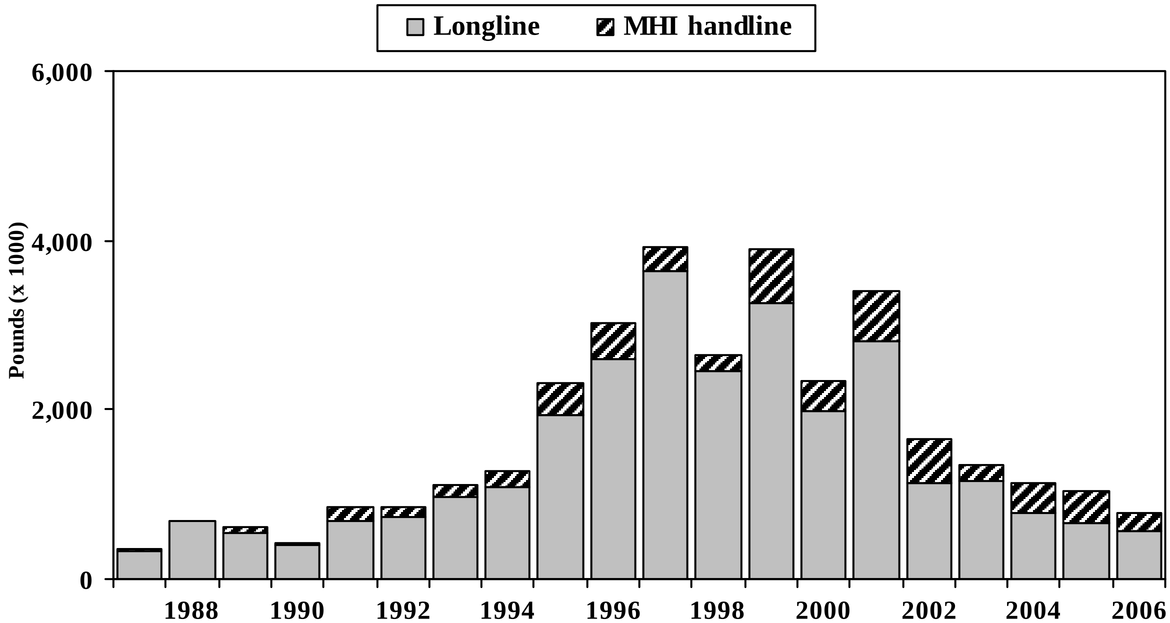


Interpretation: Skipjack tuna landings were on a declining trend with landings in 2006 47% below the long-term average. The decline in skipjack tuna landings was not apparent in all fisheries. Since the aku boat fishery accounted for most of the skipjack tuna landings, the main source of overall decline was this fishery. Skipjack tuna landings by the aku boat fishery were below the long-term average for the past 9 years. The longline and MHI troll fisheries were the next largest contributors to skipjack tuna landings.

Source and Calculations: Skipjack tuna catch statistics were derived from NMFS longline logbook, Joint NMFS and HDAR Market Sample, HDAR Commercial Fish Catch, and Marine Dealer data. The gear types summarized for catches of skipjack tuna included the longline, MHI troll, MHI handline, and aku boat fisheries. The total column also contains small catches of skipjack tuna from the other gear category.

	Hawaii skipjack tuna landings (1000 pounds)				
Year	Longline	MHI troll	MHI handline	Aku boat	Total
1987	3	277	25	3,328	3,633
1988	8	351	29	3,768	4,156
1989	22	318	20	2,938	3,298
1990	12	278	26	1,073	1,398
1991	66	504	19	2,102	2,691
1992	49	347	21	1,682	2,099
1993	79	332	14	2,121	2,546
1994	116	283	21	1,133	1,553
1995	223	318	17	1,256	1,814
1996	91	424	69	1,842	2,426
1997	234	376	56	1,942	2,608
1998	168	278	38	842	1,326
1999	219	347	52	1,291	1,909
2000	221	181	14	704	1,127
2001	456	215	30	988	1,694
2002	282	203	20	925	1,441
2003	437	237	16	1,292	1,988
2004	293	245	23	615	1,179
2005	197	188	18	779	1,183
2006	206	214	10	648	1,081
Average	**169.1**	**295.7**	**26.8**	**1,563.5**	**2,057.5**
SD	**133.5**	**82.8**	**15.6**	**909.6**	**879.1**

Figure 10. Hawaii albacore landings, 1987-2006.

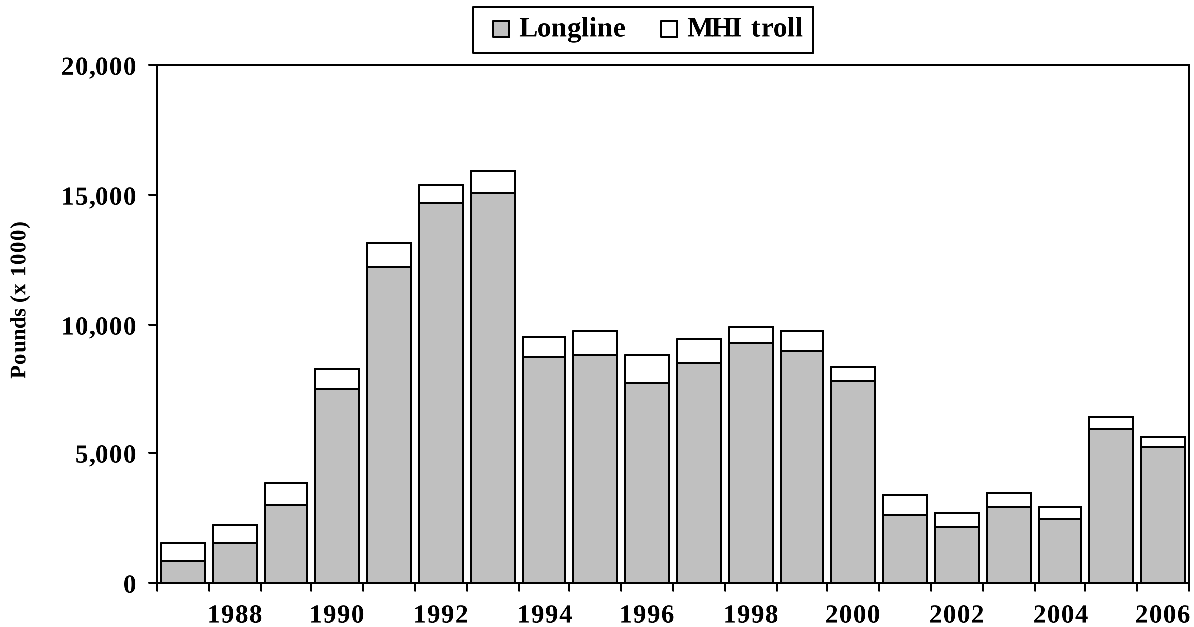


Interpretation: Albacore landings increased more than 11-fold from 1987 to 1999 and was on a declining trend thereafter. Albacore landings were 46% below the long-term average in 2006. The longline and MHI handline fisheries, account for almost all of the albacore landings and were responsible for the overall decline. Longline landings of albacore peaked in 1997 and declined thereafter. Albacore landings by the MHI handline fishery was relatively small but grew over the 20-year period peaking at 642,000 pounds in 1999. On rare occasions, the MHI troll fishery has encountered short "runs" of albacore but those landings were negligible in comparison.

Source and Calculations: Albacore catch statistics were derived from NMFS longline logbook, Joint NMFS and HDAR Market Sample, HDAR Commercial Fish Catch, and Marine Dealer Data. The gear types summarized for catches of albacore included the longline, MHI troll, and MHI handline fisheries.

	Hawaii albacore landings (1000 pounds)			
Year	**Longline**	**MHI troll**	**MHI handline**	**Total**
1987	331	1	12	344
1988	676	1	18	695
1989	547	1	78	626
1990	390	1	31	422
1991	687	2	157	846
1992	735	3	116	854
1993	965	3	154	1,122
1994	1,095	22	176	1,293
1995	1,938	10	380	2,328
1996	2,606	5	409	3,020
1997	3,626	7	287	3,920
1998	2,450	4	191	2,645
1999	3,250	87	642	3,979
2000	1,980	5	350	2,334
2001	2,803	13	602	3,419
2002	1,145	9	511	1,668
2003	1,160	10	176	1,348
2004	790	7	339	1,154
2005	663	15	372	1,050
2006	578	2	198	783
Average	**1,420.8**	**10.4**	**259.9**	**1,692.4**
SD	**1,022.9**	**18.9**	**186.6**	**1,164.8**

Figure 11. Hawaii commercial billfish landings by gear type, 1987-2006.

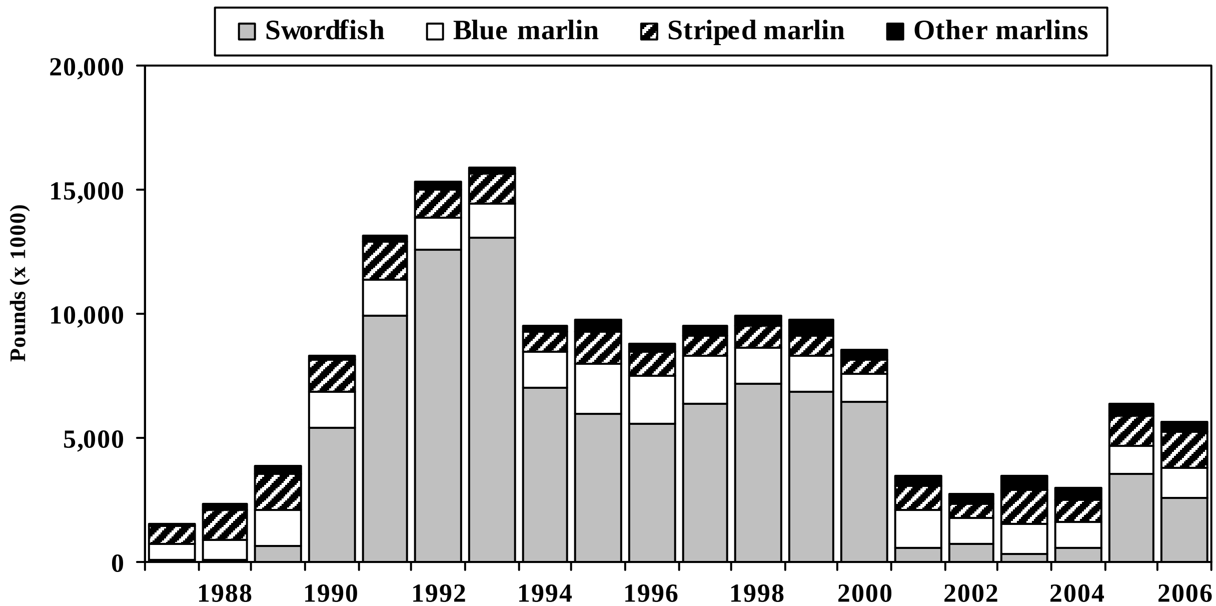


Interpretation: Two major factors affected billfish landings since 1987. The first was the growth of the longline fishery for swordfish in the early 1990s. The second was a series of management decisions that were intended to minimized longline interactions with sea turtles. These decisions strongly affected the amount of swordfish-targeted effort and the associated landings. In contrast, billfish landings by the MHI troll fishery and the MHI handline fishery were relatively small. Billfish landings by the MHI troll fishery were below the long-term average for the past 5 years.

Source and Calculations: The billfish catch statistics were derived from NMFS longline logbook, Joint NMFS and HDAR Market Sample, HDAR Commercial Fish Catch, and Marine Dealer data. Billfish landings were calculated for the longline, MHI troll, and MHI handline. The total column also contains small catches of billfish from the offshore handline and other gear category. The billfish group was composed of swordfish, blue marlin, striped marlin, spearfish, sailfish, black marlin, and unclassified billfish.

	Hawaii billfish landings (1000 lbs)			
Year	**Longline**	**MHI troll**	**MHI handline**	**Total**
1987	862	666	30	1,558
1988	1,537	736	28	2,301
1989	3,043	805	32	3,880
1990	7,519	732	27	8,278
1991	12,208	890	31	13,129
1992	14,656	683	16	15,355
1993	15,034	870	24	15,928
1994	8,737	770	19	9,526
1995	8,837	856	30	9,723
1996	7,723	1,042	31	8,796
1997	8,517	935	40	9,492
1998	9,277	626	20	9,923
1999	8,958	769	31	9,758
2000	7,815	507	213	8,546
2001	2,631	782	61	3,482
2002	2,162	536	33	2,738
2003	2,951	492	25	3,477
2004	2,471	475	23	3,013
2005	5,909	462	23	6,397
2006	5,268	396	12	5,683
Average	**6,805.8**	**701.5**	**37.4**	**7,549.1**
SD	**4,201.9**	**178.5**	**42.6**	**4,272.5**

Figure 12. Species composition of the billfish landings, 1987-2006.

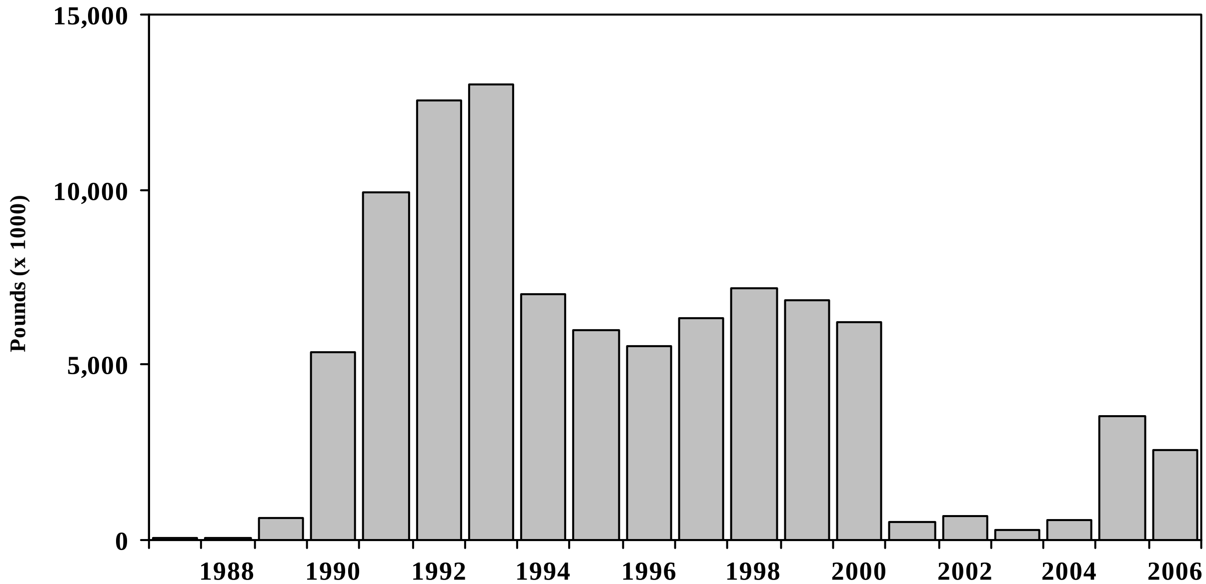


Interpretation: The billfish landings consisted mostly of marlins and small landings of swordfish from 1987 through 1989. However, in 1990 the billfish composition changed and total landings more than doubled as longline vessels began targeting swordfish. Swordfish landings continued to dominate billfish landings from 1990 through 2000 despite a 46% decrease in 1994. Swordfish landings dropped 92% in 2001 from regulatory actions and remained low through 2004. Swordfish reestablished itself as the dominant component of the billfish landings in 2005 and 2006 when targeting of swordfish was once again allowed under a new suite of regulations. Blue marlin composed 18% of the billfish landings with landings peaking in 1995-1997. Striped marlin landings peaked in 1991 and declined to a low in 2000 and recovered close to its long-term average in 2003-2006.

	Hawaii billfish landings (1000 lbs)				
Year	**Swordfish**	**Blue marlin**	**Striped marlin**	**Other marlins**	**Total**
1987	60	687	667	144	1,558
1988	65	812	1,230	194	2,301
1989	635	1,502	1,403	340	3,880
1990	5,383	1,484	1,246	164	8,278
1991	9,953	1,417	1,552	208	13,129
1992	12,569	1,339	1,098	349	15,355
1993	13,036	1,434	1,191	266	15,928
1994	7,010	1,454	796	267	9,526
1995	5,994	1,952	1,313	464	9,723
1996	5,529	1,931	1,044	292	8,796
1997	6,368	1,908	861	354	9,492
1998	7,208	1,403	891	421	9,923
1999	6,855	1,432	866	605	9,758
2000	6,414	1,146	548	438	8,546
2001	574	1,527	1,001	380	3,482
2002	711	1,051	616	361	2,738
2003	324	1,175	1,373	605	3,477
2004	598	988	937	490	3,013
2005	3,546	1,124	1,220	508	6,397
2006	2,599	1,200	1,466	417	5,683
Average	**4,771.6**	**1,348.3**	**1,065.9**	**363.3**	**7,549.1**
SD	**4,277.5**	**353.9**	**287.2**	**136.3**	**4,482.1**

Source and Calculations: The billfish catch statistics were derived from NMFS longline logbook, Joint NMFS and HDAR Market Sample, HDAR Commercial Fish Catch, and Marine Dealer data and was calculated for each species. The gear types summarized for each species was composed longline, MHI troll, MHI handline, offshore handline, aku boat, and other gear.

Figure 13. Hawaii swordfish landings, 1987-2006.

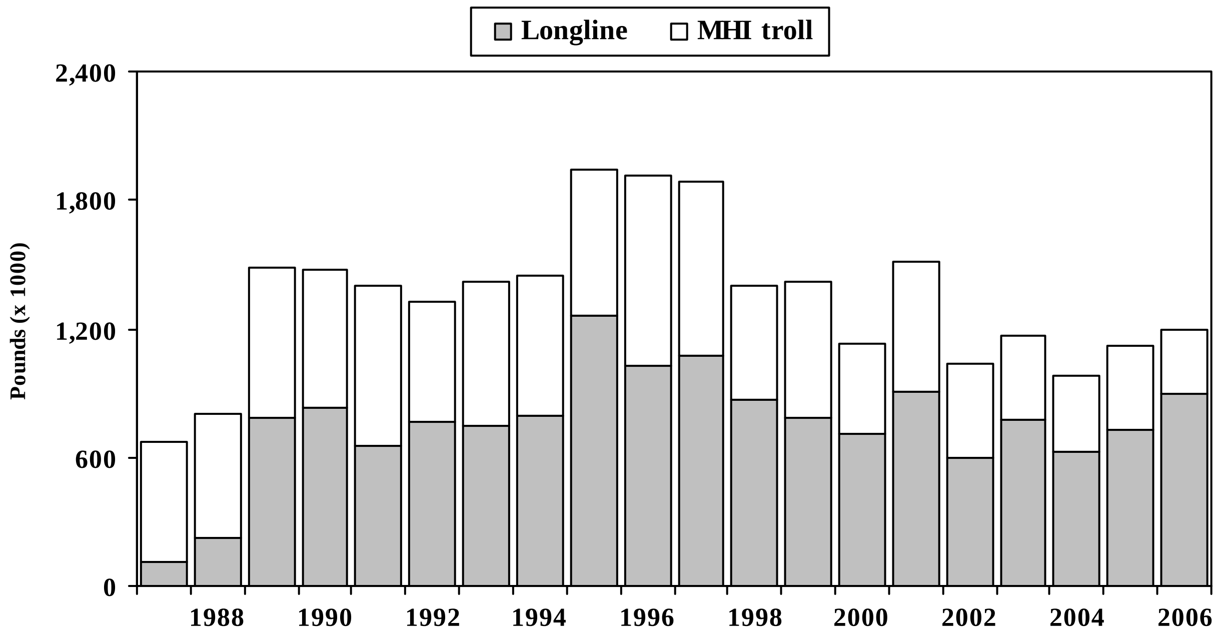


Interpretation: The trend in swordfish landings reflected both an increase in the number of vessels in the longline fishery and widespread targeting of swordfish by the fishery. Swordfish landings rose rapidly, peaking in 1993, and falling the following year. Landings remained relatively steady up to 2000 but dropped dramatically a result of increased regulations and prohibition on targeting swordfish by the longline fishery. Although the longline fishery for swordfish was reopened under a new set of regulations in April 2004, landings remained low. Swordfish landings increased in 2005 and 2006 as longline fishers became more proficient using techniques mandated under the new requirements. Swordfish landings by the MHI handline fishery were relatively low.

Source and Calculations: Swordfish catch statistics were derived from NMFS longline logbook, Joint NMFS and HDAR Market Sample, HDAR Commercial Fish Catch, and Marine Dealer data. The gear types summarized for catches of swordfish included the longline, MHI troll, and MHI handline fisheries. The total column also contains small swordfish catches by the other gear category.

	Swordfish landings (1000 lbs)			
Year	**Longline**	**MHI troll**	**MHI handline**	**Total**
1987	52	1	7	60
1988	52	2	11	65
1989	619	2	14	635
1990	5,372	1	10	5,383
1991	9,939	1	13	9,953
1992	12,566	0	3	12,569
1993	13,027	0	9	13,036
1994	7,002	1	7	7,010
1995	5,981	1	12	5,994
1996	5,517	1	11	5,529
1997	6,352	1	15	6,368
1998	7,193	1	14	7,208
1999	6,835	1	19	6,855
2000	6,202	6	205	6,414
2001	519	6	49	574
2002	681	3	27	711
2003	300	2	19	324
2004	549	0	16	598
2005	3,527	1	17	3,546
2006	2,590	1	8	2,599
Average	**4,743.8**	**1.6**	**24.4**	**4,771.6**
SD	**4,093.3**	**1.6**	**43.6**	**4,090.5**

Figure 14. Hawaii blue marlin landings, 1987-2006.



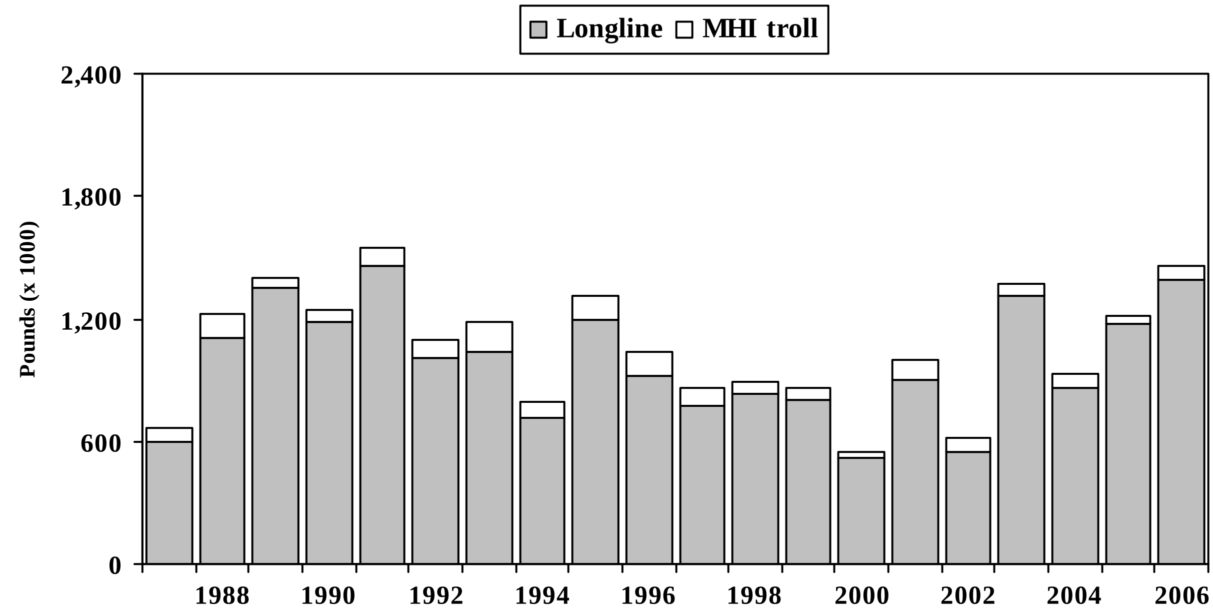
Interpretation: The two fisheries that landed the most blue marlin were the longline and MHI troll fisheries. Blue marlin landings by the longline fishery was below the long-term average for four of the past five years while blue marlin landings by the MHI troll fishery during the past five years.

Source and Calculations: Blue marlin catch statistics were derived from NMFS longline logbook, Joint NMFS and HDAR Market Sample, HDAR Commercial Fish Catch, and Marine Dealer data. The gear types summarized for catches of blue marlin included the longline, MHI troll, and MHI handline fisheries. The total column also contains small catches of blue marlin by the offshore handline fishery and other gear category.

Blue marlin catches by the longline fishery are nominal estimates that do not account for misidentification problems. The misidentification problems is currently being studied in a Pelagic Fisheries Research Program (PFRP) project (see PFRP newsletter 7(10), 1-4). The general pattern is blue marlin are overreported in longline logbooks. The reason is striped marlin is often misidentified as blue marlin. Thus, the nominal longline blue marlin estimates for are probably inflated.

	Blue marlin landings (1000 lbs)			
Year	**Longline**	**MHI troll**	**MHI handline**	**Total**
1987	112	557	18	687
1988	225	575	12	812
1989	784	704	14	1,502
1990	834	638	12	1,484
1991	654	749	14	1,417
1992	765	565	9	1,339
1993	748	675	11	1,434
1994	798	648	8	1,454
1995	1,257	684	11	1,952
1996	1,030	885	16	1,931
1997	1,074	814	20	1,908
1998	870	527	6	1,403
1999	787	635	10	1,432
2000	711	422	5	1,146
2001	909	608	5	1,527
2002	593	446	6	1,051
2003	776	390	5	1,175
2004	623	355	5	988
2005	731	385	5	1,124
2006	897	296	3	1,200
Average	**758.9**	**578.0**	**9.7**	**1,348.3**
SD	**256.2**	**158.2**	**4.8**	**341.0**

Figure 15. Hawaii striped marlin landings, 1987-2006.



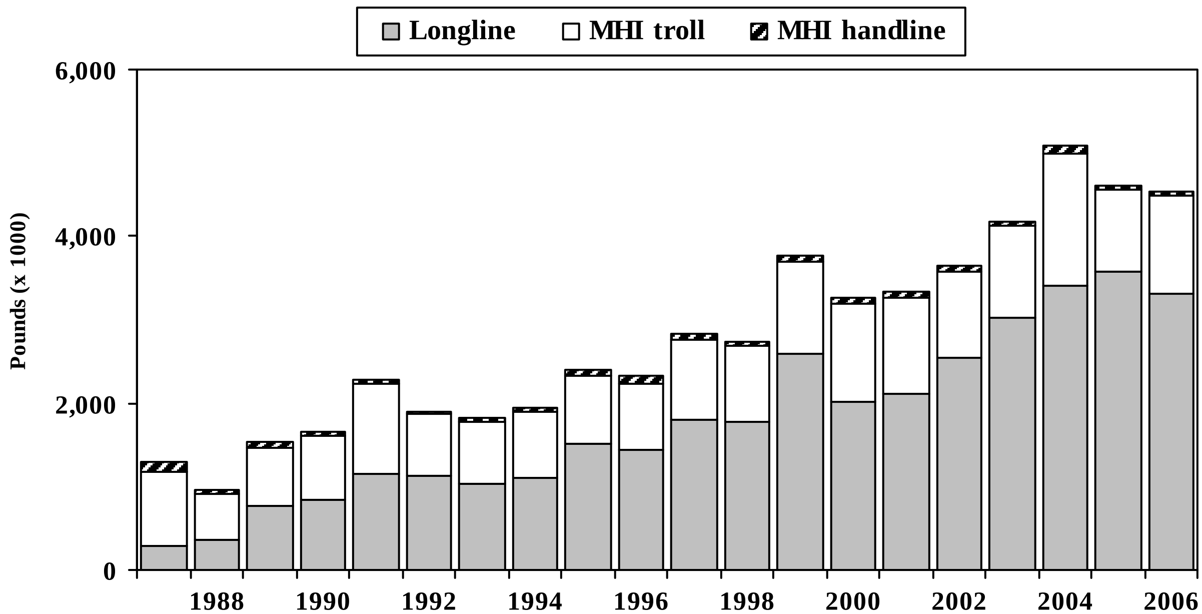
Interpretation: Striped marlin landings in 2006 exceeded the long-term average by 41%. Striped marlin was landed primarily by the longline fishery. The MHI troll fishery was the second largest producer of striped marlin in Hawaii. The MHI troll landings were close to the long-term average, but only contributed 5% to the total. There was substantial annual variation in landings of striped marlin by the MHI troll fishery.

Source and Calculations: Striped marlin catch statistics were derived from NMFS longline logbook, Joint NMFS and HDAR Market Sample, HDAR Commercial Fish Catch, and Marine Dealer data. The gear types summarized for catches of striped marlin included the longline, MHI troll, and MHI handline fisheries. The total column also contains small striped marlin catches by the offshore handline fishery and other gear category.

	Striped marlin landings (1000 lbs)			
Year	**Longline**	**MHI troll**	**MHI handline**	**Total**
1987	599	66	2	667
1988	1,110	118	2	1,230
1989	1,350	52	1	1,403
1990	1,186	59	1	1,246
1991	1,462	89	1	1,552
1992	1,013	83	2	1,098
1993	1,039	150	2	1,191
1994	719	76	1	796
1995	1,198	114	1	1,313
1996	923	119	2	1,044
1997	775	83	3	861
1998	834	57	0	891
1999	803	62	1	866
2000	517	30	1	548
2001	903	93	5	1,001
2002	550	65	1	616
2003	1,308	63	1	1,373
2004	858	74	2	937
2005	1,177	42	0	1,220
2006	1,393	71	0	1,466
Average	**985.9**	**78.3**	**1.4**	**1,065.9**
SD	**283.6**	**29.2**	**1.1**	**290.4**

Striped marlin catches by the longline fishery are nominal estimates which do not account for misidentification problems. The misidentification problems is currently being studied in a Pelagic Fisheries Research Program (PFRP) project (see PFRP newsletter 7(10), 1-4). The results of this study have shown that striped marlin underreported in longline logbooks because they are often misidentified as blue marlin. Thus, the nominal striped marlin landing estimates for the longline fishery are negatively biased. Thus, the longline landings presented in this report are a conservative estimate.

Figure 16. Hawaii commercial landings of other pelagic PMUS by gear type, 1987-2006.

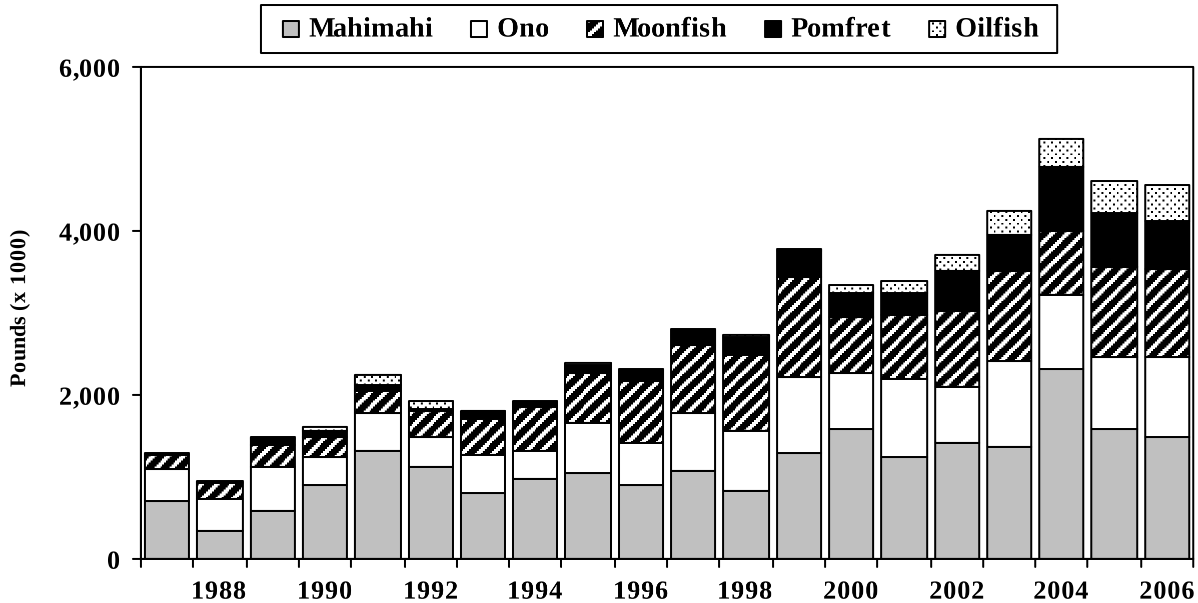


Interpretation: The landings of other pelagic PMUS were considerably greater than the long-term average. The increase was attributed primarily to the longline fishery given that the MHI troll and MHI handline landings were above or near their respective long-term averages in 2006. The other pelagic PMUS landings by the offshore handline fishery were low in 2006.

Source and Calculations: Other pelagic PMUS catch statistics were derived from NMFS longline logbook, Joint NMFS and HDAR Market Sample, HDAR Commercial Fish Catch, and Marine Dealer data and was calculated for each gear type. The other pelagic PMUS species include mahimahi, moonfish, oilfish, pomfret, and ono (wahoo).

	Landings of other PMUS by gear type (1000 lbs)					
Year	Longline	MHI troll	MHI handline	Offshore handline	Aku boat	Total
1987	281	907	102	-	2	1,292
1988	354	569	48	-	4	975
1989	775	691	62	-	1	1,529
1990	835	768	52	0	0	1,655
1991	1,155	1,067	66	5	0	2,293
1992	1,131	731	45	21	14	1,941
1993	1,030	744	50	23	3	1,850
1994	1,100	800	55	18	0	1,973
1995	1,520	815	61	20	0	2,416
1996	1,429	806	86	17	0	2,338
1997	1,792	974	55	9	5	2,835
1998	1,781	912	50	13	0	2,756
1999	2,589	1,109	81	20	0	3,799
2000	2,019	1,174	70	69	1	3,347
2001	2,115	1,155	72	41	0	3,412
2002	2,535	1,048	71	44	0	3,738
2003	3,015	1,119	50	18	1	4,271
2004	3,419	1,574	96	22	2	5,165
2005	3,578	978	52	8	0	4,616
2006	3,323	1,160	43	15	0	4,551
Average	**1,788.8**	**955.0**	**63.4**	**21.4**	**1.7**	**2,837.6**
SD	**1,011.2**	**229.9**	**17.1**	**16.6**	**3.2**	**1,216.6**

Figure 17. Species composition of other PMUS landings, 1987-2006.

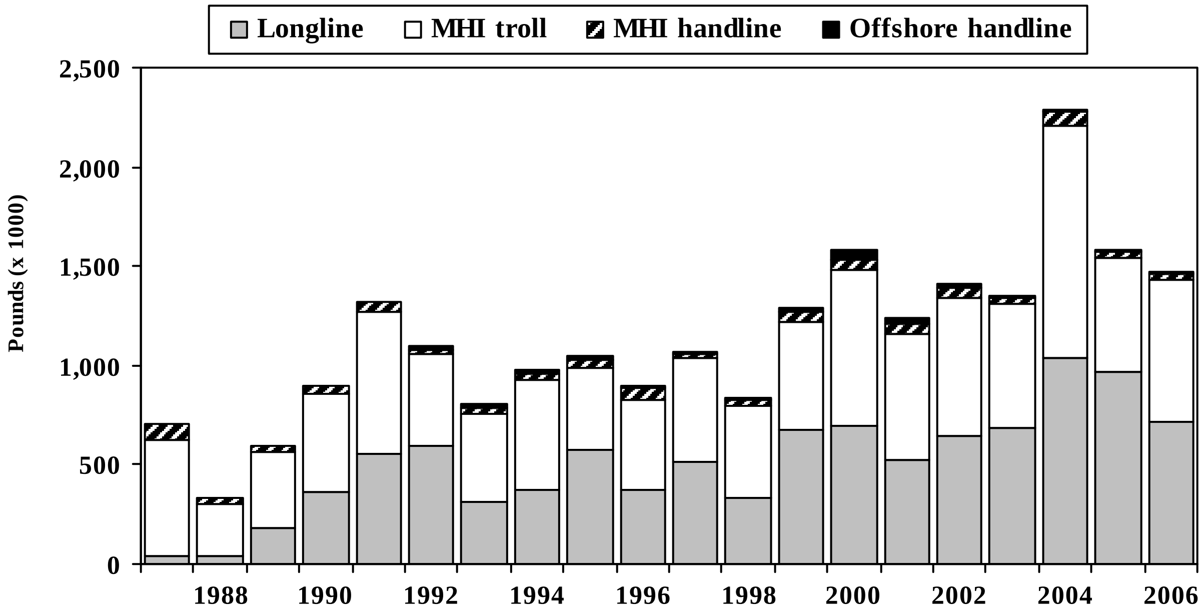


Interpretation: Mahimahi was the largest component of other pelagic landings. Mahimahi landings were above the long-term average for the past eight years. Ono landings increased at a gradual rate and consistently above its long-term average since 1997. Moonfish landings were above the long-term average for eleven years but pomfret, and oilfish landings increased at the highest rates during the 20-year period.

Source and Calculations: The other pelagic PMUS catch statistics were derived from NMFS longline logbook, Joint NMFS and HDAR Market Sample, HDAR Commercial Fish Catch, and Marine Dealer data and was calculated for each species. The gear types summarized for each species include catches from the longline, MHI troll, MHI handline, offshore handline, aku boat fisheries, and other gear category.

	Landings of other pelagic PMUS by species (1000 lbs)					
Year	Mahimahi	Ono	Moonfish	Pomfret	Oilfish	Total
1987	704	400	152	23	2	1,294
1988	332	406	182	18	3	978
1989	597	522	274	63	24	1,533
1990	894	353	253	66	52	1,655
1991	1,322	456	270	75	130	2,423
1992	1,112	365	320	37	85	2,026
1993	814	450	454	92	0	1,850
1994	974	351	524	85	4	1,977
1995	1,044	606	629	93	10	2,426
1996	899	514	760	121	11	2,349
1997	1,077	715	823	178	15	2,850
1998	839	725	922	225	26	2,782
1999	1,293	929	1,210	313	29	3,828
2000	1,587	683	691	277	93	3,347
2001	1,253	944	768	275	143	3,412
2002	1,420	687	910	492	202	3,738
2003	1,361	1,052	1,091	459	278	4,271
2004	2,308	917	781	768	344	5,165
2005	1,587	884	1,094	658	386	4,607
2006	1,479	984	1,084	587	417	4,594
Average	**1,144.8**	**647.2**	**659.6**	**245.3**	**112.7**	**2,855.3**
SD	**433.5**	**237.4**	**338.9**	**230.0**	**138.4**	**1,213.1**

Figure 18. Hawaii mahimahi landings, 1987-2006.

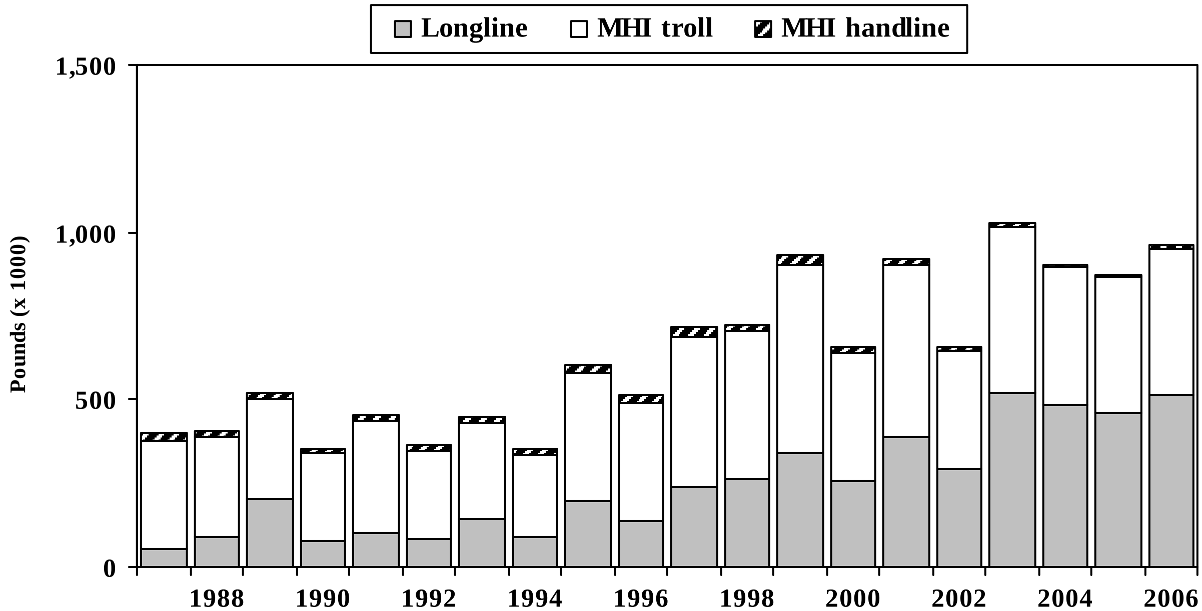


Interpretation: Mahimahi landings dropped in the past two years but landings were still higher than the long-term average. The highest landing for this species was in 2004 with records for both the longline and troll fisheries. Ninety-nine percent of mahimahi landings were attributable to the MHI troll and longline fisheries. Both the MHI troll and longline landings were above their respective long-term averages. The MHI handline, offshore handline, and aku boat landings of mahimahi in 2006 were very low and below their averages.

	Mahimahi landings (1000 lbs)					
Year	**Longline**	**MHI troll**	**MHI handline**	**Offshore handline**	**Aku boat**	**Total**
1987	45	579	78	-	2	704
1988	39	264	25	-	4	332
1989	183	379	34	-	1	597
1990	366	491	37	0	0	894
1991	555	718	44	5	0	1,322
1992	593	461	24	21	14	1,112
1993	316	444	27	23	3	814
1994	377	546	33	18	0	974
1995	570	419	35	20	0	1,044
1996	375	451	56	17	0	899
1997	518	517	27	9	5	1,077
1998	336	464	26	13	0	839
1999	679	545	49	20	0	1,293
2000	694	786	48	54	1	1,587
2001	523	637	47	35	0	1,253
2002	646	696	48	26	0	1,420
2003	686	620	30	14	1	1,361
2004	1,041	1,163	73	14	2	2,308
2005	972	569	33	6	0	1,587
2006	715	719	26	8	0	1,479
Average	**511.5**	**573.4**	**39.9**	**15.2**	**1.7**	**1,144.8**
SD	**264.7**	**189.3**	**15.5**	**13.3**	**3.2**	**433.5**

Source and Calculations: Mahimahi catch statistics were derived from NMFS longline logbook, Joint NMFS and HDAR Market Sample, HDAR Commercial Fish Catch, and Marine Dealer data. The gear types summarized for catches of mahimahi included the longline, MHI troll, MHI handline, offshore handline, and aku boat fisheries. The total column also contains small mahimahi catches by the other gear category.

Figure 19. Hawaii ono landings, 1987-2006.

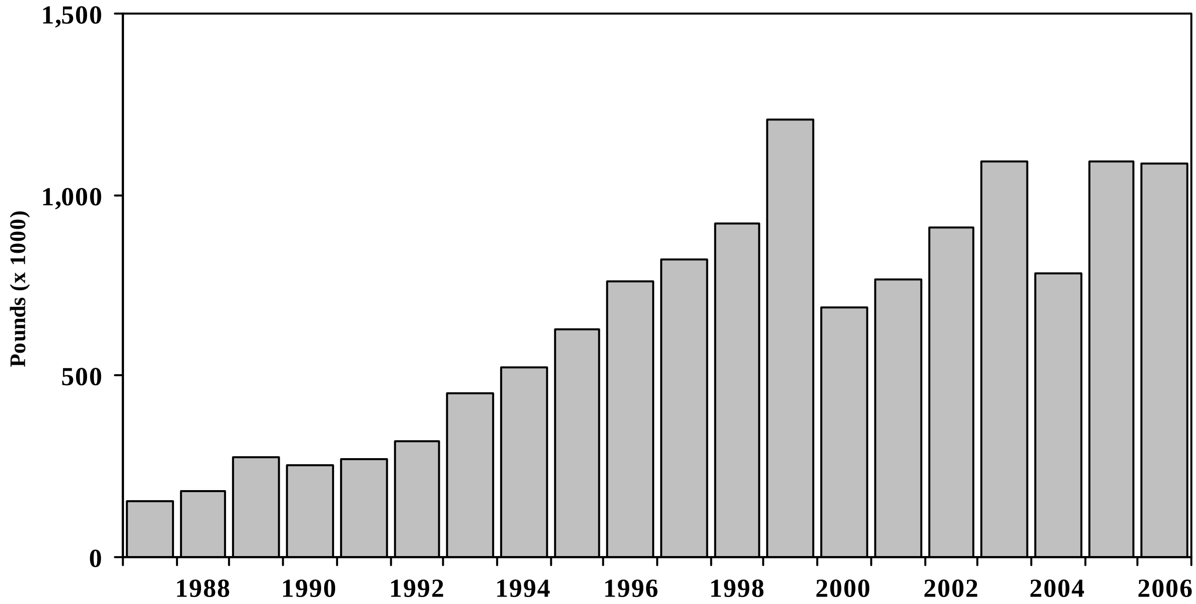


Interpretation: Ono landings were above the long-term average from 1997 with the highest total in 2003. The MHI troll fishery contributed the greatest fraction of these landings every year until 2003, at which time the longline fishery began to produce the greatest landings.

Source and Calculations: Ono catch statistics were derived from NMFS longline logbook, Joint NMFS and HDAR Market Sample, HDAR Commercial Fish Catch, and Marine Dealer data. The gear types summarized for catches of ono included the longline, MHI troll, and MHI handline fisheries. The total column also contains small ono catches by the other gear category.

	Ono landings (1000 lbs)			
Year	Longline	MHI troll	MHI handline	Total
1987	53	324	23	400
1988	90	298	18	406
1989	202	298	22	522
1990	80	262	11	353
1991	101	337	18	456
1992	85	262	18	365
1993	142	286	22	450
1994	87	245	19	351
1995	195	388	23	606
1996	140	347	27	514
1997	239	451	25	715
1998	262	442	21	725
1999	343	558	28	929
2000	256	386	18	683
2001	390	515	18	944
2002	293	350	15	687
2003	518	498	13	1,052
2004	486	409	8	917
2005	459	406	8	884
2006	512	440	8	984
Average	**246.7**	**375.2**	**18.1**	**647.2**
SD	**157.0**	**89.6**	**6.1**	**237.4**

Figure 20. Hawaii moonfish landings, 1987-2006.

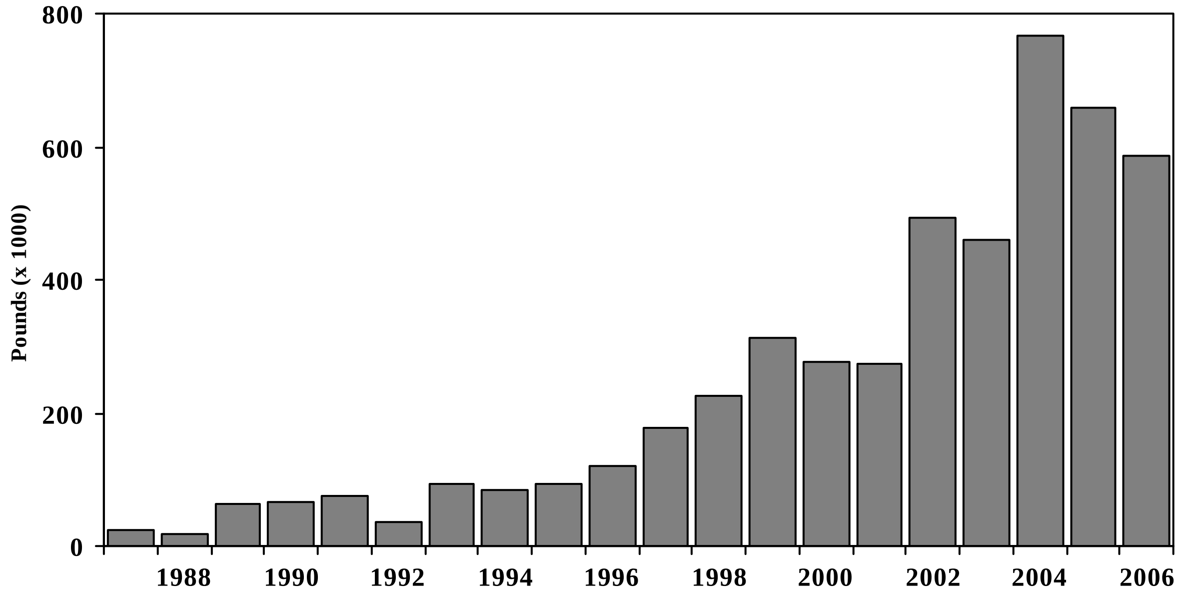


Interpretation: Moonfish are unique among the PMUS because they are caught exclusively by the longline fishery. The 2006 landings were the fourth highest since 1987 and exceeded the long-term average by 64%.

Source and Calculations: Moonfish catch statistics were derived from NMFS longline logbook, Joint NMFS and HDAR Market Sample, and HDAR Commercial Marine Dealer data.

	Moonfish landings (1000 lbs)	
Year	**Longline**	**Total**
1987	152	152
1988	182	182
1989	274	274
1990	253	253
1991	270	270
1992	320	320
1993	454	454
1994	524	524
1995	629	629
1996	760	760
1997	823	823
1998	922	922
1999	1,210	1,210
2000	691	691
2001	768	768
2002	910	910
2003	1,091	1,091
2004	781	781
2005	1,093	1,094
2006	1,084	1,084
Average	**659.6**	**659.6**
SD	**338.8**	**338.9**

Figure 21. Hawaii pomfret landings, 1987-2006.

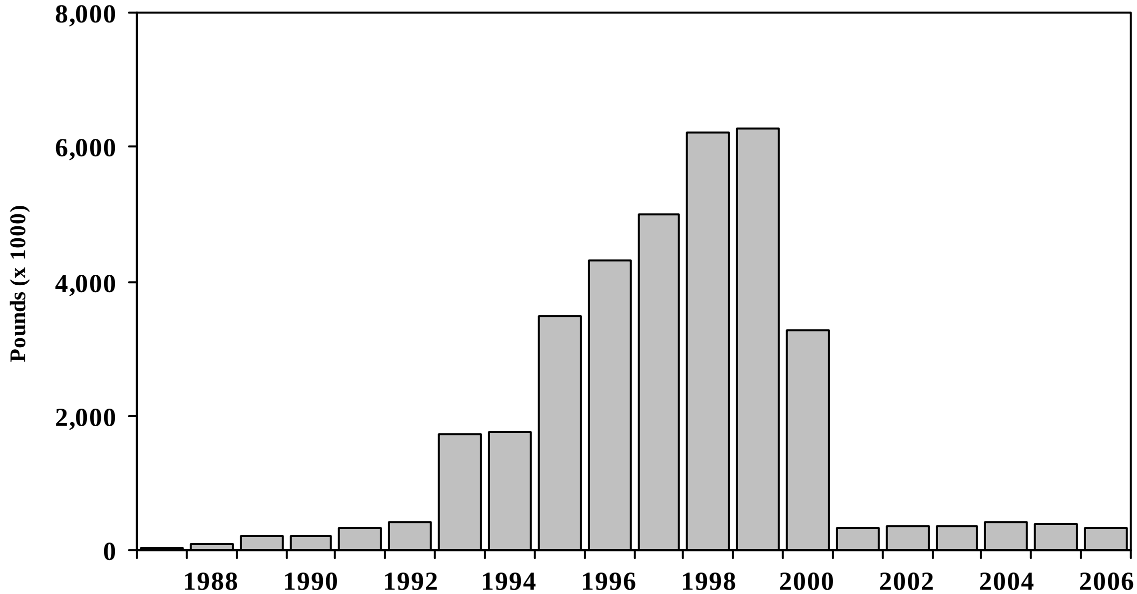


Interpretation: Landings of pomfrets came primarily from the longline fishery. The total in 2006 was the third highest over the 20 year period with the record landing in 2004. Pomfret landings rose gradually from 1987 to 1996 with substantially higher landings observed from 2002 peaking at 768,000 pounds in 2004.

Source and Calculations: Pomfret catch statistics were derived from NMFS longline logbook and HDAR Commercial Fish Catch, and Marine Dealer data. The gear types summarized for catches of pomfrets included the longline, MHI troll, and MHI handline fisheries. The total column also contains small landings of pomfret by the other gear category.

	Pomfret landings (1000 lbs)			
Year	Longline	MHI handline	Offshore handline	Total
1987	23	0	-	23
1988	18	0	-	18
1989	49	0	-	63
1990	66	0	0	66
1991	75	0	0	75
1992	37	0	0	37
1993	92	0	0	92
1994	85	0	0	85
1995	93	0	0	93
1996	121	0	0	121
1997	178	0	0	178
1998	225	0	0	225
1999	313	0	0	313
2000	272	4	0	277
2001	267	6	0	275
2002	463	6	14	492
2003	416	6	0	459
2004	734	14	5	768
2005	632	9	1	658
2006	558	8	3	587
Average	**235.9**	**2.7**	**1.2**	**245.3**
SD	**218.1**	**4.1**	**3.3**	**230.0**

Figure 22. Hawaii shark landings, 1987-2006.

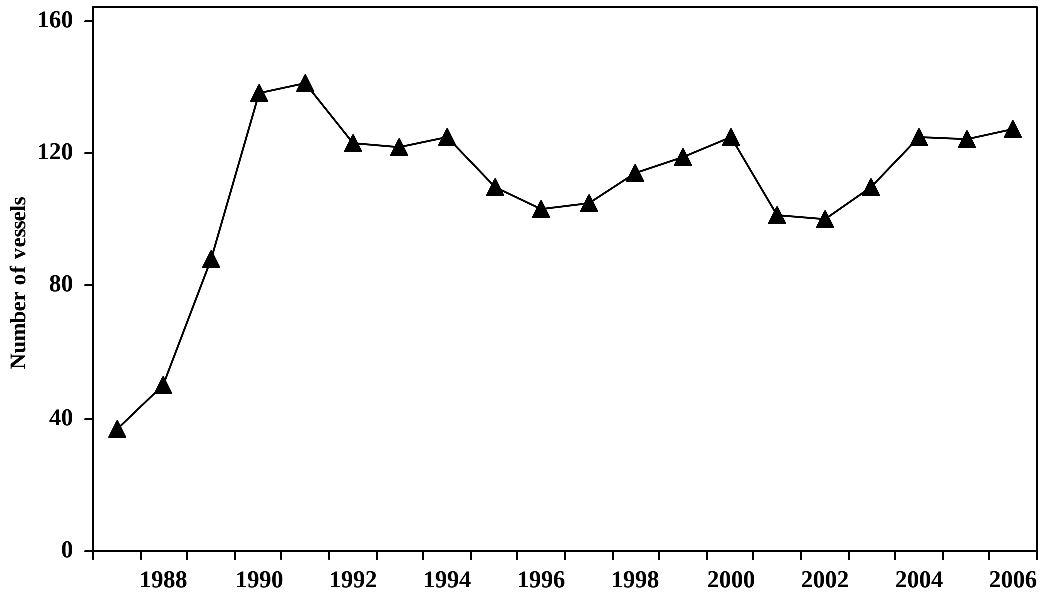


Interpretation: Sharks were landed almost exclusively by the longline fishery. Shark landings increased dramatically from 1987 to a peak of 6.3 million pounds in 1999. Sharks were landed headed and gutted in the late 1980's but a market for shark fins began in the early 1990's. Finning sharks then became widespread throughout the longline fishery. Shark landings dropped by 47% in 2000 in response to a state law that prohibited finning. This was followed by the federal Shark Finning Prohibition Act which was passed shortly thereafter. These regulatory measures caused a 90% decline in shark landings observed in 2001 with landings remaining low through 2006.

Source and Calculations: Shark catches (in number of fish) were derived from NMFS longline logbook and extrapolated to weight by using the mean weight calculated from the Market sample or HDAR Commercial Marine Dealer data. When the practice of finning sharks was allowed (typically blue and other shark species) their carcasses were discarded at sea. These fish still represented a kept and landed fish. Since the mean weight could not be calculated using either the NMFS market sample or HDAR commercial marine dealer data, these finned shark catches were also extrapolated by multiplying the number of sharks finned by an average weight from the observer data as a crude method to estimate shark biomass.

	Shark landings (1000 lbs)	
Year	**Longline**	**Total**
1987	43	43
1988	94	94
1989	203	203
1990	222	222
1991	318	318
1992	410	410
1993	1,736	1,736
1994	1,757	1,757
1995	3,468	3,468
1996	4,327	4,327
1997	5,010	5,010
1998	6,212	6,212
1999	6,272	6,273
2000	3,256	3,267
2001	329	336
2002	359	366
2003	352	356
2004	414	418
2005	389	393
2006	333	337
Average	**1,775.2**	**1,777.3**
SD	**2,159.6**	**2,159.1**

Figure 23. Number of Hawaii-based longline vessels, 1987-2006.



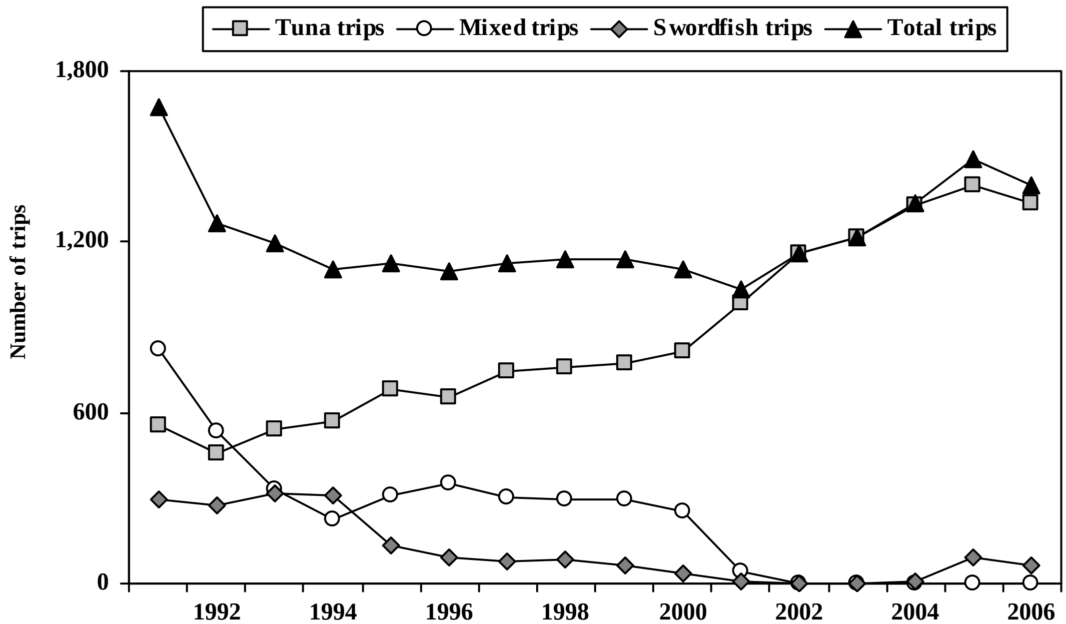
Interpretation: There were 127 active Hawaii-based longline vessels in 2006, up 3 vessels from 2005. Ninety-two vessels targeted tunas exclusively throughout the entire year while 35 vessels targeted both swordfish and tunas at some time during 2006.

The shallow-set sector of the Hawaii-based longline fishery for swordfish was reopened April 2004 under a new set of regulations intended to reduce the number of sea turtle interactions. The California-based longline fishery targeting swordfish was closed at the same time. The increase in vessels during 2003 and 2004 is due to California-based vessels migrating back to Hawaii.

Source and Calculations: The number of Hawaii-based longline vessels was compiled by counting the number of unique permit numbers from the NMFS marketing monitoring data from 1987-1990 and the NMFS longline logbook data from 1991-2006 based on date of landing.

Year	Vessels
1987	37
1988	50
1989	88
1990	138
1991	141
1992	123
1993	122
1994	125
1995	110
1996	103
1997	105
1998	114
1999	119
2000	125
2001	101
2002	100
2003	110
2004	125
2005	124
2006	127
Average	**109.4**
SD	**26.1**

Figure 24. Number of trips by the Hawaii-based longline fishery, 1991-2006.

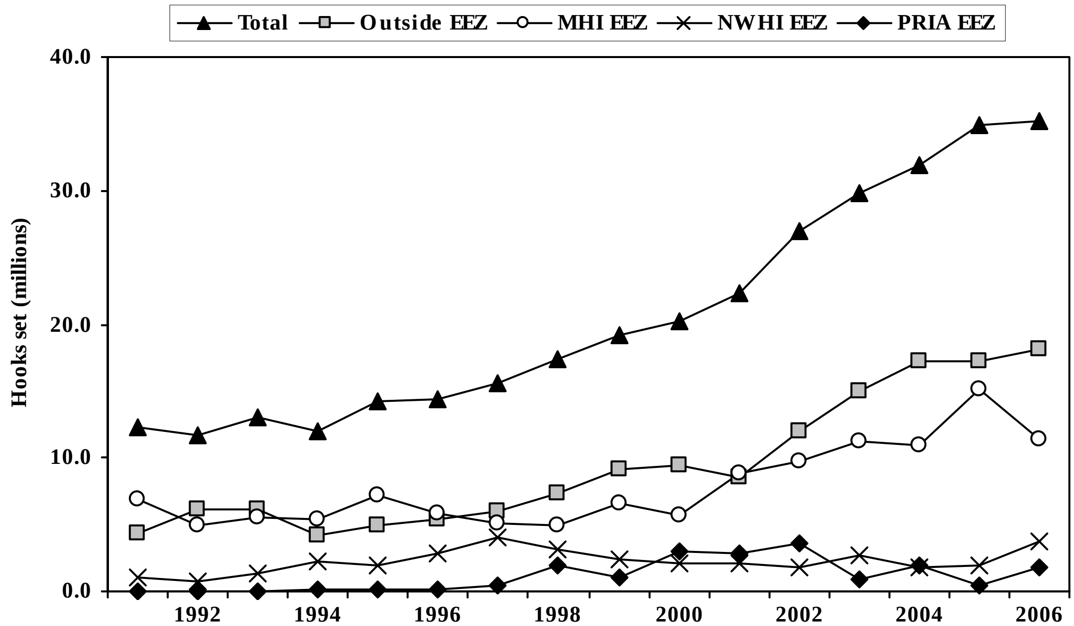


<u>Interpretation:</u> The Hawaii-based longline fleet made 1,399 trips in 2006. Total number of trips was above the long-term average in 2006. A large majority (96%) of the trips targeted tunas, with the remainder targeting swordfish.

<u>Source and Calculations:</u> The number of trips was compiled from NMFS federal longline logbook data collected from 1991 to 2006. The trip summary was based on landing date. The trip type was determined by an interview with the vessel captain or assigned by FMEP staff on the basis of gear characteristics, fishing techniques and locations, catch composition and past targeting strategy.

	Hawaii longline trip activity			
Year	**Total trips**	**Tuna trips**	**Mixed trips**	**Swordfish trips**
1991	1,671	556	823	292
1992	1,266	458	531	277
1993	1,192	542	331	319
1994	1,106	568	228	310
1995	1,125	682	307	136
1996	1,100	657	351	92
1997	1,125	745	302	78
1998	1,140	760	296	84
1999	1,137	776	296	65
2000	1,103	814	252	37
2001	1,034	987	43	4
2002	1,163	1,163	2	0
2003	1,215	1,215	0	0
2004	1,338	1,332	0	6
2005	1,490	1,396	0	94
2006	1,399	1,339	0	60
Average	**1,225.3**	**874.4**	**235.1**	**115.9**
SD	**170.3**	**317.9**	**228.8**	**116.4**

Figure 25. Number of hooks set by the Hawaii-based longline fishery, 1991-2006.

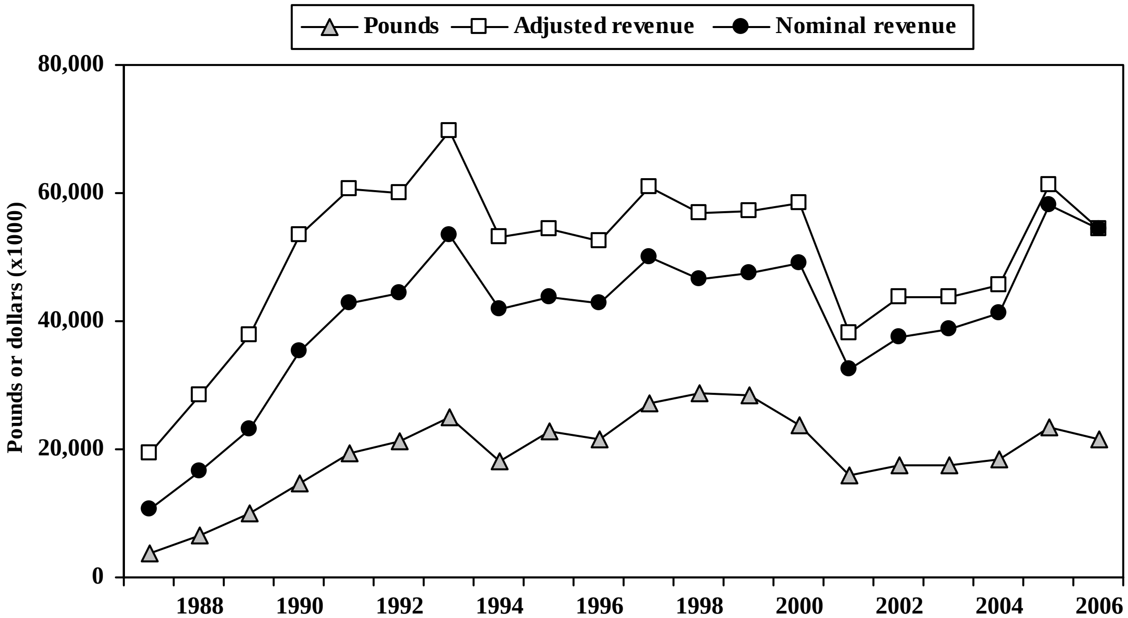


Interpretation: The total number of hooks set by the Hawaii-based longline fishery increased steadily since 1994 to a record 35.2 million hooks in 2006. Much of the increase is due to the shift in effort from swordfish and mixed target to tuna. Tuna sets typically set more hooks per day than swordfish and mixed target set types. Most of the hooks set were in the areas outside the EEZ (52%) and MHI EEZ (32%) in 2006. Effort in the NWHI EEZ (11%) increased slightly while effort in the EEZ of U.S. possessions (5%) increased in 2006.

Source and Calculations: Number of hooks set was compiled from NMFS federal longline logbook data collected from 1991 to 2006. The summary of hooks set was based on date of haul.

	Number of hooks set by area (milions)				
Year	**Outside EEZ**	**MHI EEZ**	**NWHI EEZ**	**PRIA EEZ**	**Total**
1991	4.4	6.9	1.1	0.1	12.3
1992	6.1	4.9	0.7	0.0	11.7
1993	6.2	5.6	1.3	0.0	13.0
1994	4.1	5.5	2.2	0.2	12.0
1995	4.9	7.1	2.0	0.2	14.2
1996	5.4	5.9	2.9	0.2	14.4
1997	6.0	5.1	4.1	0.4	15.6
1998	7.4	5.0	3.1	1.9	17.4
1999	9.1	6.6	2.4	1.1	19.1
2000	9.5	5.7	2.1	3.0	20.3
2001	8.6	8.8	2.0	2.9	22.4
2002	12.0	9.7	1.8	3.5	27.0
2003	15.0	11.2	2.7	0.9	29.9
2004	17.3	11.0	1.8	2.0	32.0
2005	17.2	15.1	2.0	0.5	34.9
2006	18.2	11.4	3.8	1.8	35.2
Average	**9.46**	**7.84**	**2.24**	**1.16**	**20.70**
SD	**4.94**	**3.04**	**0.91**	**1.19**	**8.46**

Figure 26. Hawaii longline landings and revenue, 1987-2006.



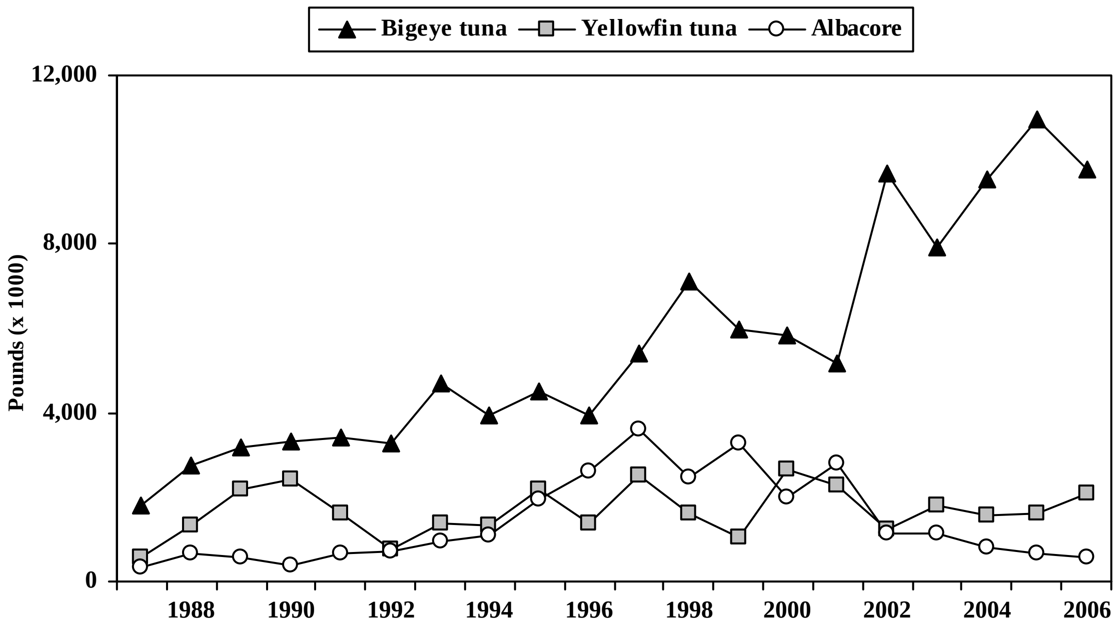
Interpretation: Total landings in 2006 was 12% higher than long-term average. Hawaii longline landings decreased for the first time in four years. Revenue in 2006 was also 8% higher than long-term average and decreased for the first time in the past four years.

Source and Calculations: Longline catch and nominal ex-vessel revenue estimates were compiled from NMFS logbook and market sample or HDAR Commercial Marine Dealer data.

Total catch and revenue estimates were calculated by extrapolating NMFS market sample data from 1987-1991, combining the number of fish from the federal logbook with the average weight per fish and average price per pound from the market sample data during 1992-1999, and the HDAR Dealer data from 2000 to 2006. The adjusted revenue was calculated by multiplying nominal revenue by the Honolulu CPI for the current year and then dividing by the Honolulu CPI for that corresponding year.

Year	Pounds	Adjusted revenue	Nominal revenue	Honolulu CPI
1987	3,891	$19,300	$10,600	114.9
1988	6,710	$28,400	$16,500	121.7
1989	9,942	$37,700	$23,200	128.7
1990	14,738	$53,500	$35,300	138.1
1991	19,478	$60,700	$42,900	148.0
1992	21,105	$59,900	$44,400	155.1
1993	25,005	$69,800	$53,400	160.1
1994	18,134	$53,200	$41,800	164.5
1995	22,723	$54,300	$43,600	168.1
1996	21,553	$52,400	$42,700	170.7
1997	27,145	$61,000	$50,100	171.9
1998	28,629	$56,900	$46,600	171.5
1999	28,348	$57,300	$47,400	173.3
2000	23,818	$58,400	$49,200	176.3
2001	15,804	$38,100	$32,500	178.4
2002	17,405	$43,600	$37,500	180.3
2003	17,647	$43,800	$38,600	184.5
2004	18,483	$45,500	$41,400	190.6
2005	23,334	$61,400	$58,000	197.8
2006	21,551	$54,400	$54,400	209.4
Average	**19,272.2**	**$50,480.0**	**$40,505.0**	
SD	**6,687.4**	**$12,333.2**	**$12,203.1**	

Figure 27. Hawaii longline tuna landings, 1987-2006.



Interpretation: The three major tuna species landed by the Hawaii-based longline fishery are bigeye tuna, yellowfin tuna, and albacore. Landings of bigeye tuna decreased to 9.8 million pounds in 2006, down from a record 11 million pounds in 2005. It was also the largest component of the longline landings and made up 77% of the tuna landings. Yellowfin tuna was above to its long-term average in 2006 at 2.1 million pounds. Albacore landings were 59% below its long-term average in 2006 and showed a substantial decline from its peak in 1997. The longline fishery also landed small amounts of skipjack tuna and bluefin tuna.

	Hawaii longline tuna landings (1000 lbs)					
Year	Bigeye tuna	Yellowfin tuna	Albacore	Skipjack tuna	Bluefin tuna	Total
1987	1,796	575	331	3	0	2,705
1988	2,732	1,309	676	8	0	4,725
1989	3,178	2,174	547	22	0	5,921
1990	3,338	2,421	390	12	1	6,162
1991	3,423	1,617	687	66	4	5,797
1992	3,277	763	735	49	84	4,908
1993	4,677	1,392	965	79	92	7,205
1994	3,940	1,336	1,095	116	53	6,540
1995	4,522	2,159	1,938	223	56	8,898
1996	3,940	1,389	2,606	91	48	8,074
1997	5,399	2,515	3,626	234	52	11,826
1998	7,113	1,592	2,450	168	36	11,359
1999	5,995	1,042	3,250	219	23	10,529
2000	5,830	2,656	1,980	221	7	10,694
2001	5,190	2,278	2,803	456	3	10,729
2002	9,679	1,235	1,145	282	2	12,349
2003	7,916	1,815	1,160	437	1	11,329
2004	9,532	1,559	790	293	1	12,179
2005	10,975	1,620	663	197	1	13,458
2006	9,754	2,087	578	206	1	12,628
Average	**5,610.3**	**1,676.7**	**1,420.8**	**169.1**	**23.3**	**8,900.8**
SD	**2,691.6**	**577.4**	**1,022.9**	**133.5**	**30.4**	**3,194.7**

Source and Calculations: The longline tuna catch estimates were derived from NMFS longline logbook, market sample, and Marine Dealer data. Longline tuna catches were estimated by either extrapolating the NMFS market sample data (1987-1991) or multiplying the number of fish from the logbook data by the average weight from the sample or HDAR Dealer data (1992-2006).

Figure 28a. Hawaii longline swordfish and billfish landings, 1987-2006.

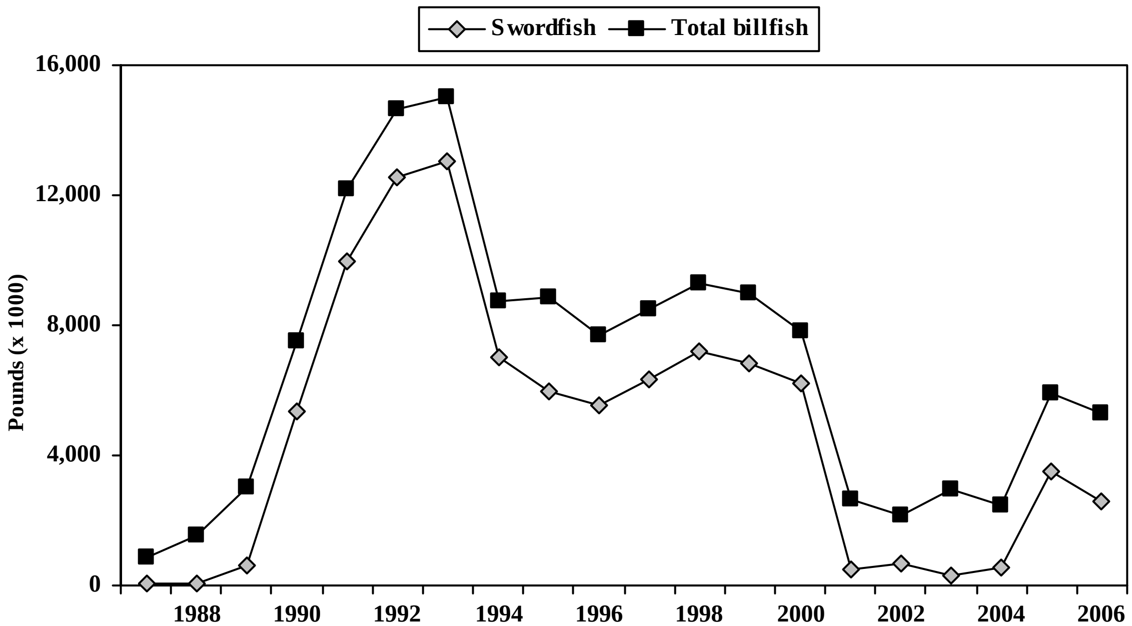
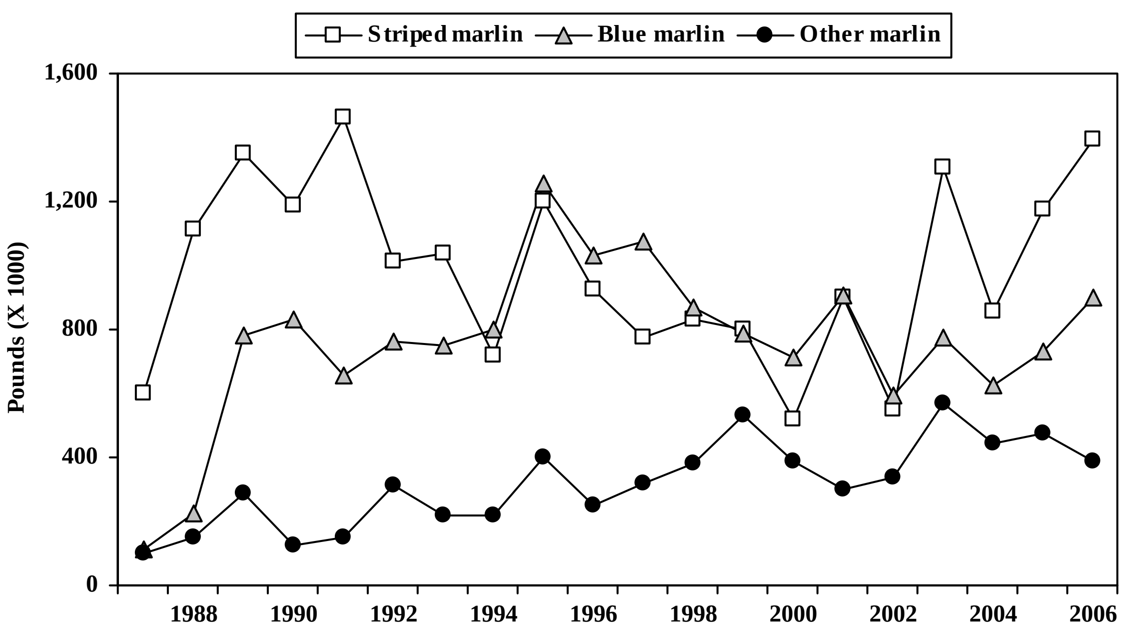


Figure 28b. Hawaii longline marlin landings, 1987-2006.



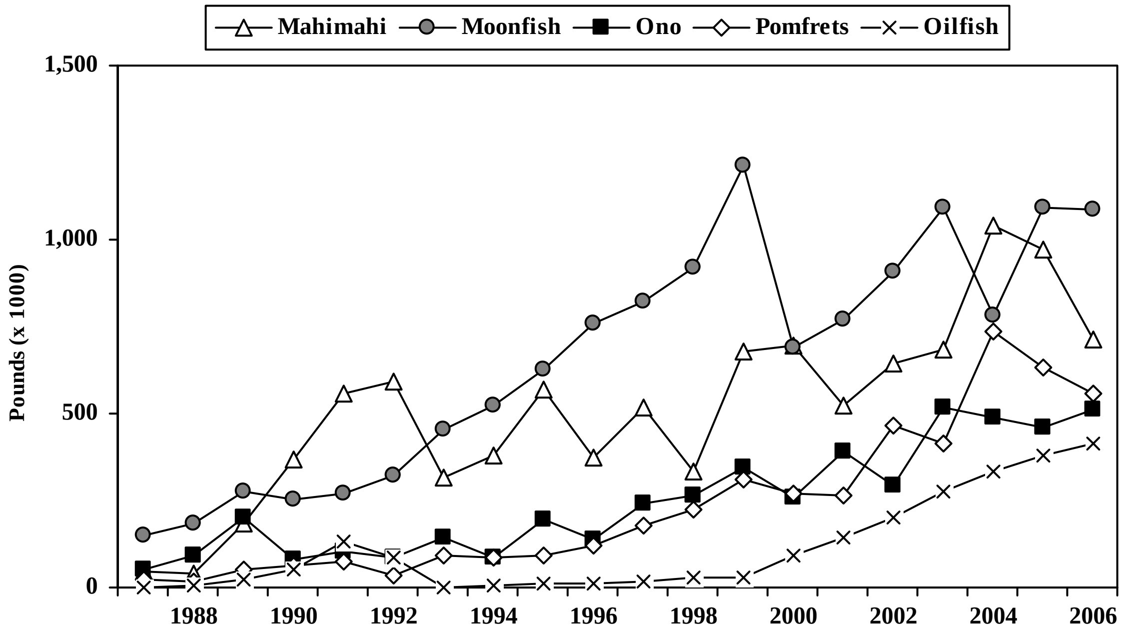
Interpretation: Billfish landings was 5.3 m,illion pounds, 23% below the long-term average in 2006. The decrease observed in 2006 was attributable to lower swordfish landings. The swordfish-targeted longline fishery target was closed in March of 2006 due to reaching the allowable number of interactions with loggerhead sea turtles. Although this sector of the longline fishery was closed early in the year, swordfish landings in 2006 was still higher than those landed during 2001-2004.

Marlins are caught incidentally by the longline fishery and are retained because they sell for a moderate market price. Striped marlin and blue marlin are the largest component of the marlin landings. Both striped marlin and blue marlin landings were above their long-term average in 2006 by 41% and 18%, respectively. Other marlin, primarily spearfish, was on an increasing trend.

	Hawaii longline billfish landings (1000 lbs)				
Year	**Swordfish**	**Striped marlin**	**Blue marlin**	**Other marlin**	**Total billfish**
1987	52	599	112	99	862
1988	52	1,110	225	150	1,537
1989	619	1,350	784	290	3,043
1990	5,372	1,186	834	127	7,519
1991	9,939	1,462	654	153	12,208
1992	12,566	1,013	765	312	14,656
1993	13,027	1,039	748	220	15,034
1994	7,002	719	798	218	8,737
1995	5,981	1,198	1,257	401	8,837
1996	5,517	923	1,030	253	7,723
1997	6,352	775	1,074	316	8,517
1998	7,193	834	870	380	9,277
1999	6,835	803	787	533	8,958
2000	6,202	517	711	385	7,815
2001	519	903	909	299	2,631
2002	681	550	593	338	2,162
2003	300	1,308	776	567	2,951
2004	549	858	623	441	2,471
2005	3,527	1,177	731	473	5,909
2006	2,590	1,393	897	388	5,268
Average	**4,743.8**	**985.9**	**758.9**	**317.2**	**6,805.8**
SD	**4,093.3**	**283.6**	**256.2**	**132.3**	**4,201.9**

Source and Calculations: The longline billfish catch estimates were derived from NMFS longline logbook, market sample, and HDAR Dealer data. Longline billfish catches were estimated by either extrapolating the NMFS Market Sample data to an estimated full coverage (1987-1991) or multiplying the number of fish from the logbook data by the average weight from the Market Sample or HDAR Dealer data (1992-2006).

Figure 29. Hawaii longline landings of other pelagic PMUS, 1987-2006.



Interpretation: Longline landings of other pelagic PMUS show an increasing trend with landings at 3.3 million pounds, 86% above the long-term average. Moonfish was dominant component in this category at 1.1 million pounds in 2006, 64% above the long-term average. Mahimahi composed a large fraction of the landings with landings 40% higher than its long-term average in 2006. Ono and pomfret landings increased substantially during the 20-year period with record landings in 2003 and 2004, respectively.

	Hawaii longline landings of other pelagic PMUS (1000 lbs)					
Year	**Mahimahi**	**Moonfish**	**Ono**	**Pomfrets**	**Oilfish**	**Total**
1987	45	152	53	23	2	281
1988	39	182	90	18	3	354
1989	183	274	202	49	24	775
1990	366	253	80	66	52	835
1991	555	270	101	75	130	1,155
1992	593	320	85	37	85	1,131
1993	316	454	142	92	0	1,030
1994	377	524	87	85	4	1,100
1995	570	629	195	93	10	1,520
1996	375	760	140	121	11	1,429
1997	518	823	239	178	15	1,792
1998	336	922	262	225	26	1,781
1999	679	1,210	343	313	29	2,589
2000	694	691	256	272	93	2,019
2001	523	768	390	267	141	2,115
2002	646	910	293	463	201	2,535
2003	686	1,091	518	416	277	3,015
2004	1,041	781	486	734	335	3,419
2005	972	1,093	459	632	380	3,578
2006	715	1,084	512	558	412	3,323
Average	**511.5**	**659.6**	**246.7**	**235.9**	**111.5**	**1,788.8**
SD	**264.7**	**338.8**	**157.0**	**218.1**	**136.3**	**1,011.2**

Source and Calculations: Estimates of longline catch of other pelagic species were derived from NMFS longline logbook, Market Sample, and HDAR Dealer data. Catch of other pelagic species were estimated by either extrapolating the NMFS Market Sample data to an estimated full coverage (1987-1991) or multiplying the number of fish from the logbook data by the average weight from the Market Sample or HDAR Dealer data (1992-2006).

Figure 30a. Hawaii longline blue and total shark landings, 1987-2006.

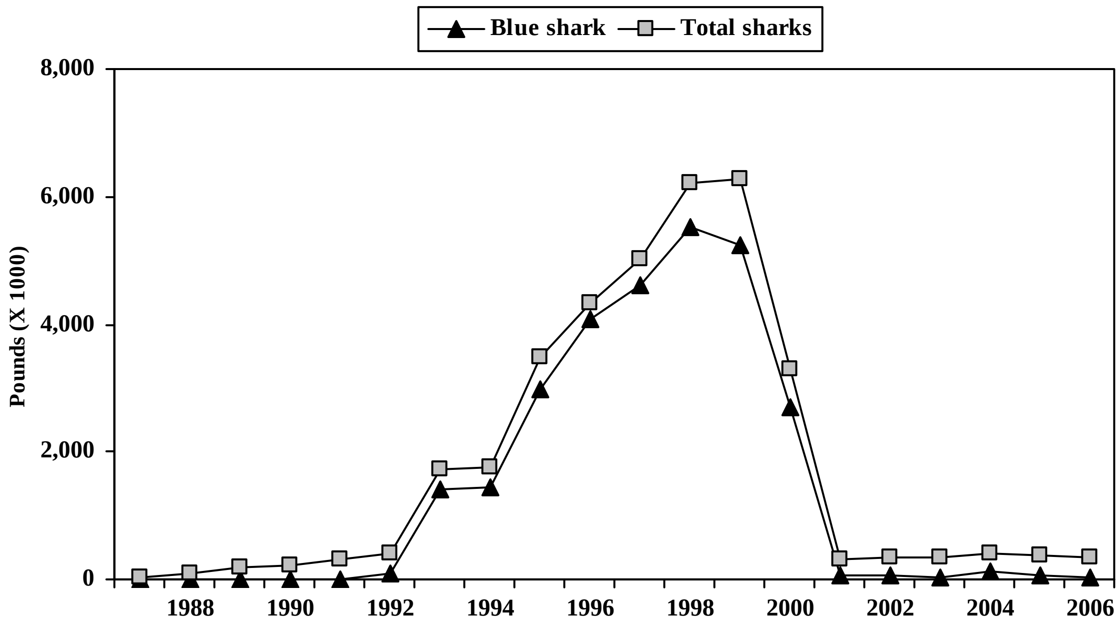
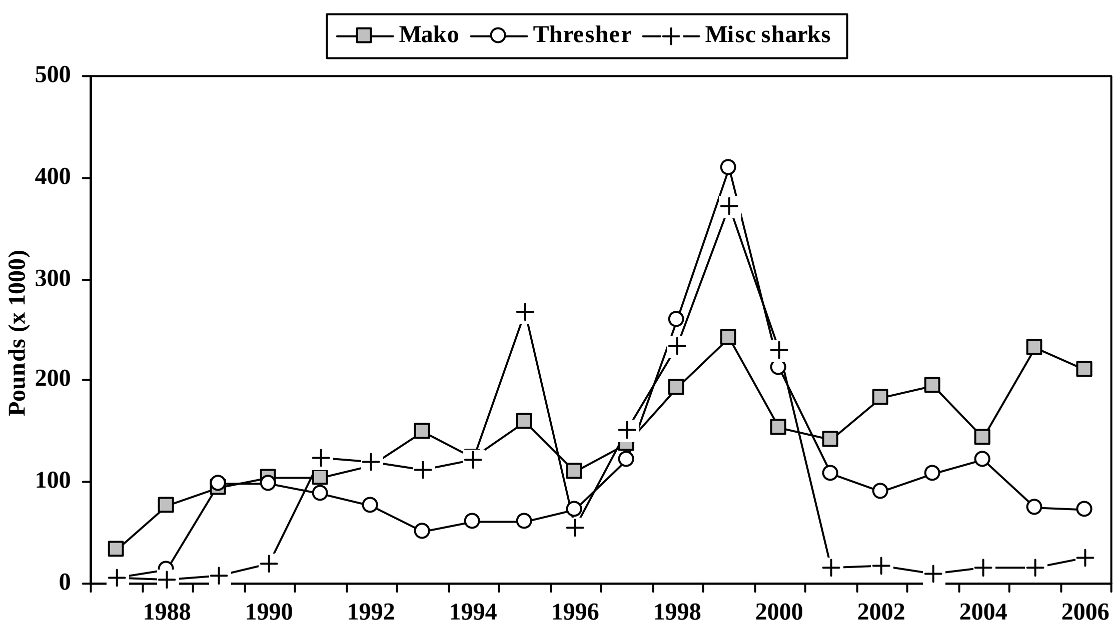


Figure 30b. Hawaii longline mako, thresher and other shark landings, 1987-2006.



	Hawaii longline shark landings (1000 lbs)				
Year	Blue shark	Mako	Thresher	Misc sharks	Total sharks
1987	0	33	5	5	43
1988	0	77	13	4	94
1989	2	95	98	8	203
1990	0	105	98	19	222
1991	0	104	89	125	318
1992	97	117	76	120	410
1993	1,423	150	51	112	1,736
1994	1,450	124	61	122	1,757
1995	2,978	160	62	268	3,468
1996	4,088	110	73	56	4,327
1997	4,598	137	123	152	5,010
1998	5,527	192	259	234	6,212
1999	5,249	242	409	372	6,272
2000	2,693	153	213	231	3,290
2001	63	142	109	16	329
2002	67	184	90	17	359
2003	39	195	109	9	352
2004	130	144	123	16	414
2005	66	233	75	15	389
2006	26	210	73	25	333
Average	**1,424.8**	**145.4**	**110.5**	**96.3**	**1,776.9**
SD	**1,995.3**	**53.0**	**91.0**	**107.3**	**2,160.9**

Interpretation: Shark landings in 2006 were 81% below the long-term average. Shark landings have been low since 2001 due to State and Federal laws which prohibited the practice of finning and landing sharks without the associated carcass. Blue shark and other sharks were retained for fins only so landings dropped significantly when laws prohibiting the practice took effect. Mako and thresher sharks were retained for their flesh and had landings substantially lower and less variable compared to blue shark.

Source and Calculations: Catch statistics for sharks were derived from NMFS longline logbook, Market Sample, and HDAR Dealer data. Shark catch landed whole was estimated by multiplying the number of fish from the logbook data by the average weight from the Market Sample or HDAR Dealer data. When finning sharks was allowed, finned shark catches were also extrapolated to whole weight by multiplying the number of sharks finned by an average weight from the observer data.

Table 3. Hawaii-based longline catch (number of fish) by area, 1991-2006.

	Tunas			Billfish				Other PMUS			
Year	Bigeye Tuna	Yellowfin Tuna	Albacore	Swordfish	Blue Marlin	Striped Marlin	Other Billfish	Mahimahi	Ono (Wahoo)	Moonfish	Sharks
Main Hawaiian Islands EEZ											
1991	**22,517**	**7,150**	5,763	13,598	**6,086**	**11,520**	**5,973**	17,672	**1,885**	**2,569**	13,295
1992	**22,982**	**3,846**	3,979	7,102	**2,761**	**9,838**	**3,368**	13,313	**1,194**	**2,387**	11,748
1993	**25,031**	**8,895**	6,496	4,388	**2,720**	**10,426**	**3,440**	9,366	**2,641**	**3,261**	12,955
1994	**27,022**	**6,815**	10,833	2,842	**3,344**	**6,494**	**3,213**	**17,660**	**1,332**	**3,626**	14,455
1995	**31,899**	**13,018**	18,271	5,239	**4,168**	**12,472**	**6,900**	**30,417**	2,658	**4,022**	22,557
1996	**29,803**	**7,715**	19,259	4,634	**3,556**	**7,124**	**3,404**	**11,676**	1,527	**3,094**	19,418
1997	21,397	10,982	19,025	4,873	**4,085**	**4,193**	**3,662**	11,660	2,525	2,847	16,476
1998	26,723	4,678	12,482	4,721	1,698	4,856	**4,254**	7,664	2,305	**3,585**	14,685
1999	29,328	4,838	23,805	2,357	1,709	**5,617**	6,702	11,660	2,579	5,168	17,469
2000	21,654	5,247	5,964	2,510	1,557	2,446	**3,492**	17,628	1,202	2,772	16,590
2001	**36,928**	5,671	10,448	1,027	2,134	**7,651**	**4,018**	**21,608**	3,223	**3,404**	16,086
2002	51,177	2,465	2,707	752	873	**3,449**	3,761	21,374	1,345	3,373	14,828
2003	39,901	10,058	2,593	1,421	1,738	**12,243**	**8,284**	25,233	4,748	3,467	25,856
2004	49,001	8,773	3,022	1,166	1,135	**6,665**	5,366	26,609	3,199	2,688	24,923
2005	52,844	**13,761**	4,606	2,463	1,594	**6,951**	**7,796**	**40,168**	5,472	4,228	27,274
2006	32,799	6,731	1,598	916	1,547	7,479	3,881	16,854	4,130	3,313	17,824
Northwestern Hawaiian Islands EEZ											
1991	4,473	1,375	481	9,472	723	2,445	789	2,003	134	70	10,604
1992	2,624	396	311	5,228	244	1,776	330	2,321	77	187	9,042
1993	7,760	2,019	1,413	9,565	509	2,861	754	2,279	198	398	17,507
1994	10,726	2,015	5,592	9,752	554	2,679	719	3,037	227	707	28,346
1995	9,011	3,630	5,097	8,400	1,379	5,076	1,557	5,836	902	810	19,915
1996	15,409	2,451	12,738	3,987	1,114	4,184	1,651	1,995	659	2,388	16,539
1997	**30,168**	5,139	17,118	5,148	1,519	4,109	2,250	6,321	1,789	**2,877**	17,921
1998	16,629	2,713	6,802	10,611	1,217	**5,757**	2,927	3,527	761	1,862	20,152
1999	9,672	1,581	6,261	6,182	1,053	3,515	2,400	4,316	763	1,431	15,070
2000	7,615	1,380	2,663	6,676	415	2,294	1,082	6,413	224	699	11,233
2001	8,521	1,169	3,648	373	761	2,528	882	3,923	783	1,030	5,478
2002	9,492	806	1,897	109	295	1,352	1,339	3,485	313	882	4,950
2003	8,929	2,522	2,286	259	1,035	4,703	2,597	3,559	1,596	1,372	11,871
2004	8,918	932	708	203	265	1,292	938	3,866	469	662	6,854
2005	6,709	2,030	1,041	6,030	512	2,187	1,044	5,697	620	865	11,524
2006	20,383	4,162	1,005	256	480	3,291	1,660	4,005	1,322	1,291	12,865
U.S. Possessions EEZ's											
1991	374	439	30	25	36	38	33	84	21	0	237
1992	70	42	0	16	7	1	7	6	8	0	223
1993	4	1	0	0	0	3	1	6	3	0	7
1994	1,127	1,649	151	53	37	173	55	37	77	24	705
1995	460	583	296	21	94	121	94	252	206	5	895
1996	766	1,184	1,612	17	86	192	93	49	155	57	756
1997	2,070	1,932	4,054	33	194	255	293	591	328	206	1,503
1998	17,742	6,330	3,784	174	308	307	450	831	1,127	258	5,892
1999	4,514	**5,737**	1,575	102	315	438	619	542	1,499	179	3,463
2000	7,483	**21,788**	8,766	234	766	733	910	1,202	1,916	448	8,307
2001	5,566	**20,778**	9,529	224	1,072	1,049	684	1,708	2,151	279	5,199
2002	18,110	**12,826**	6,342	532	778	1,015	765	957	2,429	377	7,660
2003	2,106	2,392	2,202	83	443	572	490	842	1,058	117	2,606
2004	9,813	4,587	2,661	253	426	618	533	1,049	1,344	288	4,860
2005	1,428	1,714	1,089	64	143	161	163	316	569	46	962
2006	6,698	7,353	2,359	134	614	520	528	1,126	1,486	311	3,499

Table 3 (Cont.) Hawaii-based longline catch (number of fish) by area, 1991-2006.

	Tunas				Billfish			Other PMUS			
Year	Bigeye Tuna	Yellowfin Tuna	Albacore	Swordfish	Blue Marlin	Striped Marlin	Other Billfish	Mahimahi	Ono (Wahoo)	Moonfish	Sharks
Outside EEZ's											
1991	13,559	4,305	**7,777**	**43,194**	2,130	4,280	2,558	**19,766**	695	440	**47,047**
1992	18,228	3,595	**15,523**	**61,968**	1,506	4,434	1,963	**41,044**	1,169	719	**73,884**
1993	22,008	5,147	**22,551**	**65,601**	1,895	4,920	1,486	**14,367**	1,600	856	**124,139**
1994	9,227	3,037	**14,553**	**30,698**	742	1,946	1,130	12,283	877	733	**71,150**
1995	18,577	6,419	**22,125**	**23,745**	3,125	4,885	3,220	23,374	**2,801**	1,314	**58,154**
1996	17,597	6,236	**23,720**	**29,621**	1,929	4,250	2,624	9,591	**2,120**	1,776	**64,279**
1997	26,140	**10,992**	**30,887**	**29,568**	2,457	4,080	2,806	**30,747**	**3,640**	2,314	**49,938**
1998	**37,777**	**8,017**	**25,765**	**28,270**	**2,127**	3,427	3,885	**10,161**	**4,088**	3,479	**59,208**
1999	**36,960**	4,817	**35,752**	**29,574**	**1,859**	4,860	**7,401**	**27,862**	**5,438**	**5,628**	**51,797**
2000	**37,828**	9,933	**21,649**	**27,630**	**1,770**	**2,455**	3,485	**32,601**	**4,402**	**3,084**	**42,968**
2001	27,712	9,460	**27,841**	**2,545**	**2,440**	5,209	3,413	17,715	**7,117**	3,068	**20,152**
2002	**61,990**	4,278	**9,643**	**2,275**	**2,025**	3,076	**4,076**	**22,407**	**4,791**	**4,658**	**23,197**
2003	**56,211**	**12,952**	**13,783**	**1,777**	**2,437**	8,421	7,080	**25,708**	**10,965**	**6,945**	**29,093**
2004	**74,230**	**11,541**	**10,941**	**3,569**	**3,020**	6,585	**7,741**	**35,061**	**10,593**	**4,905**	**38,280**
2005	**68,365**	11,468	**6,901**	**15,796**	**2,072**	6,493	6,207	31,779	**9,505**	**8,193**	**35,944**
2006	**58,785**	**12,324**	**6,460**	**15,279**	**3,063**	**9,728**	**6,372**	**30,615**	**10,197**	**7,909**	**34,316**
TOTAL CATCH											
1991	40,923	13,269	14,051	66,289	8,975	18,283	9,353	39,525	2,735	3,079	71,183
1992	43,904	7,879	19,813	74,314	4,518	16,049	5,668	56,684	2,448	3,293	94,897
1993	54,803	16,062	30,460	79,554	5,124	18,210	5,681	26,018	4,442	4,515	154,608
1994	48,102	13,516	31,129	43,345	4,677	11,292	5,117	33,017	2,513	5,090	114,656
1995	59,947	23,650	45,789	37,405	8,766	22,554	11,771	59,879	6,567	6,151	101,521
1996	63,575	17,586	57,329	38,259	6,685	15,750	7,772	23,311	4,461	7,315	100,992
1997	79,775	29,045	71,084	39,622	8,255	12,637	9,011	49,319	8,282	8,244	85,838
1998	98,871	21,738	48,833	43,776	5,350	14,347	11,516	22,183	8,281	9,184	99,937
1999	80,474	16,973	67,393	38,215	4,936	14,430	17,122	44,380	10,279	12,406	87,799
2000	74,580	38,348	39,042	37,050	4,508	7,928	8,969	57,844	7,744	7,003	79,098
2001	78,727	37,078	51,466	4,169	6,407	16,437	8,997	44,954	13,274	7,781	46,915
2002	140,769	20,375	20,589	3,668	3,971	8,892	9,941	48,223	8,878	9,290	50,635
2003	107,147	27,924	20,864	3,540	5,653	25,939	18,451	55,342	18,367	11,901	69,426
2004	141,962	25,833	17,332	5,191	4,846	15,160	14,578	66,585	15,605	8,543	74,917
2005	129,346	28,973	13,637	24,353	4,321	15,792	15,210	77,960	16,166	13,332	75,704
2006	118,665	30,570	11,422	16,585	5,704	21,018	12,441	52,600	17,135	12,824	68,504

Interpretation: The bolded numbers in Table 5 show the area with the highest catch for a particular species. Catches of albacore, swordfish, and sharks were always highest outside of the U.S. EEZ. Bigeye tuna, blue marlin, moonfish, and ono catches were highest in the MHI EEZ in the early years but shifted to areas outside of the U.S. EEZ in more recent times. Yellowfin tuna catches were highest in the MHI EEZ during 1991-1996, switched to the NWHI EEZ in 1999-2002 and moved outside of the U.S. EEZ in 2003-2004. The predominant area of capture for yellowfin tuna was the MHI EEZ in 2005. Striped marlin catch was typically highest in the MHI EEZ. The highest catches for mahimahi were outside of the EEZ and the MHI EEZ.

Source and Calculations: Catches (number of fish) by area were compiled from NMFS federal longline logbook data collected from 1991 to the current year. The catch tables (based on date of haul) were summaries of fish kept and released. The bold numbers are the areas where the catch for that species and year was larger than for the other three areas

Table 4. Average weight of the Hawaii-based longline landings by species, 1987-2006.

	Tunas				
Year	Bigeye tuna	Yellowfin tuna	Albacore	Skipjack tuna	Bluefin Tuna
1987	77	82	63	18	-
1988	83	103	60	19	-
1989	77	104	62	19	-
1990	81	122	61	21	638
1991	85	118	52	20	185
1992	77	99	45	17	192
1993	88	93	44	17	203
1994	81	97	41	18	190
1995	79	95	51	18	271
1996	64	80	53	17	223
1997	71	89	55	20	239
1998	74	76	55	20	177
1999	75	62	52	20	202
2000	79	67	54	17	166
2001	68	62	55	18	190
2002	71	62	56	16	151
2003	77	67	56	19	273
2004	69	62	46	16	207
2005	88	58	50	15	238
2006	84	71	52	17	-
Average	**77.4**	**83.5**	**53.2**	**18.1**	**234.1**
SD	**6.6**	**19.8**	**6.0**	**1.6**	**113.1**

	Billfish					
Year	Swordfish	Striped marlin	Blue marlin	Spearfish	Sailfish	Black marlin
1987	129	66	161	34	52	208
1988	119	57	157	31	51	151
1989	130	62	165	31	55	191
1990	152	62	199	35	55	204
1991	153	58	173	32	51	184
1992	178	66	175	34	45	155
1993	171	64	157	34	49	136
1994	163	64	171	33	55	167
1995	171	58	156	33	47	72
1996	157	58	154	31	40	-
1997	163	66	134	31	46	190
1998	176	60	165	32	43	167
1999	188	55	164	29	45	131
2000	180	62	157	35	57	150
2001	146	48	142	31	48	151
2002	146	55	150	33	59	222
2003	141	49	145	31	56	150
2004	137	53	132	30	39	185
2005	164	72	175	31	40	196
2006	167	64	158	30	50	185
Average	**156.6**	**60.0**	**159.5**	**32.1**	**49.2**	**168.2**
SD	**18.9**	**6.1**	**15.4**	**1.7**	**6.0**	**34.5**

Table 4. (Cont.) Average weight of the Hawaii-based longline landings by species, 1987-2006.

	Other PMUS					Sharks	
Year	Mahimahi	Ono (Wahoo)	Moonfish	Pomfrets	Oilfish	Mako shark	Thresher shark
1987	21	33	111	15	20	124	97
1988	20	32	108	18	22	137	122
1989	23	35	104	18	23	161	158
1990	19	36	98	18	22	162	167
1991	15	32	97	17	23	135	180
1992	11	35	98	16	22	144	176
1993	13	33	101	16	21	147	199
1994	12	34	103	17	13	153	164
1995	10	31	101	16	23	178	172
1996	17	31	105	15	-	177	156
1997	13	30	103	17	-	161	160
1998	16	32	101	15	-	177	171
1999	16	34	98	14	-	177	202
2000	14	33	100	14	18	168	166
2001	12	29	99	13	16	175	166
2002	14	33	98	13	17	182	166
2003	13	29	93	12	16	184	196
2004	16	31	92	11	16	173	169
2005	13	29	83	13	17	177	202
2006	14	30	84	13	17	176	193
Average	**15.1**	**32.1**	**98.9**	**15.1**	**19.1**	**163.4**	**169.1**
SD	**3.4**	**2.1**	**6.9**	**2.1**	**3.2**	**17.7**	**25.5**

Interpretation: Longline fishing effort can cover a large area within a trip. The data on individual fish from the market data cannot be directly linked to the exact area of capture, therefore, the average weight by location was referenced in general terms.

The three main tuna species, bigeye tuna, yellowfin tuna, and albacore, exhibited changes throughout 1987-2006. The average weight of bigeye tuna showed small change over the 19 year period, ranging from 64 pounds to 88 pounds. Bigeye tuna average weight was 84 pounds in 2006. Yellowfin tuna average weight showed the most variation ranging from 58 pounds to 122 pounds. The average weight of yellowfin tuna was more than 100 pounds in earlier years and decreased to less than 70 pounds from 1999. This probably reflects a trend of increasing effort in the EEZ of Kingman Reef and Palmyra Atoll where relatively small yellowfin tuna are caught. The average weight of albacore was 60 pounds or more from 1987 until 1990 then declined to less than 50 pounds during 1992-94. This decline was related to increasing incidental landings of small albacore far north of the Hawaiian Islands by longliners targeting swordfish. The average weight of albacore then increased as a greater proportion of longline effort shifted back to target tunas.

Swordfish landed by tuna-targeted trips were smaller than from swordfish-targeted trips. Average weight for swordfish was lowest in the late 1980s when the longline fishery targeted tunas only. The average weight increased in the early 1990s with as the number of swordfish-target trips grew. Average weight peaked at 188 pounds in 1999 and was about the same in the following year. Swordfish-directed effort (shallow-set longlining) was restricted or prohibited during 2001-2004. As a result, almost all the longline effort was directed towards tuna target (deep-set longline) and swordfish average weight then dropped below 150 pounds during that time. Swordfish average weight increased to more than 160 pounds from 2005 when the longline fishery was allowed to target swordfish once again.

Average weight of blue marlin varied substantially and ranged from 132 pounds in 2004 to 199 pounds in 1990. Average weight of striped marlin show very little variation over the 20-year period ranging from 48 pounds in 2001 to a record 72 pounds in 2005.

Source and Calculations: Average weight of the longline landings was summarized from the NMFS, Honolulu Laboratory and HDAR market sampling data from 1987 to 1999. The average weight was calculated from the State Commercial Marine Dealer data identified as landed by longline fishing during 2000 to 2006. Swordfish and sharks were landed headed and gutted. In December of 2004, the Honolulu Auction required fishers to gill and gut tunas and mahimahi that weighed more than 20 pounds and marlins greater than 40 pounds. When fish were processed prior to sale, e.g., headed and gutted, gilled and gutted, a conversion factor was applied to convert it to an estimated whole weight. Discarded fish and sharks that were retained for fins only were not represented in these size summaries.

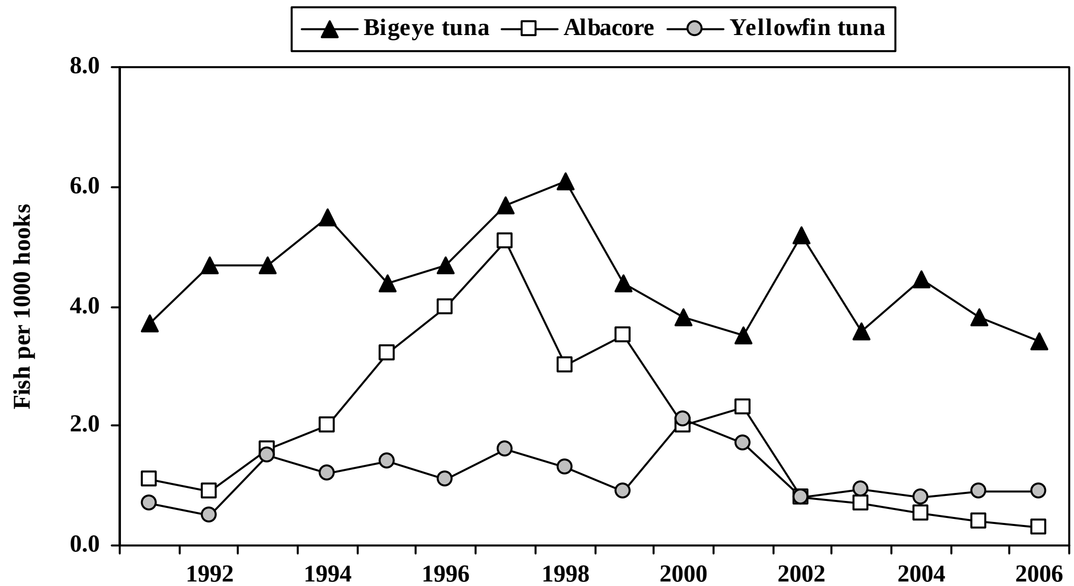
Table 5. Bycatch, retained catch, and total catch for the Hawaii-based longline fishery, 2006.

	Number Released	Percent Released	Kept	Caught
Tuna				
Albacore	172	1.5	11,250	11,422
Bigeye Tuna	2,985	2.5	115,680	118,665
Bluefin Tuna	0	0.0	6	6
Skipjack Tuna	887	6.8	12,108	12,995
Yellowfin Tuna	1,007	3.3	29,563	30,570
Other Tunas	1	2.4	40	41
Billfish				
Blue Marlin	53	0.9	5,651	5,704
Spearfish	134	1.1	11,793	11,927
Striped Marlin	287	1.4	20,731	21,018
Other Billfish	13	2.5	501	514
Swordfish	1,182	7.1	15,403	16,585
Other Pelagic Fish				
Mahimahi	804	1.5	51,796	52,600
Moonfish	61	0.5	12,763	12,824
Oilfish	451	1.9	23,354	23,805
Pomfret	382	0.9	42,751	43,133
Wahoo	114	0.7	17,021	17,135
Misc. Pelagic Fish	3,885	70.9	1,592	5,477
Total (Non-Shark)	**12,418**	**3.2**	**372,003**	**384,421**
Sharks				
Blue Shark	58,365	99.6	259	58,624
Mako Shark	1,690	58.7	1,188	2,878
Thresher Shark	4,375	92.0	380	4,755
Other sharks	2,036	90.6	211	2,247
Total Sharks	**66,466**	**97.0**	**2,038**	**68,504**

Interpretation: Bycatch of the Hawaii-based longline fishery was measured in number of fish released. The total bycatch for all species combined was 17% in 2006. Tunas, which are the primary target species of the longline fleet, had a low bycatch rate (3%). The number of bigeye tuna released was highest for all tuna species although the bycatch rate was relatively low (3%). Swordfish had a bycatch rate of 7% in 2006. Although marlins and other miscellaneous pelagic catch are not targeted, these species are highly marketable and also have low rates of discards (1% and 4%, respectively). Most of the sharks landed by the longline fishery were released. Blue shark and other sharks are not marketable and therefore a high percentage of those species were discarded. In contrast, a relatively higher proportion of mako and thresher sharks were kept since there was a market for their flesh.

Source and Calculations: Longline bycatch totals and percentages were compiled from NMFS longline logbook data. Longline catch was summarized on date of haul.

Figure 31. Hawaii longline CPUE for major tunas on tuna trips, 1991-2006.



Interpretation: Tuna-target trips always had the highest catch-per-unit-effort (CPUE) for bigeye tuna, which is the primary target species. Bigeye tuna CPUE was consistently higher than those for albacore or yellowfin tuna. Bigeye tuna CPUE peaked at 6.1 in 1998 and declined to 3.4 in 2006. Bigeye tuna CPUE was usually highest in the MHI EEZ.

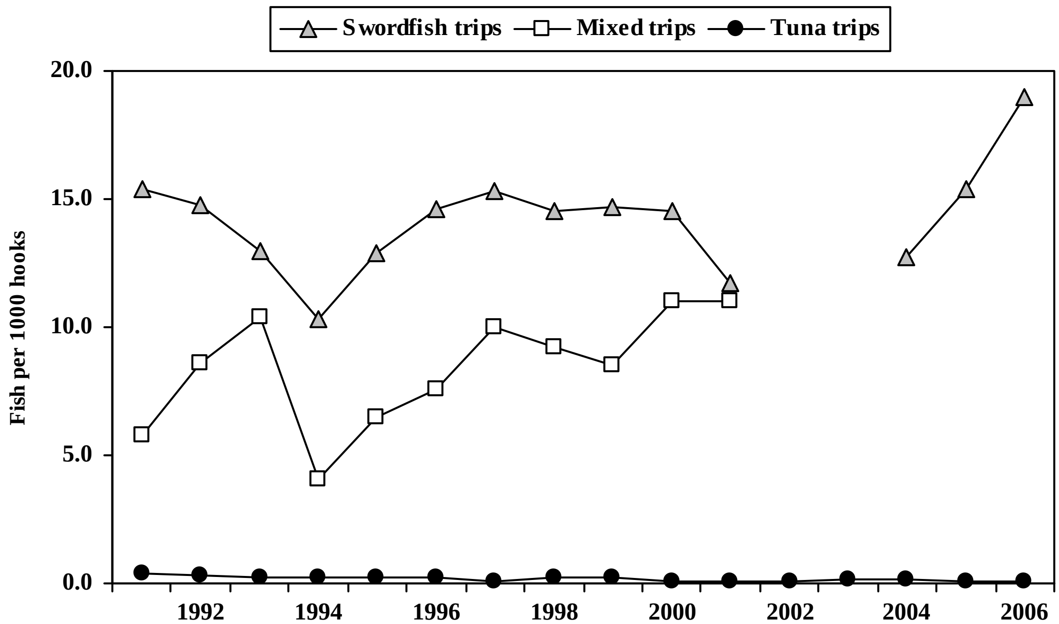
Albacore generally sells for a substantially lower price than bigeye tuna, so it is seldom targeted or is caught incidentally. Albacore CPUE rose rapidly in the early 1990s, peaked in 1997, then declined to a record low of 0.3 fish per 1000 hooks in 2006. Albacore CPUE is usually higher outside of the U.S. EEZ.

CPUE for yellowfin tuna was usually the lowest of the three major tuna species. Yellowfin tuna CPUE was lowest in 1992, increased to a CPUE of about 1 to 2 fish the following nine years, declined just below 1 fish thereafter. High yellowfin tuna CPUEs were observed in the EEZ of Kingman Reef and Palmyra Atoll.

	Tuna trip CPUE (fish per 1000 hooks)		
Year	Bigeye tuna	Albacore	Yellowfin tuna
1991	3.7	1.1	0.7
1992	4.7	0.9	0.5
1993	4.7	1.6	1.5
1994	5.5	2.0	1.2
1995	4.4	3.2	1.4
1996	4.7	4.0	1.1
1997	5.7	5.1	1.6
1998	6.1	3.0	1.3
1999	4.4	3.5	0.9
2000	3.8	2.0	2.1
2001	3.5	2.3	1.7
2002	5.2	0.8	0.8
2003	3.6	0.7	0.9
2004	4.5	0.5	0.8
2005	3.8	0.4	0.9
2006	3.4	0.3	0.9
Average	**4.48**	**1.96**	**1.15**
SD	**0.83**	**1.44**	**0.43**

Source and Calculation: Tuna CPUE was compiled from NMFS longline logbook data and summarized on date of haul. CPUE was measured as number of fish caught (kept + released) per 1000 hooks. Trip target information was collected from an interview with the longline captain or, if the captain could not be contacted, NMFS staff categorized the trip based on the vessel's fishing history and gear configuration.

Figure 32. Hawaii longline swordfish CPUE by trip type, 1991-2006.



Interpretation: Swordfish-targeted trips had the highest swordfish CPUE of all trip types. Swordfish CPUE on swordfish target trips declined to a low in 1994 but returned to typical swordfish catch rates the subsequent year up through 2000. Swordfish target effort was drastically reduced in 2001 and prohibited in 2002 and 2003 due to sea turtle conservation measures then reopened under a new set of regulations in April 2004. A few swordfish trips were made before the end of the year and had a respectable swordfish CPUE. In 2005, the first complete year since its reopening, the swordfish fishery managed to equal a record CPUE of 15.4 fish per 1000 hooks previously attained in 1991. The swordfish fishery was closed in March 2006 due to reaching the limit of 17 loggerhead turtle interaction but attained a record CPUE of 19.

Tuna-target trips had the lowest swordfish CPUEs throughout the monitoring period.

	Swordfish CPUE (fish per 1000 hooks)		
Year	**Swordfish trips**	**Mixed trips**	**Tuna trips**
1991	15.4	5.8	0.4
1992	14.8	8.6	0.3
1993	13.0	10.4	0.2
1994	10.3	4.1	0.2
1995	12.9	6.5	0.2
1996	14.6	7.6	0.2
1997	15.3	10.0	0.1
1998	14.5	9.2	0.2
1999	14.7	8.5	0.2
2000	14.5	11.0	0.1
2001	11.7	11.0	0.1
2002	-	-	0.1
2003	-	-	0.1
2004	12.7	-	0.1
2005	15.4	-	0.1
2006	19.0	-	0.1
Average	**14.20**	**8.43**	**0.17**
SD	**2.06**	**2.24**	**0.09**

Source and Calculation: Longline swordfish CPUE was compiled from NMFS longline logbook data and summarized based on date of haul. CPUE was based on number of swordfish caught (kept + released) divided by the number of hooks set. Trip target information was collected from an interview with the longline captain or, if the captain could not be contacted, NMFS staff categorized the trip based on the vessel's fishing history and gear configuration.

Figure 33a. Longline blue marlin CPUE by trip type, 1992-2006.

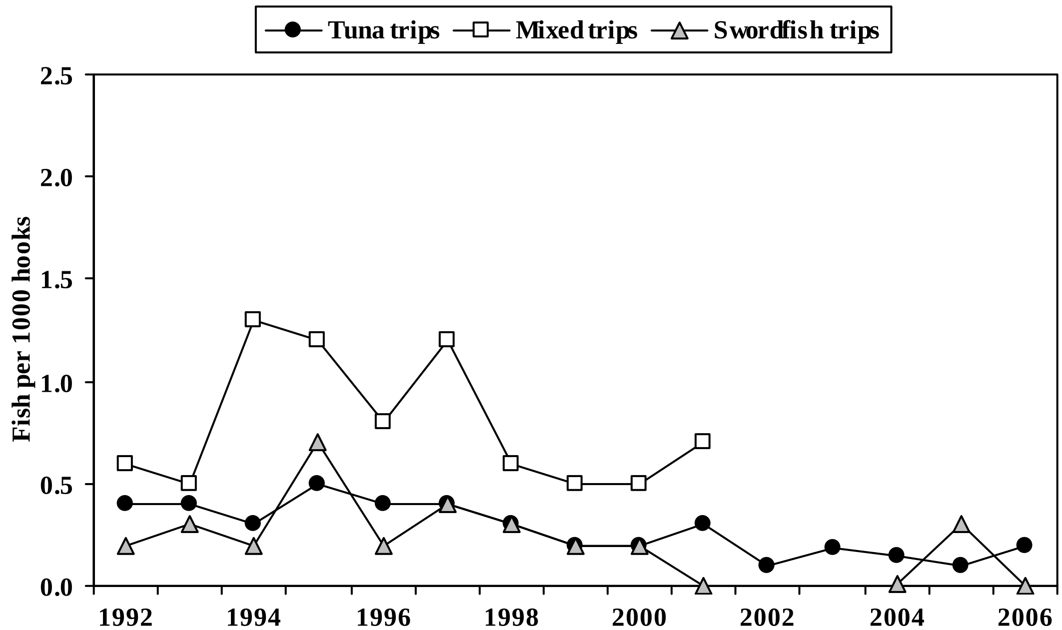
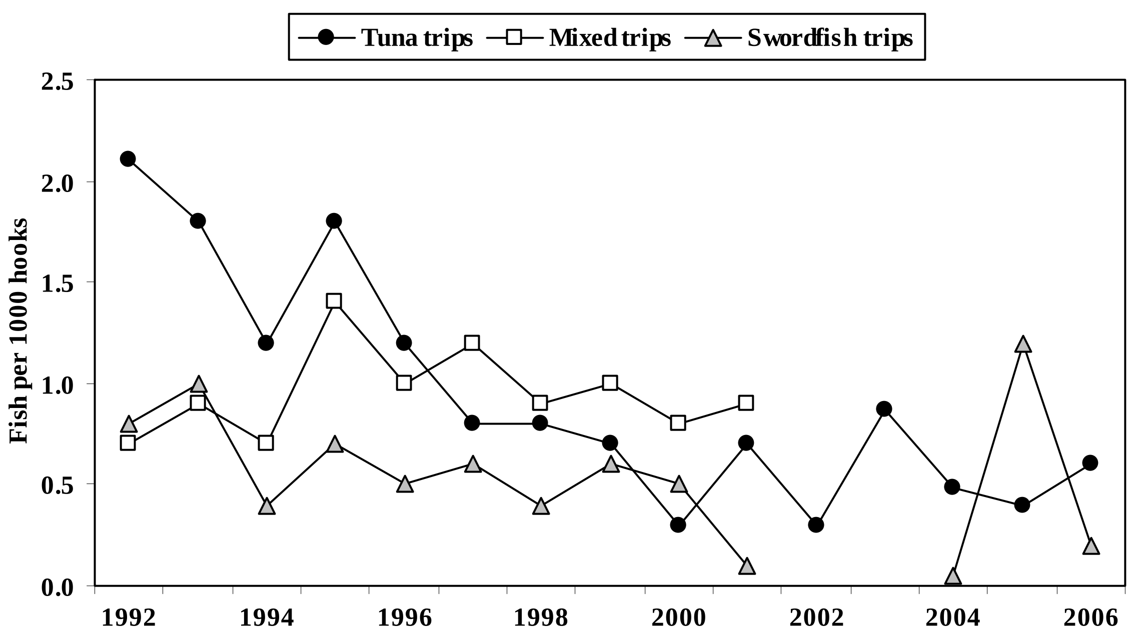


Figure 33b. Longline striped marlin CPUE by trip type, 1992-2006



Year	Blue marlin Tuna trips	Blue marlin Mixed trips	Blue marlin Swordfish trips	Striped marlin Tuna trips	Striped marlin Mixed trips	Striped marlin Swordfish trips
1991	**Poor species identification precluded quantification in 1991**					
1992	0.4	0.6	0.2	2.1	0.7	0.8
1993	0.4	0.5	0.3	1.8	0.9	1.0
1994	0.3	1.3	0.2	1.2	0.7	0.4
1995	0.5	1.2	0.7	1.8	1.4	0.7
1996	0.4	0.8	0.2	1.2	1.0	0.5
1997	0.4	1.2	0.4	0.8	1.2	0.6
1998	0.3	0.6	0.3	0.8	0.9	0.4
1999	0.2	0.5	0.2	0.7	1.0	0.6
2000	0.2	0.5	0.2	0.3	0.8	0.5
2001	0.3	0.7	0.0	0.7	0.9	0.1
2002	0.1	-	-	0.3	-	-
2003	0.2	-	-	0.9	-	-
2004	0.2	-	0.0	0.5	-	0.1
2005	0.1	-	0.3	0.4	-	1.2
2006	0.2	-	0.0	0.6	-	0.2
Average	**0.28**	**0.79**	**0.23**	**0.94**	**0.95**	**0.54**
SD	**0.12**	**0.32**	**0.19**	**0.57**	**0.22**	**0.33**

Interpretation: Blue and striped marlin are caught incidentally by the longline fishery. Therefore, their catch rates are significantly lower than those for target species such as swordfish and bigeye tuna. There were differences in marlin CPUE among trip types. Blue marlin CPUE was higher on mixed-target trips.The highest blue marlin CPUE on mixed trips occurred between 1994 and 1997; catch rates remained stable at slightly lower levels from 1998 thorough 2001. Striped marlin CPUE was higher on tuna-target trips in the early to mid-1990s and converged with catch rates of swordfish and mixed trips and remained low thereafter.

Source and Calculation: Longline CPUE was compiled from NMFS longline logbook data and summarized on date of haul. CPUE was based on number of blue or striped marlin caught (kept + released) divided by the number of hooks set for each trip type. Trip target information was collected from an interview with the longline captain or, if the captain could not be contacted, NMFS staff categorized the trip based on the vessel's fishing history and gear configuration.

Figure 34a. Hawaii longline mahimahi CPUE by trip type, 1991-2006.

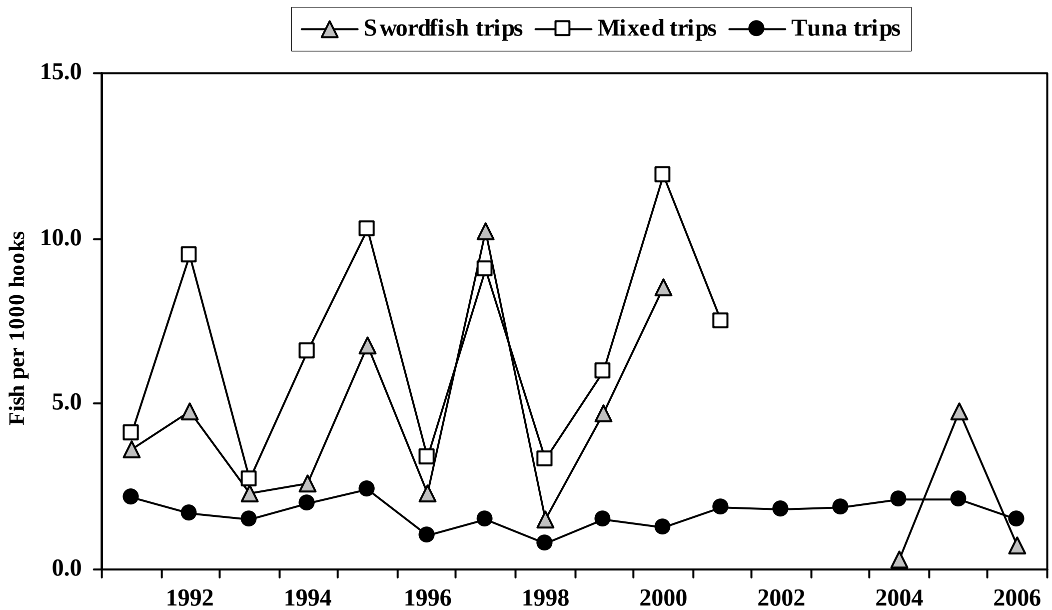
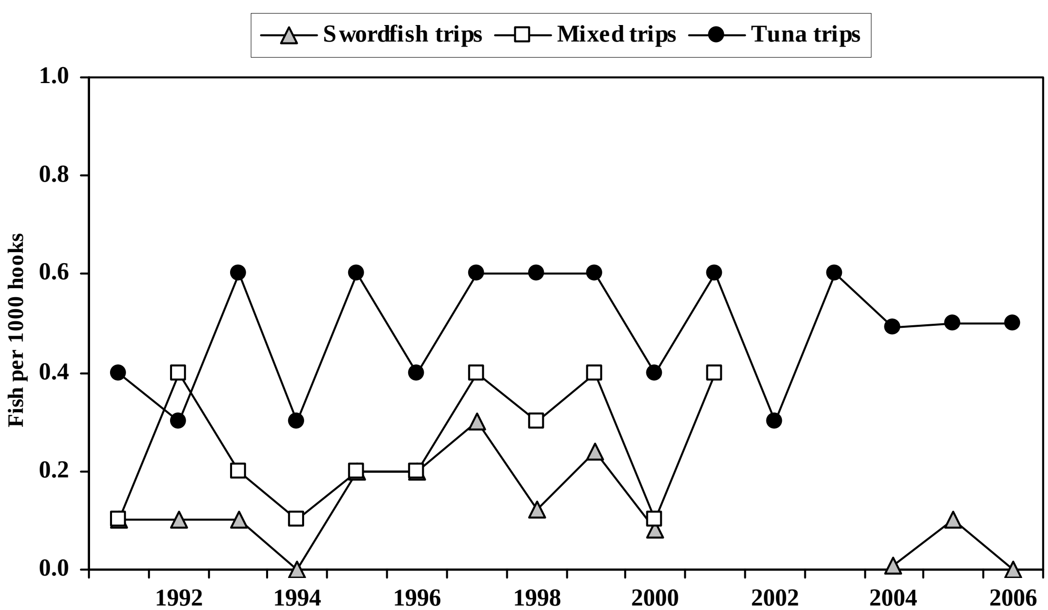


Figure 34b. Hawaii longline ono (wahoo) CPUE by trip type, 1991-2006.



Year	Mahimahi Tuna trips	Mahimahi Mixed trips	Mahimahi Swordfish trips	Ono Tuna trips	Ono Mixed trips	Ono Swordfish trips
1991	2.2	4.1	3.6	0.4	0.1	0.1
1992	1.7	9.5	4.8	0.3	0.4	0.1
1993	1.5	2.7	2.3	0.6	0.2	0.1
1994	2.0	6.6	2.6	0.3	0.1	0.0
1995	2.4	10.3	6.8	0.6	0.2	0.2
1996	1.0	3.4	2.3	0.4	0.2	0.2
1997	1.5	9.1	10.2	0.6	0.4	0.3
1998	0.8	3.3	1.5	0.6	0.3	0.1
1999	1.5	6.0	4.7	0.6	0.4	0.2
2000	1.3	11.9	8.5	0.4	0.1	0.1
2001	1.9	7.5		0.6	0.4	
2002	1.8	-	-	0.3	-	-
2003	1.9	-	-	0.6	-	-
2004	2.1	-	0.3	0.5	-	0.0
2005	2.1	-	4.8	0.5	-	0.1
2006	1.5	-	0.7	0.5	-	0.0
Average	**1.70**	**6.76**	**4.08**	**0.49**	**0.25**	**0.12**
SD	**0.44**	**3.16**	**2.99**	**0.12**	**0.13**	**0.09**

Interpretation: Mahimahi and ono were caught incidentally by the longline fishery. There were substantial differences in mahimahi CPUE among trip types and considerable annual variation in CPUE within each trip type (Fig. 34a). Mahimahi CPUE was higher on swordfish and mixed-target trips. The highest mahimahi CPUE was by mixed trips at 11.9 in 2000. Ono CPUE was consistently higher on tuna trips (Fig. 34b). Ono CPUE has been at the long-term from 2004-2006.

Source and Calculation: Longline CPUE was compiled from NMFS longline logbook data and summarized on date of haul. CPUE was based on number of mahimahi or ono caught (kept + released) divided by the number of hooks set for each trip type. Trip target information was collected from an interview with the longline captain or, if the captain could not be contacted, NMFS staff categorized the trip based on the vessel's fishing history and gear configuration.

Figure 35a. Hawaii longline moonfish CPUE by trip type, 1991-2006.

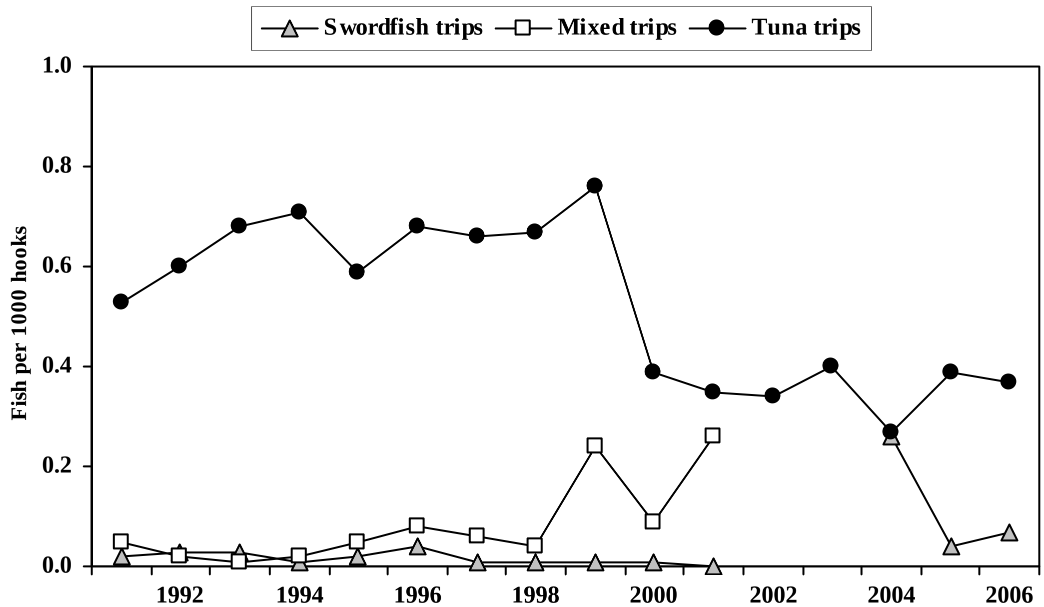
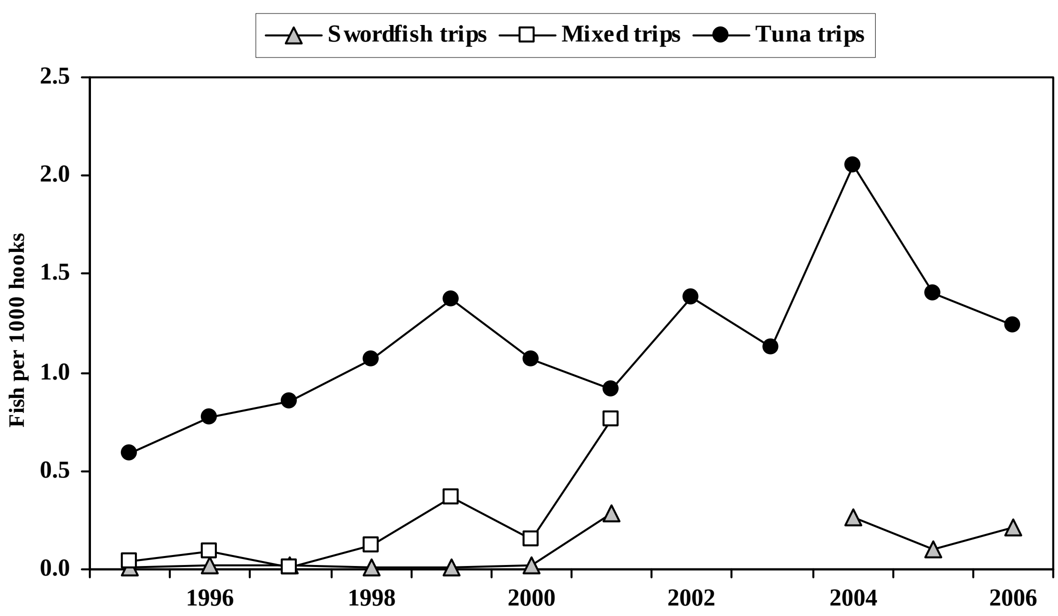


Figure 35b. Hawaii longline pomfret CPUE by trip type, 1994-2006.

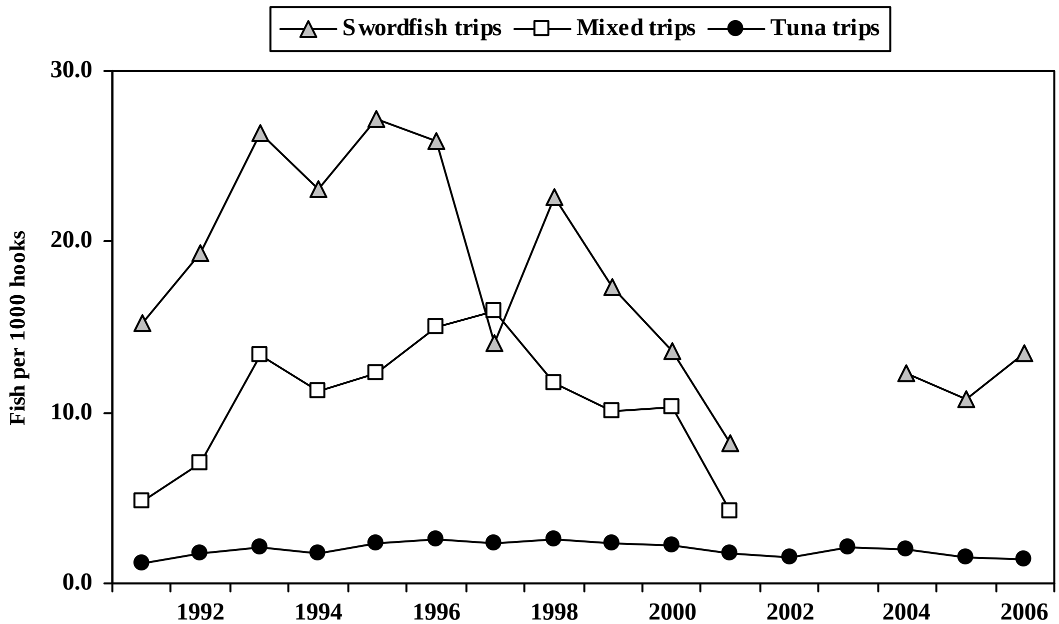


Year	Moonfish Tuna trips	Moonfish Mixed trips	Moonfish Swordfish trips	Pomfret Tuna trips	Pomfret Mixed trips	Pomfret Swordfish trips
1991	0.5	0.1	0.0	-	-	-
1992	0.6	0.0	0.0	-	-	-
1993	0.7	0.0	0.0	-	-	-
1994	0.7	0.0	0.0	-	-	-
1995	0.6	0.1	0.0	0.6	0.0	0.0
1996	0.7	0.1	0.0	0.8	0.1	0.0
1997	0.7	0.1	0.0	0.9	0.0	0.0
1998	0.7	0.0	0.0	1.1	0.1	0.0
1999	0.8	0.2	0.0	1.4	0.4	0.0
2000	0.4	0.1	0.0	1.1	0.2	0.0
2001	0.4	0.3	0.0	0.9	0.8	0.3
2002	0.3	-	-	1.4	-	-
2003	0.4	-	-	1.1	-	-
2004	0.3	-	0.3	2.1	-	0.3
2005	0.4	-	0.0	1.4	-	0.1
2006	0.4	-	0.1	1.2	-	0.2
Average	**0.52**	**0.08**	**0.04**	**1.15**	**0.22**	**0.09**
SD	**0.16**	**0.09**	**0.07**	**0.38**	**0.27**	**0.11**

Interpretation: Moonfish and pomfrets were caught incidentally by the longline fishery. There were substantial differences in moonfish and pomfret CPUE among the different trip types. CPUE for both moonfish and pomfret was higher on tuna-target trips. Moonfish CPUE during 2000-2006 appear to be about half compared to the period 1993-1999. Pomfret CPUE showed a relatively steady increase over the past 10 years declining in 2005 and 2006.

Source and Calculation: Longline CPUE was compiled from NMFS longline logbook data and summarized on date of haul. CPUE was based on number of moonfish or pomfrets caught (kept + released) divided by the number of hooks set for each trip type. Trip target information was collected from an interview with the longline captain or, if the captain could not be contacted, NMFS staff categorized the trip based on the vessel's fishing history and gear configuration.

Figure 36. Hawaii longline blue shark CPUE by trip type, 1991-2006.

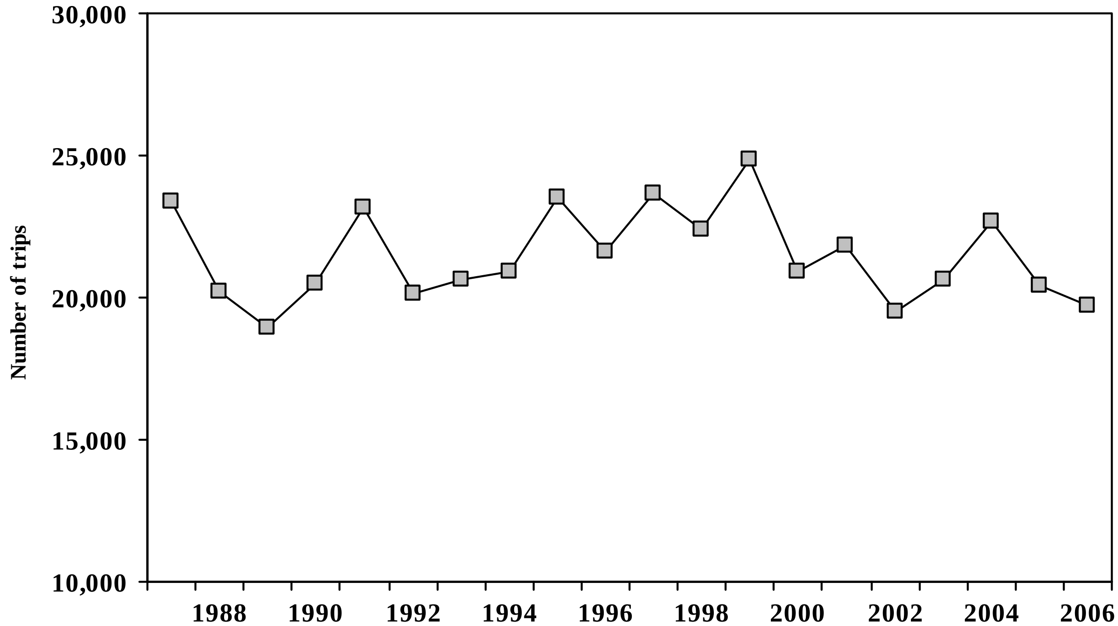


Interpretation: Blue sharks are caught incidentally by the longline fishery. The blue shark CPUE on swordfish-targeted trips is always considerably greater (by about 8-fold) than on tuna-targeted trips. Blue shark CPUE on swordfish targeted trip during 2004-2006 was lower than in the 1990s One factor that may have contributed to this is the implementation of sea turtle bycatch reduction measures, e.g., use of circle hooks, night setting, mackerel-like bait.

Source and Calculation: The longline blue shark CPUE was compiled from federal daily longline logbooks and summarized based on date of haul. CPUE was based on number of blue sharks caught (kept + released) divided by the number of hooks set. Trip target information was collected from an interview with the longline captain or, if the captain could not be contacted, NMFS staff categorized the trip based on the vessels' fishing history and gear configuration.

	Blue shark CPUE (fish per 1000 hooks)		
Year	**Swordfish trips**	**Mixed trips**	**Tuna trips**
1991	15.3	4.8	1.2
1992	19.4	7.1	1.7
1993	26.3	13.4	2.1
1994	23.1	11.3	1.8
1995	27.2	12.3	2.4
1996	25.9	15.0	2.5
1997	14.0	16.0	2.3
1998	22.6	11.7	2.6
1999	17.4	10.1	2.3
2000	13.6	10.3	2.2
2001	8.2	4.2	1.7
2002	-	-	1.5
2003	-	-	2.1
2004	12.3	-	2.0
2005	10.7	-	1.6
2006	13.5	-	1.4
Average	**17.82**	**10.56**	**1.96**
SD	**6.27**	**3.83**	**0.42**

Figure 37. Number of Main Hawaiian Islands troll trips, 1987-2006.

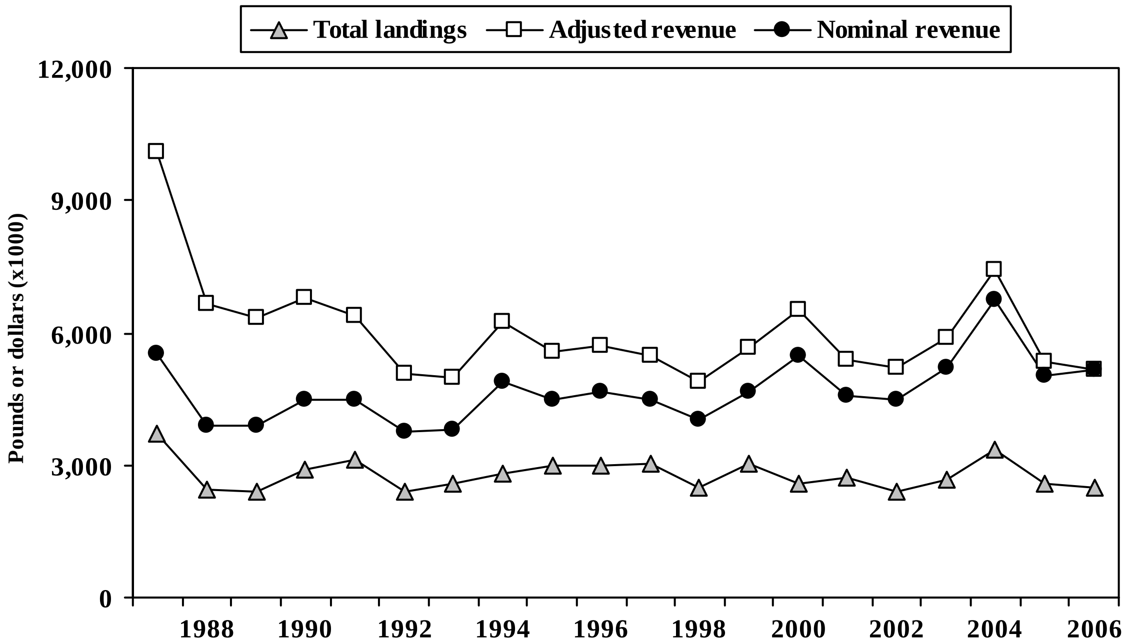


Interpretation: Main Hawaiian Islands (MHI) troll trips in 2006 was 19,702, 8% below the long-term average. The number of trips by the MHI troll fishery ranged from 18,924 in 1989 to 24,884 in 1999 with no apparent trend over the twenty year period.

Source and Calculations: The number of trips by the MHI troll fishery was calculated from the HDAR Commercial Fish Catch reports. A MHI troll trip was defined as a unique HDAR Commercial Marine License number returning on a particular day using the gear and fishing areas defined for the MHI troll fishery at the beginning of this module. There was no way to distinguish the difference between a Commercial Fish Catch report that represented no fishing effort from one that represented no catch (unsuccessful fishing operation(s)). Therefore, the MHI troll fishery trip count did not include Fish Catch reports with zero catch.

Year	MHI troll trips
1987	23,391
1988	20,202
1989	18,924
1990	20,468
1991	23,184
1992	20,109
1993	20,647
1994	20,905
1995	23,527
1996	21,611
1997	23,674
1998	22,403
1999	24,884
2000	20,950
2001	21,839
2002	19,520
2003	20,599
2004	22,668
2005	20,417
2006	19,702
Average	**21,481.2**
SD	**1,635.8**

Figure 38. Main Hawaiian Islands troll landings and revenue, 1987-2006.

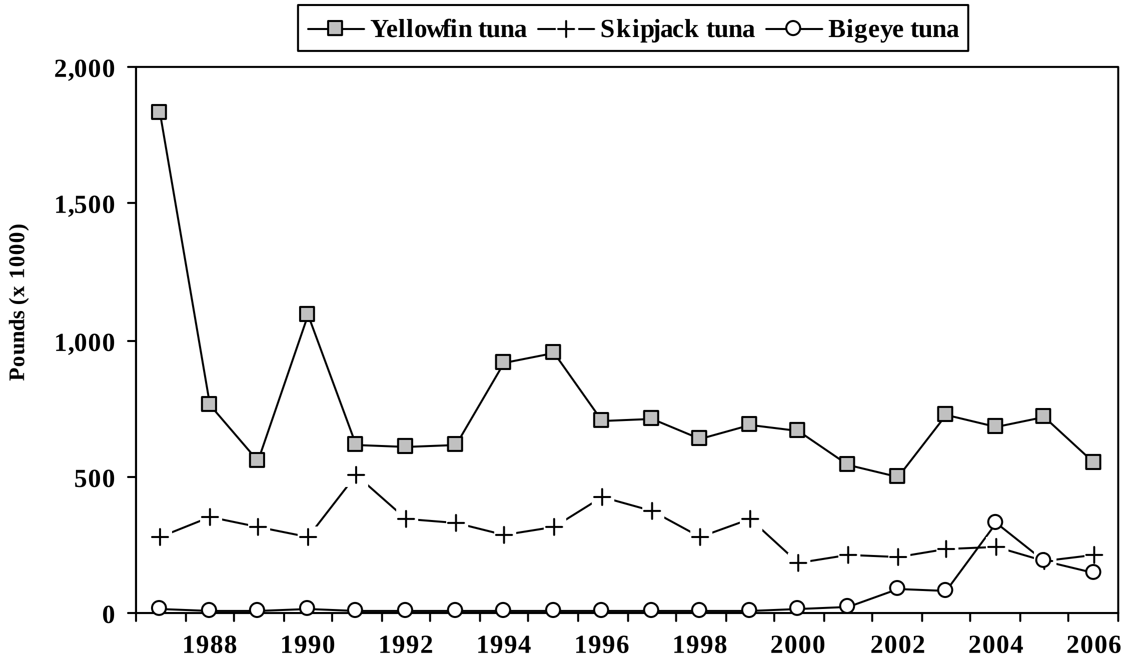


Interpretation: The total landings by the MHI troll fishery in 2006 were 2.5 million pounds worth an estimated $5.2 million. Total landings and revenue this year were 11% and 16% below their respective long-term averages. Landings ranged from 2.4 million pounds to 3.7 million pounds from 1987-2006. Adjusted revenue varied substantially from $4.9 million in 1998 to $10.1 million in 1987 and a increasing trend from the early 1990s.

Source and Calculations: Total landings and nominal revenue for the MHI troll fishery were derived from HDAR Commercial Fish Catch and HDAR Marine Dealer data. The total catch and nominal revenue values were obtained by adding the catch and revenue values for all species caught by the MHI troll fishery. The adjusted revenue is calculated by dividing the nominal revenue by the Honolulu CPI for the respective year then multiplying the result by the current year (2006) Honolulu CPI.

Year	Total landings (1000 lbs)	Adjusted revenue ($1000)	Nominal revenue ($1000)	Honolulu CPI
1987	3,709	$10,089	$5,536	114.9
1988	2,445	$6,667	$3,875	121.7
1989	2,401	$6,344	$3,899	128.7
1990	2,901	$6,814	$4,494	138.1
1991	3,102	$6,363	$4,497	148.0
1992	2,395	$5,079	$3,762	155.1
1993	2,578	$4,991	$3,816	160.1
1994	2,810	$6,234	$4,897	164.5
1995	2,966	$5,569	$4,471	168.1
1996	2,994	$5,704	$4,650	170.7
1997	3,016	$5,466	$4,487	171.9
1998	2,470	$4,897	$4,011	171.5
1999	3,014	$5,661	$4,685	173.3
2000	2,559	$6,505	$5,477	176.3
2001	2,738	$5,382	$4,585	178.4
2002	2,388	$5,219	$4,494	180.3
2003	2,692	$5,896	$5,195	184.5
2004	3,353	$7,433	$6,766	190.6
2005	2,563	$5,333	$5,038	197.8
2006	2,482	$5,161	$5,161	209.4
Average	**2,778.8**	**$6,040.5**	**$4,689.8**	
SD	**354.7**	**$1,176.9**	**$721.0**	

Figure 39. Main Hawaiian Islands troll tuna landings, 1987-2006.

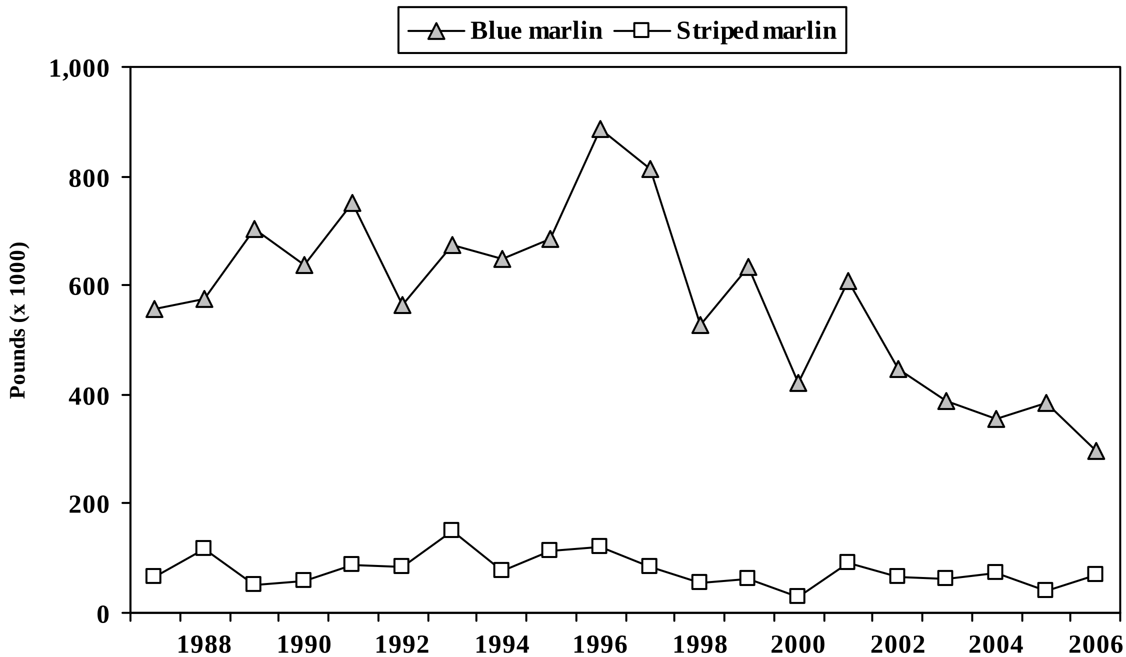


Interpretation: The MHI troll tuna landings in 2006 were 926,000 pounds, 17% below the long-term average. The largest component of tuna landings by the MHI troll fishery was yellowfin tuna. Landings of this species in 2006 were 27% below the long-term average. Skipjack tuna was the second largest component of the MHI troll landings. Skipjack tuna landings in 2006 were 28% below the long term average. Increasing catches of bigeye tuna and small catches of albacore were also landed by this fishery. The greatest bigeye tuna landings by this fishery were in 2004.

MHI troll tuna landings (1000 pounds)						
Year	**Yellowfin tuna**	**Skipjack tuna**	**Bigeye tuna**	**Albacore**	**Other tunas**	**Total tunas**
1987	1,828	277	11	1	19	2,136
1988	764	351	10	1	16	1,141
1989	559	318	11	1	14	904
1990	1,089	278	15	1	18	1,401
1991	615	504	11	2	13	1,145
1992	606	347	9	3	15	980
1993	616	332	4	3	9	964
1994	914	283	6	22	15	1,240
1995	949	318	10	10	9	1,295
1996	707	424	4	5	6	1,146
1997	712	376	6	7	6	1,107
1998	636	278	5	4	10	933
1999	687	347	7	87	7	1,135
2000	670	181	15	5	6	878
2001	545	215	23	13	5	801
2002	499	203	86	9	6	804
2003	727	237	81	10	27	1,081
2004	681	245	328	7	43	1,304
2005	715	188	187	15	16	1,121
2006	549	214	149	2	11	926
Average	**753.4**	**295.7**	**48.9**	**10.4**	**13.5**	**1,122.1**
SD	**291.6**	**82.8**	**83.6**	**18.9**	**9.0**	**291.8**

Source and Calculations: The tuna catch statistics for the MHI troll fishery were derived from HDAR Commercial Fish Catch and Marine Dealer data. The MHI troll fishery tuna catch was calculated by totaling tuna catch by species and includes kawakawa and unclassified tunas in the other tunas category.

Figure 40. Main Hawaiian Islands troll billfish landings, 1987-2006.

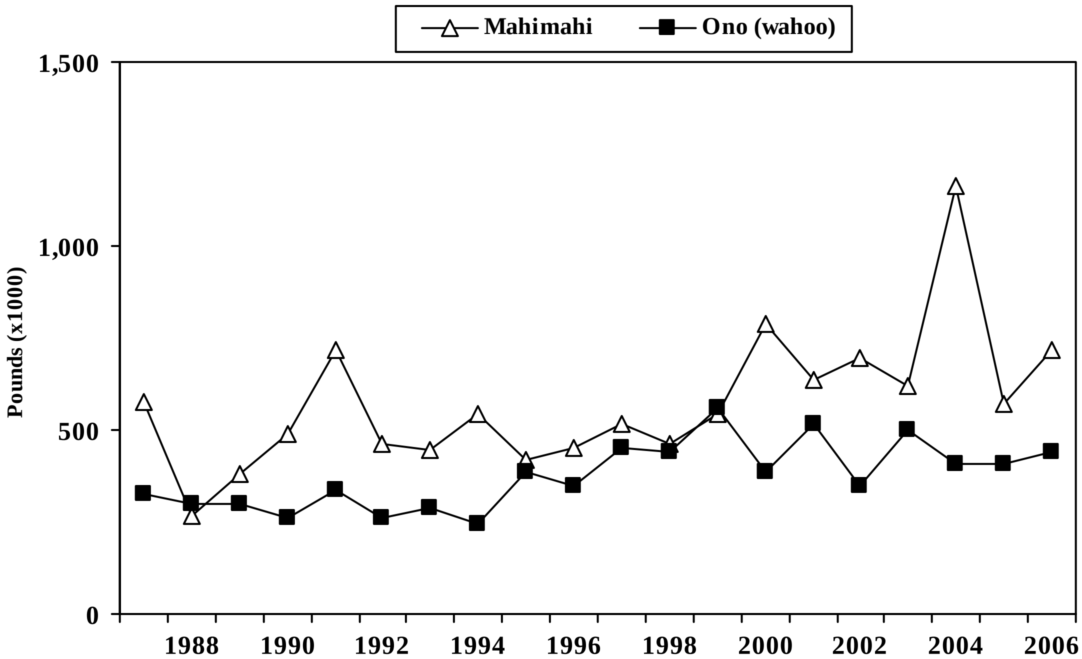


Interpretation: Billfish landings by the MHI troll fishery in 2006 were 396,000 pounds, 44% below the long-term average. Landings of billfish by the MHI troll fishery consisted primarily of blue marlin. Blue marlin landings have been on a decreasing trend from a peak of 885,000 pounds in 1996 to 296,000 pounds in 2006. The striped marlin landings in this fishery were relatively low. The MHI troll fishery also had small landings of other billfish, e.g., including spearfish, sailfish, swordfish, and black marlin.

Source and Calculations: The billfish catch statistics for the MHI troll fishery were derived from HDAR Commercial Fish Catch and Marine Dealer data. Billfish catch by the MHI troll fishery catch was calculated by totaling billfish catch by species and include black marlin, sailfish, spearfish and unclassified billfish in the other billfish category.

	MHI troll billfish landings (1000 pounds)				
Year	Blue marlin	Striped marlin	Other billfish	Swordfish	Total billfishes
1987	557	66	42	1	666
1988	575	118	41	2	736
1989	704	52	47	2	805
1990	638	59	33	1	732
1991	749	89	52	1	890
1992	565	83	35	0	683
1993	675	150	44	0	870
1994	648	76	46	1	770
1995	684	114	57	1	856
1996	885	119	37	1	1,042
1997	814	83	36	1	935
1998	527	57	41	1	626
1999	635	62	71	1	769
2000	422	30	49	6	507
2001	608	93	75	6	782
2002	446	65	22	3	536
2003	390	63	37	2	492
2004	355	74	46	0	475
2005	385	42	34	1	462
2006	296	71	28	1	396
Average	**578.0**	**78.3**	**43.6**	**1.6**	**701.5**
SD	**158.2**	**29.2**	**13.0**	**1.6**	**178.5**

Figure 41. Main Hawaiian Islands troll landings of other pelagic PMUS, 1987-2006.

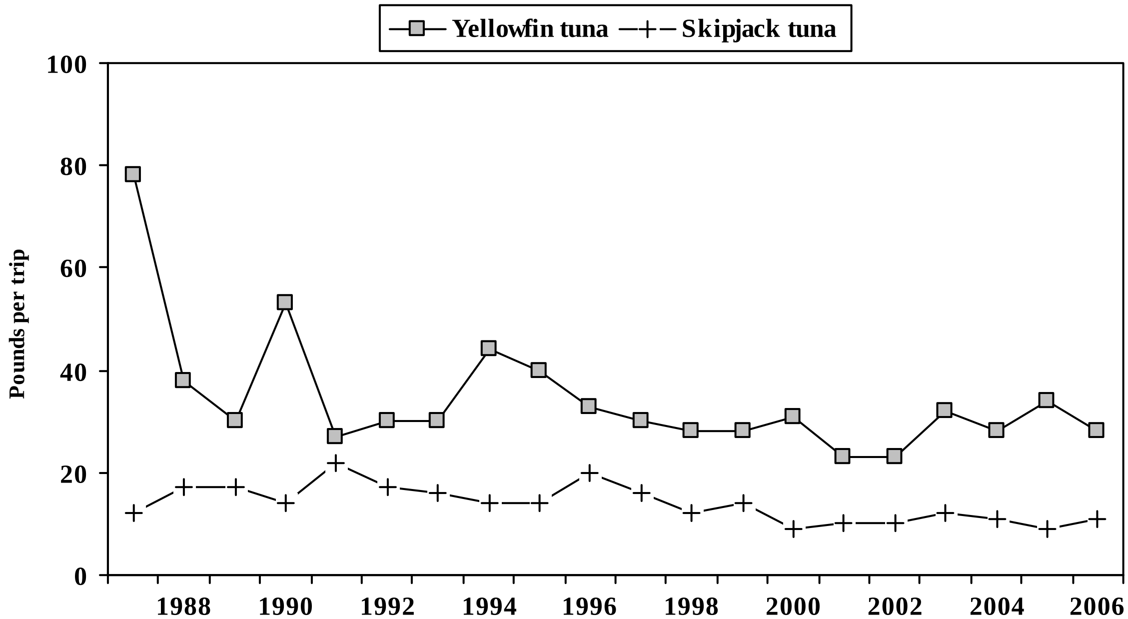


Interpretation: Landings of "other pelagic" species by the MHI troll fishery in 2006 was 1.2 million pounds, 21% above the long-term average. Mahimahi and ono comprised majority of these landings. Both mahimahi and ono landings in 2006 were above their long term average by 27% and 17%, respectively.

Source and Calculations: The other pelagic catch statistics for the MHI troll fishery were derived from HDAR Commercial Fish Catch and Dealer data. Other pelagic catch by the MHI troll fishery was calculated by totaling other pelagic catch by species. The total other pelagic column is the sum of the two dominant pelagic species plus miscellaneous pelagic species, which include barracuda, flying fish, and frigate mackerel.

	MHI troll other pelagic landings (1000 pounds)			
Year	**Mahimahi**	**Ono (wahoo)**	**Misc pelagics**	**Total other pelagics**
1987	579	324	3	907
1988	264	298	6	569
1989	379	298	14	691
1990	491	262	16	768
1991	718	337	12	1,067
1992	461	262	8	731
1993	444	286	13	744
1994	546	245	9	800
1995	419	388	8	815
1996	451	347	7	806
1997	517	451	5	974
1998	464	442	6	912
1999	545	558	6	1,109
2000	786	386	7	1,174
2001	637	515	6	1,155
2002	696	350	4	1,048
2003	620	498	3	1,119
2004	1,163	409	3	1,574
2005	569	406	4	978
2006	719	440	2	1,160
Average	**573.4**	**375.2**	**7.1**	**955.0**
SD	**189.3**	**89.6**	**3.9**	**229.9**

Figure 42. Main Hawaiian Islands troll tuna landings per trip, 1987-2006.



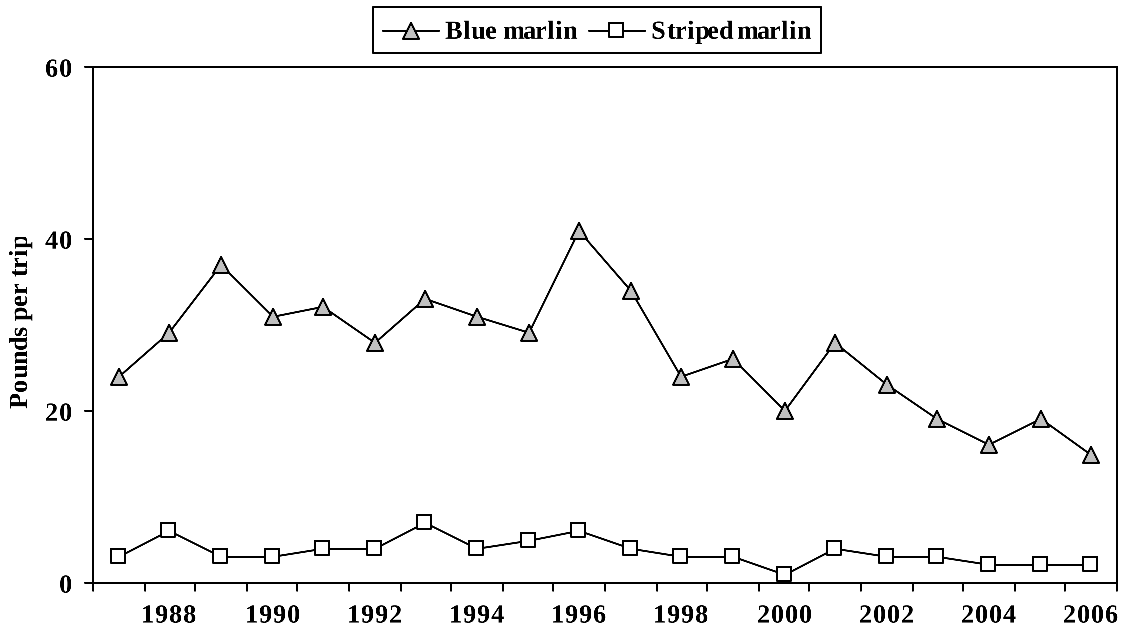
Interpretation: MHI troll yellowfin tuna CPUE was consistently higher than skipjack tuna CPUE. Yellowfin tuna CPUE was 28 pounds per trip and has been below the long-term average CPUE for the past eleven years. Yellowfin tuna peaked near 80 pounds in 1987 and trended downward to a low of 23 pounds per trip in 2001 and 2002. Skipjack tuna CPUE was 11 pounds in 2006 and has been below its long-term average for the past seven years.

Source and Calculations: The MHI troll tuna CPUE was defined as landings per successful day fished and complied from HDAR Commercial Fish Catch data. MHI troll CPUE was measured as pounds per trip. MHI troll catch and effort were calculated using the specific gear and area codes described in the introduction. Since there was no way to determine if a zero Commercial Fish Catch report represented no fishing effort at all or no catch (unsuccessful fishing operation(s)), the CPUE calculation did not include Fish Catch reports with zero catch. Yellowfin tuna and skipjack tuna catches were divided by the number of MHI troll trips.

MHI troll tuna CPUE (pounds per trip)

Year	Yellowfin tuna	Skipjack tuna
1987	78	12
1988	38	17
1989	30	17
1990	53	14
1991	27	22
1992	30	17
1993	30	16
1994	44	14
1995	40	14
1996	33	20
1997	30	16
1998	28	12
1999	28	14
2000	31	9
2001	23	10
2002	23	10
2003	32	12
2004	28	11
2005	34	9
2006	28	11
Average	**34.4**	**13.9**
SD	**12.5**	**3.6**

Figure 43. Main Hawaiian Island troll marlin landings per trip, 1987-2006.



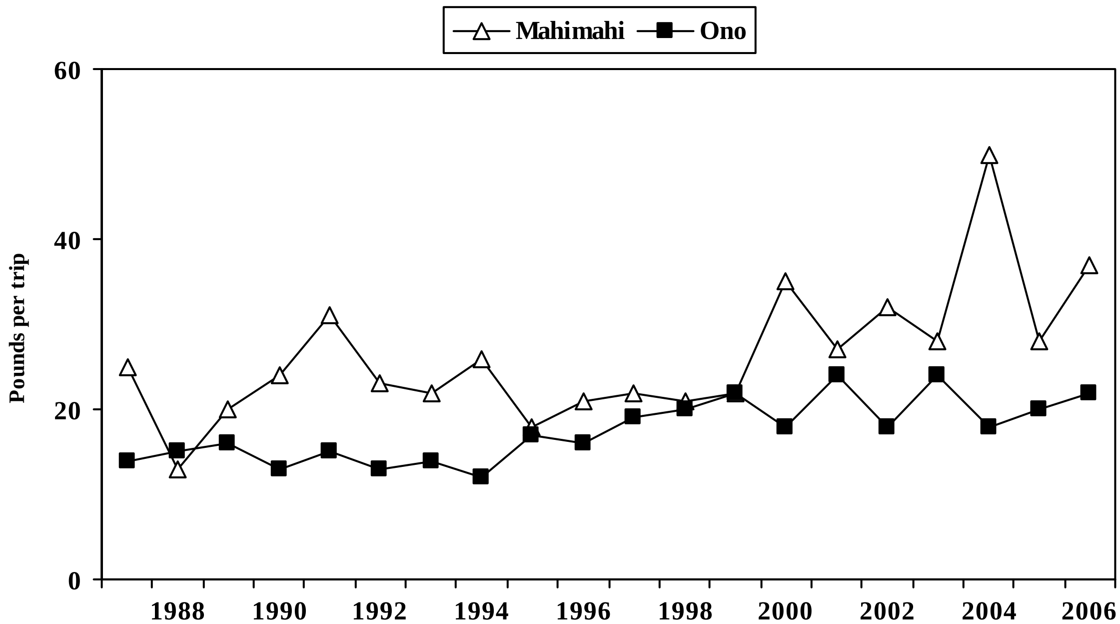
Interpretation: CPUE for blue marlin was substantially higher compared to the CPUE for striped marlin. CPUE for both blue marlin and striped marlin in 2006 was below their long-term average by 44%. Blue marlin and striped marlin CPUE were both below their long-term average for the past five years. The CPUE for blue marlin appeared to be on a downward trend from the mid 1990s. CPUE for striped marlin also seemed to be stable.

Source and Calculations: The MHI troll marlin CPUE was defined as landings per successful day fished and complied from HDAR Commercial Fish Catch data. MHI troll CPUE was measured as pounds per trip. MHI troll catch and effort were calculated using the specific gear and area codes described in the introduction. Since there was no way to determine if a zero Commercial Fish Catch report represented no fishing effort at all or no catch (unsuccessful fishing operation(s)), the CPUE calculation did not include Fish Catch reports with zero catch. Blue marlin and striped marlin catches were divided by the number of MHI troll trips.

MHI troll marlin CPUE (pounds per trip)

Year	Blue marlin	Striped marlin
1987	24	3
1988	29	6
1989	37	3
1990	31	3
1991	32	4
1992	28	4
1993	33	7
1994	31	4
1995	29	5
1996	41	6
1997	34	4
1998	24	3
1999	26	3
2000	20	1
2001	28	4
2002	23	3
2003	19	3
2004	16	2
2004	19	2
2004	15	2
Average	**27.0**	**3.6**
SD	**7.0**	**1.5**

Figure 44. Main Hawaiian Island troll mahimahi and ono landings per trip, 1987-2006.

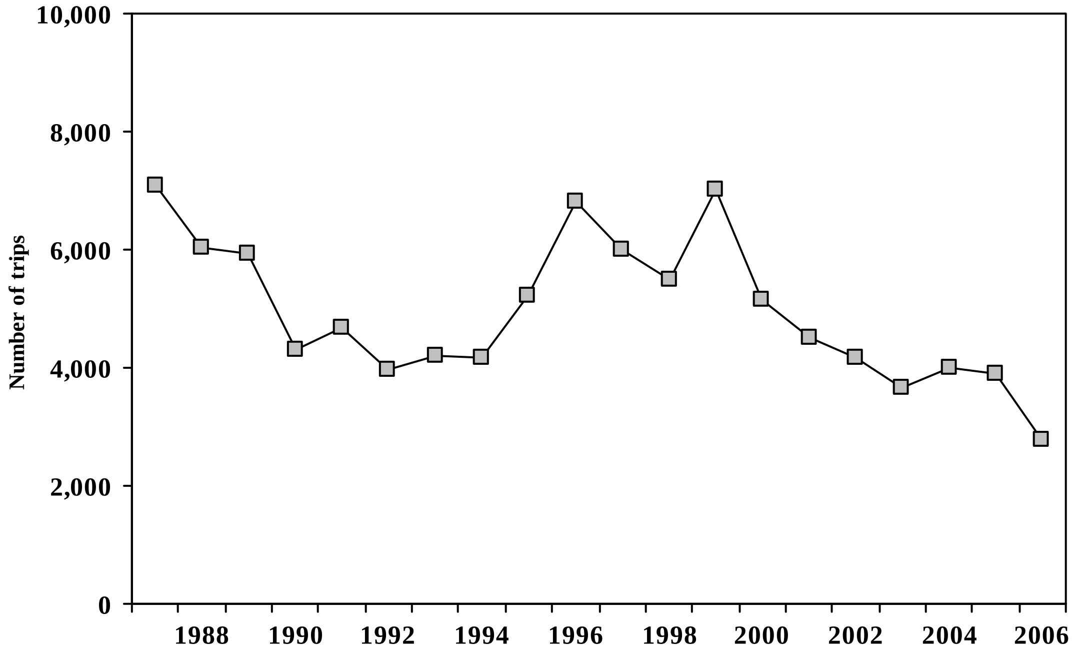


Interpretation: Mahimahi CPUE for the MHI troll fishery was slightly higher and more variable than that for ono. CPUE for both mahimahi and ono in 2006 exceeded their long-term average by 41% and 26%, respectively. CPUE for both species have been on an upward trend since the mid-1990s.

Source and Calculations: The MHI troll mahimahi and ono CPUEs were defined as landings per successful day fished and complied from HDAR Commercial Fish Catch data. MHI troll CPUE was measured as pounds per trip. MHI troll catch and effort were calculated using the specific gear and area codes described in the introduction. Since there was no way to determine if a zero Commercial Fish Catch report represented no fishing effort at all or no catch (unsuccessful fishing operation(s)), the CPUE calculation did not include Fish Catch reports with zero catch. Mahimahi and ono catches were divided by the number of MHI troll trips.

MHI troll mahimahi and ono CPUE (pounds per trip)		
Year	**Mahimahi**	**Ono**
1987	25	14
1988	13	15
1989	20	16
1990	24	13
1991	31	15
1992	23	13
1993	22	14
1994	26	12
1995	18	17
1996	21	16
1997	22	19
1998	21	20
1999	22	22
2000	35	18
2001	27	24
2002	32	18
2003	28	24
2004	50	18
2005	28	20
2006	37	22
Average	**26.3**	**17.5**
SD	**8.0**	**3.6**

Figure 45. Number of Main Hawaiian Islands handline trips, 1987-2006.

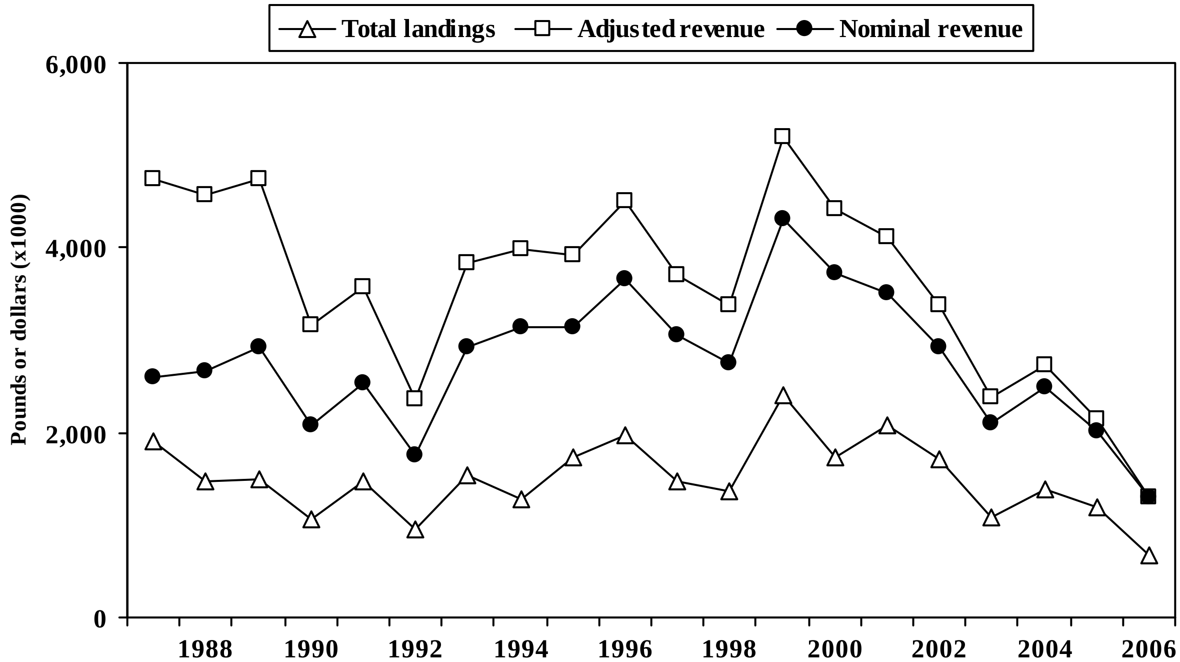


Interpretation: There were 2,775 MHI handline trips in 2006, 44% below the long-term average. MHI handline trip activity appeared to have two periods of high effort (1986-1989 and 1996-1999) and more recently, a downward trend thereafter.

Source and Calculations: The number of MHI handline trips was calculated from HDAR Commercial Fish Catch data. A MHI troll trip was defined as a unique HDAR Commercial Marine License number returning on a particular day using the gear and fishing areas defined for the MHI handline fishery at the beginning of this module. There was no way to distinguish the difference between a Commercial Fish Catch report that represented no fishing effort from one that represented no catch (unsuccessful fishing operation(s)). Therefore, the MHI handline fishery trip count did not include Fish Catch reports with zero catch.

Year	MHI handline trips
1987	7,069
1988	6,032
1989	5,947
1990	4,300
1991	4,688
1992	3,981
1993	4,209
1994	4,157
1995	5,230
1996	6,801
1997	6,010
1998	5,481
1999	7,004
2000	5,149
2001	4,496
2002	4,180
2003	3,660
2004	3,986
2005	3,894
2006	2,775
Average	**4,952.5**
SD	**1,206.8**

Figure 46. Main Hawaiian Island handline landings and revenue, 1987-2006.

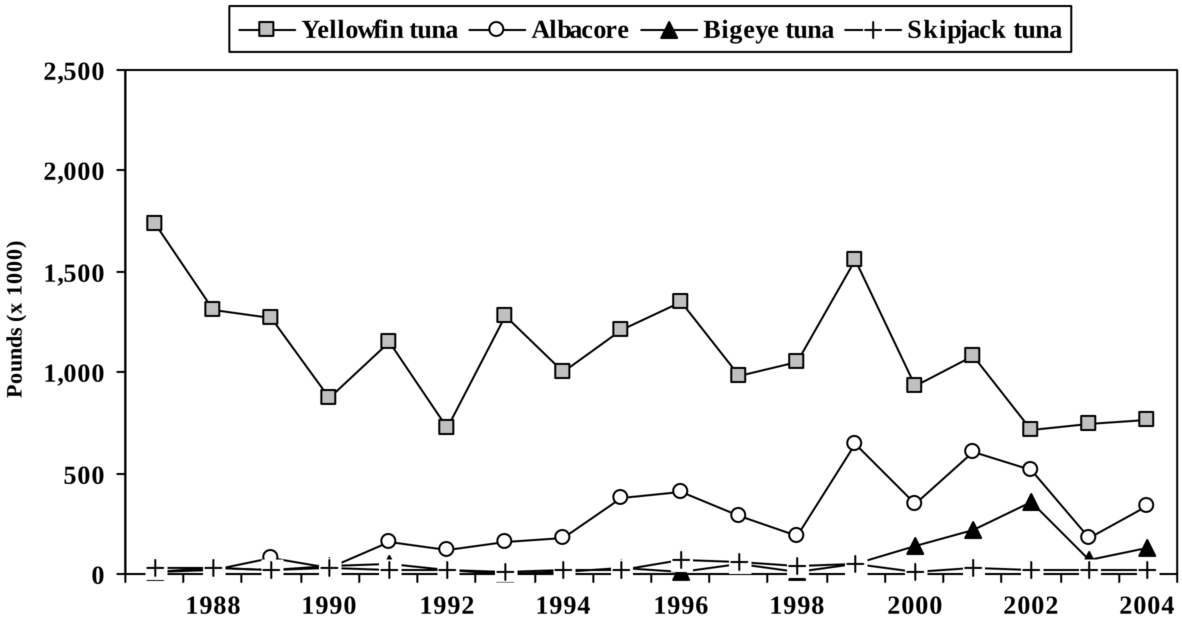


Interpretation: Total landings by the MHI handline fishery in 2006 were 670,000 pounds, worth an estimated $1.3 million. Total landings and revenue by this fishery was below the long-term values by 55% and 64%, respectively. The recent pattern for MHI handline fishery landings and revenue was similar to the trip activity, which consisted of a decreasing trend from 1999.

Source and Calculations: Total landings and nominal revenue for the MHI handline fishery were derived from HDAR Commercial Fish Catch and Marine Dealer data. The total catch and nominal revenue values were obtained by adding the catch and revenue values for all species caught by the MHI handline fishery. The adjusted revenue is calculated by dividing the nominal revenue by the respective year Honolulu CPI and then multiplying the result by the current year (2006) Honolulu CPI.

Year	Total landings (1000 lbs)	Adjusted revenue ($1000)	Nominal revenue ($1000)	Honolulu CPI
1987	1,914	$4,749	$2,606	114.9
1988	1,470	$4,567	$2,654	121.7
1989	1,487	$4,754	$2,922	128.7
1990	1,060	$3,160	$2,084	138.1
1991	1,477	$3,582	$2,532	148.0
1992	946	$2,368	$1,754	155.1
1993	1,532	$3,824	$2,924	160.1
1994	1,287	$3,991	$3,135	164.5
1995	1,733	$3,910	$3,139	168.1
1996	1,962	$4,501	$3,669	170.7
1997	1,479	$3,708	$3,044	171.9
1998	1,368	$3,369	$2,759	171.5
1999	2,413	$5,197	$4,301	173.3
2000	1,728	$4,427	$3,727	176.3
2001	2,072	$4,123	$3,513	178.4
2002	1,702	$3,387	$2,916	180.3
2003	1,091	$2,389	$2,105	184.5
2004	1,386	$2,727	$2,482	190.6
2005	1,204	$2,135	$2,017	197.8
2006	670	$1,304	$1,304	209.4
Average	**1,499.1**	**$3,608.6**	**$2,779.4**	
SD	**411.5**	**$1,017.5**	**$720.8**	

Figure 47. Main Hawaiian Island handline tuna landings, 1987-2006.

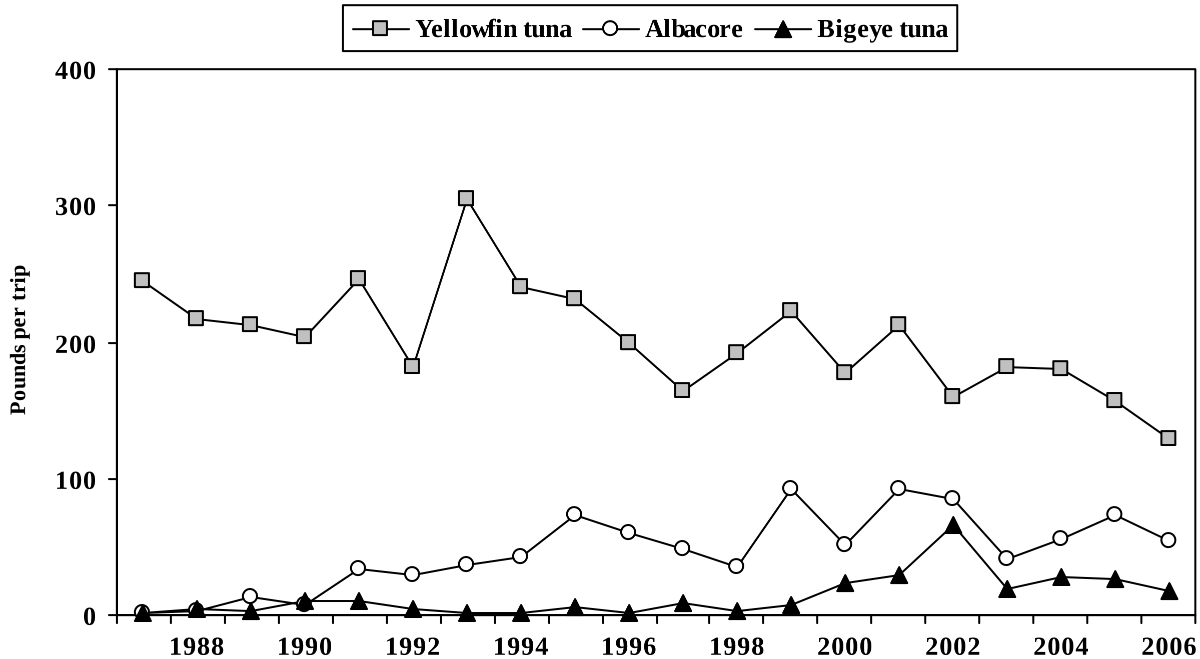


Interpretation: The MHI handline tuna landings in 2006 were 613,000 pounds, 56% below the long-term average. The largest component of tuna landings by the MHI handline fishery was yellowfin tuna, followed by albacore and bigeye tuna. Yellowfin tuna landings by MHI handline fishery were 66% below the long-term average. Albacore and bigeye tuna were also below their long-term averages by 24% and 34%, respectively.

Source and Calculations: The tuna landing statistics for the MHI handline fishery were derived from HDAR Commercial Fish Catch and Dealer data. The MHI handline fishery tuna catch was calculated by totaling tuna catch by species and includes kawakawa and unclassified tunas in the other tunas category.

	MHI handline tuna landings (1000 lbs)					
Year	**Yellowfin tuna**	**Albacore**	**Bigeye tuna**	**Skipjack tuna**	**Other tunas**	**Total**
1987	1,734	12	6	25	5	1,782
1988	1,310	18	28	29	9	1,395
1989	1,266	78	19	20	11	1,393
1990	876	31	41	26	7	981
1991	1,154	157	45	19	6	1,380
1992	722	116	19	21	7	885
1993	1,283	154	2	14	5	1,458
1994	1,003	176	10	21	3	1,213
1995	1,207	380	33	17	6	1,642
1996	1,352	409	11	69	4	1,845
1997	986	287	52	56	3	1,384
1998	1,052	191	15	38	3	1,298
1999	1,559	642	46	52	2	2,302
2000	937	350	141	14	3	1,444
2001	1,082	602	222	30	4	1,940
2002	711	511	354	20	3	1,598
2003	746	176	74	16	4	1,016
2004	762	339	125	23	18	1,267
2005	631	372	100	18	6	1,127
2006	357	198	46	10	1	613
Average	**1,036.5**	**259.9**	**69.4**	**26.8**	**5.4**	**1,398.1**
SD	**334.2**	**186.6**	**86.7**	**15.6**	**3.8**	**390.6**

Figure 48. Main Hawaiian Island handline tuna landings per trip, 1987-2006.

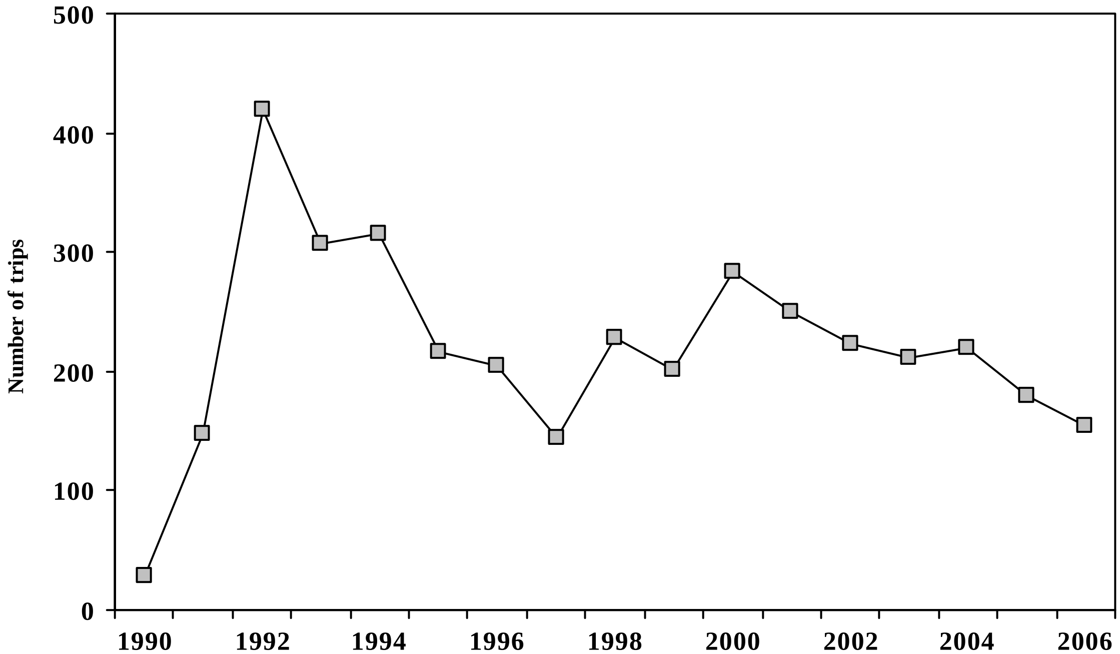


Interpretation: MHI handline yellowfin tuna CPUE was 129 pounds per trip in 2006, more than double that for albacore and seven times that of bigeye tuna. Nonetheless, the yellowfin tuna MHI handline CPUE was on a decreasing trend and at its lowest level throughout 1986-2006. In contrast, albacore and bigeye tuna CPUE were above their long term averages.

Source and Calculations: The MHI handline tuna CPUE was defined as landings per successful day fished and complied from HDAR Commercial Fish Catch data. MHI handline CPUE was measured as pounds per trip. MHI handline catch and effort were calculated using the specific gear and area codes described in the introduction. Since there was no way to determine the difference between a Commercial Fish Catch report that represented no fishing effort at all or no catch (unsuccessful fishing operation(s)), the CPUE calculation did not include Fish Catch reports with zero catch. Tuna landings for each species were divided by the number of MHI handline trips.

	MHI handline landings per trip (pounds)			
Year	**Yellowfin tuna**	**Albacore**	**Bigeye tuna**	**Total**
1987	245	2	1	252
1988	217	3	5	231
1989	213	13	3	234
1990	204	7	10	228
1991	246	33	10	294
1992	181	29	5	222
1993	305	37	1	346
1994	241	42	2	292
1995	231	73	6	314
1996	199	60	2	271
1997	164	48	9	230
1998	192	35	3	237
1999	223	92	7	329
2000	177	51	23	253
2001	212	93	29	341
2002	159	85	66	316
2003	181	41	19	247
2004	180	56	28	274
2005	157	73	26	261
2006	129	54	17	204
Average	**202.8**	**46.4**	**13.6**	**268.8**
SD	**40.0**	**27.9**	**15.5**	**42.6**

Figure 49. Number of offshore tuna handline trips, 1990-2006.



Interpretation: The offshore tuna handline fishery made 155 trips in 2006, slightly less than the previous year. Trips by offshore tuna handline vessels peaked at 420 trips in 1992 showed a slow decline from 2000 to 2006.

Source and Calculations: The number of offshore handline trips was counted from HDAR Commercial Fish Catch data. An offshore troll trip was defined as a unique HDAR Commercial Marine License number returning on a particular day using the gear and fishing areas defined for the offshore handline fishery at the beginning of this module. There was no way to distinguish a zero Commercial Fish Catch report that represented no fishing effort from one that represented no catch (unsuccessful fishing operation(s)), the trip count did not include Fish Catch reports with zero catch.

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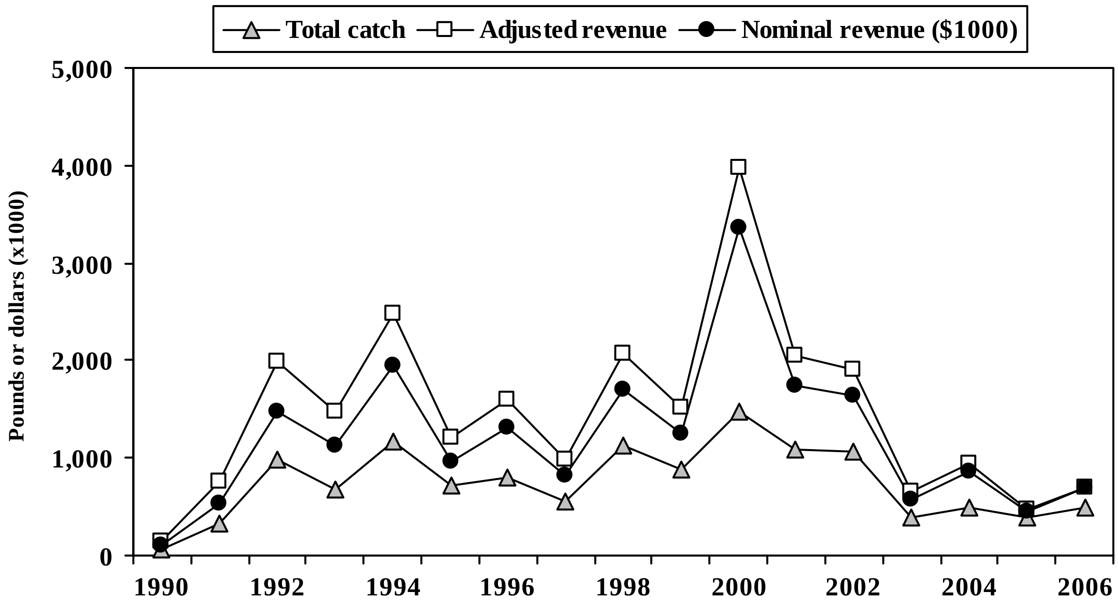
Year	Offshore handline trips
1990	29
1991	148
1992	420
1993	307
1994	316
1995	216
1996	204
1997	145
1998	228
1999	202
2000	284
2001	250
2002	223
2003	212
2004	220
2005	180
2006	155
Average	**219.9**
SD	**85.0**

Figure 50. Offshore tuna handline landings and revenue, 1990-2006.

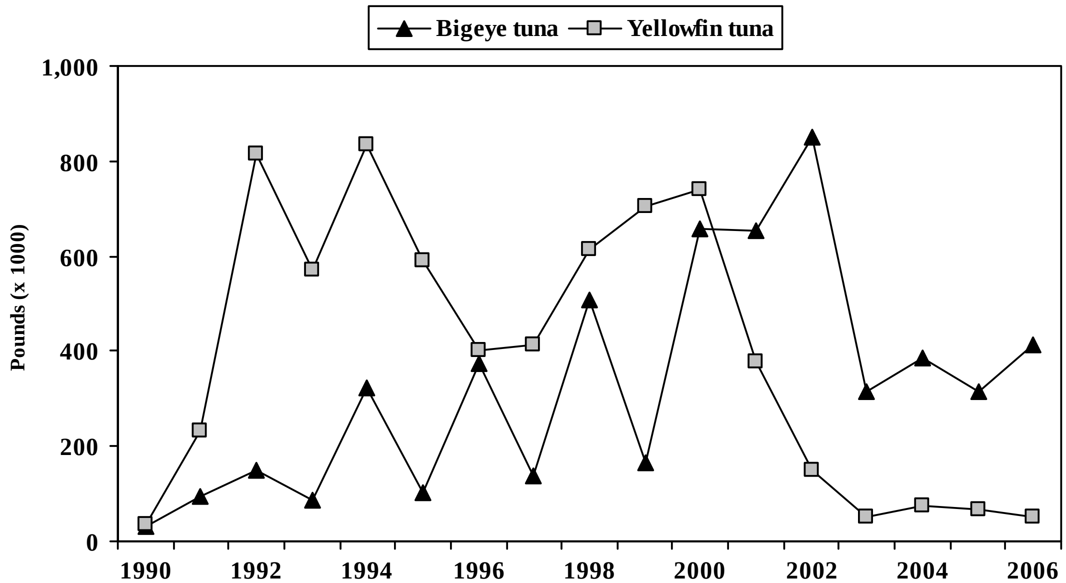


Interpretation: Total landings and revenue by the offshore handline fishery were 487,000 pounds worth an estimated $696,000 in 2006. Total landings and revenue by this fishery increased slightly from the previous year but were below the long-term values by 35% and 53%, respectively in 2006. The recent trend for offshore handline fishery landings and revenue was one of a steep decline since 2000.

Source and Calculations: Total landings and nominal revenue for the offshore handline fishery were derived from HDAR Commercial Fish Catch and Marine Dealer data. The total landings and nominal revenue values were obtained by adding the catch and revenue values for all species caught by the offshore handline fishery. The adjusted revenue is calculated by dividing the nominal revenue by the respective year Honolulu CPI and then multiplying the result by the current year (2006) Honolulu CPI.

Year	Total landings (1000 lbs)	Adjusted revenue ($1000)	Nominal revenue ($1000)	Honolulu CPI
1990	66	$147	$97	138.1
1991	331	$754	$533	148.0
1992	987	$1,994	$1,477	155.1
1993	679	$1,471	$1,125	160.1
1994	1,175	$2,478	$1,947	164.5
1995	714	$1,201	$964	168.1
1996	793	$1,597	$1,302	170.7
1997	563	$988	$811	171.9
1998	1,134	$2,071	$1,696	171.5
1999	888	$1,518	$1,256	173.3
2000	1,482	$3,985	$3,355	176.3
2001	1,087	$2,052	$1,748	178.4
2002	1,059	$1,913	$1,647	180.3
2003	399	$653	$575	184.5
2004	485	$945	$860	190.6
2005	392	$475	$449	197.8
2006	487	$696	$696	209.4
Average	**748.3**	**$1,466.9**	**$1,208.1**	
SD	**372.9**	**$923.0**	**$759.8**	

Figure 51. Offshore tuna handline landings, 1990-2006.



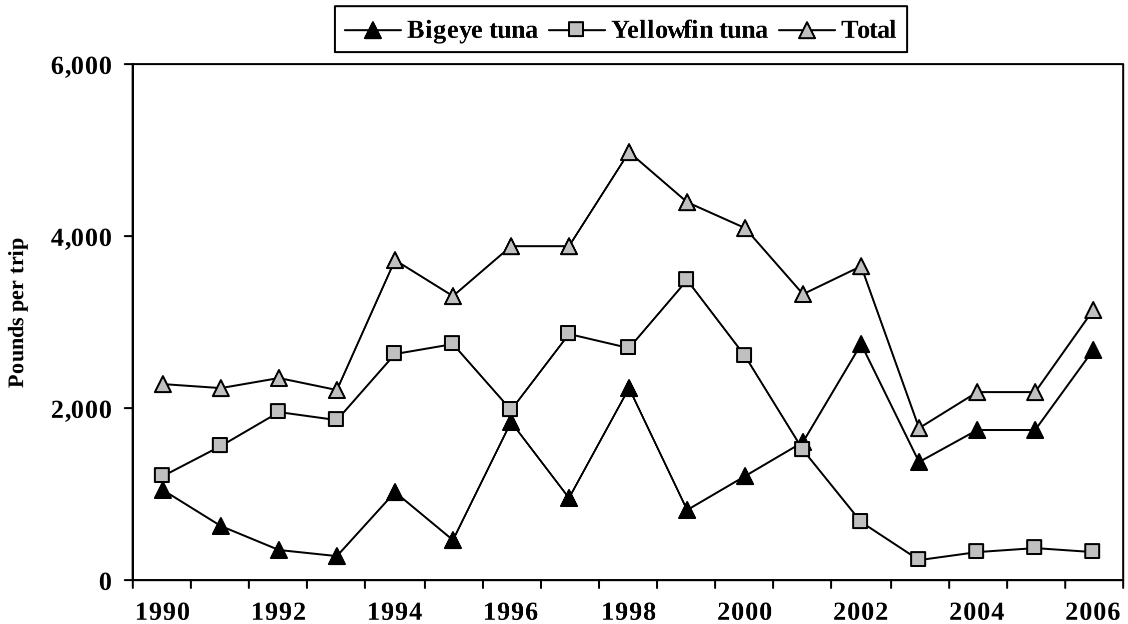
Interpretation: The offshore handline landings in 2006 were 487,000 pounds, 35% below the long-term average. The largest component of landings by the offshore handline fishery was bigeye tuna, yellowfin tuna with small landings of mahimahi. Bigeye tuna landings by the offshore handline fishery were 27% above the long-term average, whereas yellowfin tuna was below the long-term averages by 87%

Most of the tunas caught by the offshore handline fishery are smaller than those taken by the MHI handline fishery. The yellowfin tuna catch reported in the HDAR Commercial Fish Catch data may actually be bigeye tuna; knowledgeable observers have reported that the small tunas caught by this fishery (up to 70%) are predominantly bigeye tuna (David Itano, pers. comm.). As standard practice, tuna catch reported by fishermen as "ahi" are coded by the HDAR Fisheries Statistics Unit as yellowfin tuna. Therefore, the total tuna catch by the offshore handline fishery is almost certainly more accurate than the catch for individual species. HDAR is making an effort to help educate fishermen and fish dealers to identify small tunas correctly.

	Offshore handline landings (1000 pounds)			
Year	**Bigeye tuna**	**Yellowfin tuna**	**Mahimahi**	**Total**
1990	31	35	0	66
1991	94	232	5	331
1992	151	816	21	987
1993	85	571	23	679
1994	324	834	18	1,175
1995	102	591	20	714
1996	375	401	17	793
1997	138	415	9	563
1998	508	613	13	1,134
1999	164	703	20	888
2000	656	739	54	1,482
2001	655	379	35	1,087
2002	851	151	26	1,059
2003	314	53	14	399
2004	385	75	14	485
2005	315	67	6	392
2006	414	52	8	487
Average	**327.1**	**395.7**	**17.8**	**748.2**
SD	**234.7**	**291.6**	**12.7**	**373.0**

Source and Calculations: The catch statistics for the offshore tuna handline fishery were derived from HDAR Commercial Fish Catch and Dealer data. The offshore tuna handline fishery catch was calculated by totaling catch by species.

Figure 52. Offshore tuna handline landings per trip, 1990-2006.



Interpretation: Offshore handline CPUE was 3,132 pounds in 2006, close to its long-term average. Bigeye tuna CPUE in 2006 was twice as high as the long-term average. In contrast, yellowfin tuna and mahimahi CPUE down this year by 80% and 27%, respectively. In general, the trend for bigeye tuna CPUE was that of an increase while yellowfin tuna CPUE was a decrease.

The total landings per trip by the offshore handline fishery may be more accurate than the catch for individual species due to misidentification of tunas in this fishery.

	Offshore handline landings per trip (pounds)			
Year	**Bigeye tuna**	**Yellowfin tuna**	**Mahimahi**	**Total**
1990	1,052	1,217	2	2,271
1991	635	1,568	31	2,234
1992	359	1,942	49	2,349
1993	277	1,860	76	2,213
1994	1,024	2,638	56	3,718
1995	474	2,738	94	3,306
1996	1,838	1,966	82	3,886
1997	954	2,865	65	3,884
1998	2,228	2,689	57	4,974
1999	812	3,480	101	4,397
2000	1,200	2,601	173	4,088
2001	1,610	1,514	131	3,327
2002	2,741	676	100	3,650
2003	1,380	233	62	1,761
2004	1,750	330	62	2,185
2005	1,749	375	34	2,180
2006	2,674	337	53	3,132
Average	**1,338.6**	**1,707.6**	**72.2**	**3,150.3**
SD	**756.6**	**1,042.9**	**40.0**	**948.8**

Source and Calculations: The offshore handline tuna CPUE was defined as landings per successful day fished and complied from HDAR Commercial Fish Catch data. Offshore handline CPUE was measured as pounds per trip. Offshore handline catch and effort were calculated using the specific gear and area codes described in the introduction. Since there was no way to determine if a zero Commercial Fish Catch report represented no fishing effort at all or no catch (unsuccessful fishing operation(s)), the CPUE calculation did not include Fish Catch reports with zero catch. Total landings by the offshore handline fishery were divided by the number of offshore tuna handline trips.

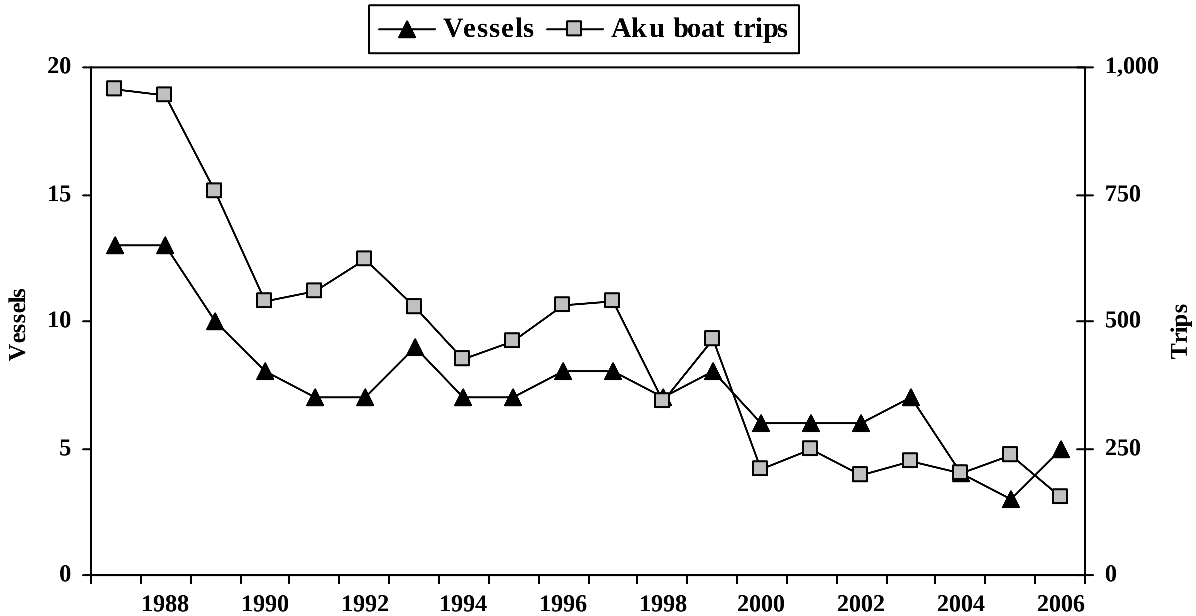
Table 6. Average weight by species for the troll and handline landings, 1987-2006.

	Tunas				Billfish			Other PMUS	
Year	**Albacore**	**Bigeye tuna**	**Skipjack tuna**	**Yellowfin tuna**	**Blue marlin**	**Striped marlin**	**Swordfish**	**Mahimahi**	**Ono (wahoo)**
1987	33	13	7	26	209	65	125	20	23
1988	57	33	7	27	178	64	115	18	24
1989	49	24	11	40	180	73	104	20	25
1990	52	25	6	35	246	71	93	19	24
1991	51	28	8	32	194	62	111	15	22
1992	52	24	6	26	213	69	73	13	25
1993	52	20	7	41	179	66	138	14	23
1994	50	22	8	35	228	66	94	14	26
1995	20	15	7	28	200	60	106	15	24
1996	41	21	11	40	192	65	87	16	22
1997	40	19	11	34	175	68	96	16	21
1998	21	21	6	28	224	64	83	18	25
1999	48	24	7	31	210	55	88	18	27
2000	48	28	11	48	238	61	178	15	25
2001	42	20	11	39	181	50	158	15	24
2002	38	30	10	41	224	42	139	16	26
2003	46	20	6	30	185	49	137	16	22
2004	43	36	6	27	192	60	143	18	23
2005	48	30	5	23	144	74	121	15	23
2006	46	32	8	29	206	66	121	16	23
Average	**43.9**	**24.3**	**8.0**	**33.0**	**199.9**	**62.5**	**115.5**	**16.4**	**23.9**
SD	**9.8**	**6.0**	**2.1**	**6.7**	**24.8**	**8.2**	**27.3**	**2.0**	**1.6**

Interpretation: Except for mean weight for bigeye tuna marlin, the average weight for fish landed by troll and handline gear in 2006 was about the same as their respective long-term average. Mean weight for bigeye tuna in 2006 was 8 pounds more or 32% higher than the long-term average. Blue marlin had the biggest mean weight of all species for troll and handline landed fish at 206 pounds.

Source and Calculations: The average weights were calculated from HDAR commercial fish catch data. Total weight landed was divided by the total number landed. Landings by the troll and handline fishery were usually landed whole. However, if the catch was processed, i.e., headed and gutted, gilled and gutted a raising factor was applied to approximate whole weight of the fish.

Figure 53. Hawaii aku boat (pole and line) vessel and trip activity, 1987-2006.

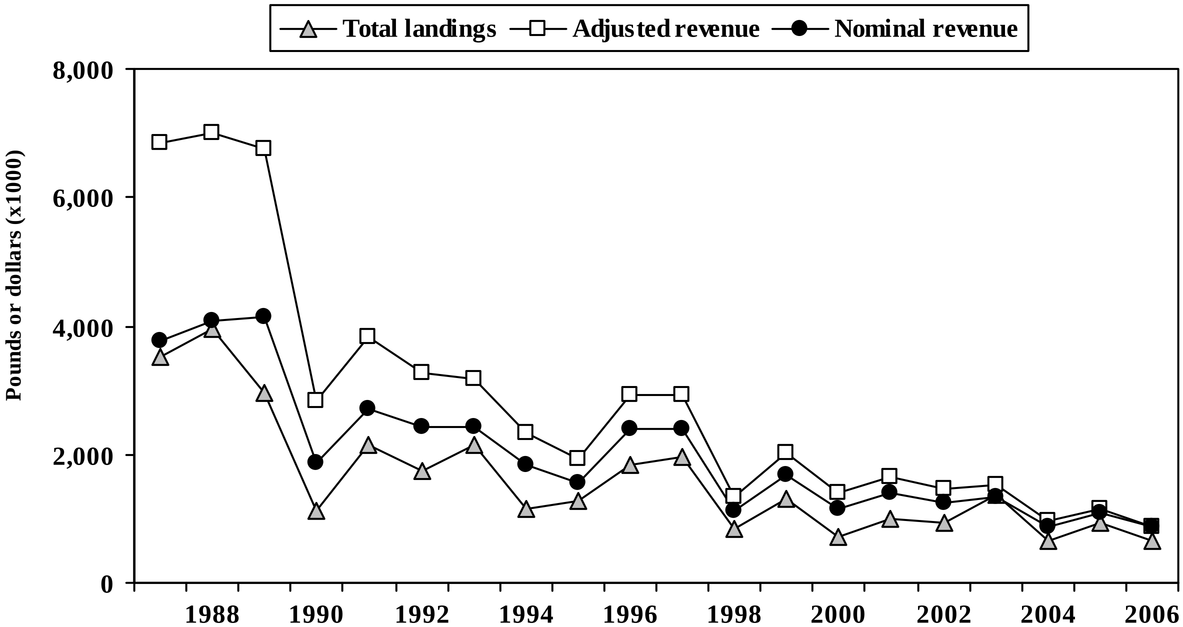


Interpretation: The vessel and trip activity of the aku boat fishery has been in decline over the 20-year period with only five aku boat vessels fishing in 2006. The steep decline occurred in the 1980s and was attributed primarily to the closure of the tuna cannery. Attrition of vessels, many which were built in the 1940s, and poor skipjack tuna landings also contributed to the long-term decline in this fishery. The trip activity for the aku boat fishery in 2006 was a record low 155 trips.

Source and Calculations: The number of aku boat vessels and trips were counted from HDAR Commercial Aku Boat Fish Catch data. The number of aku boat vessels was determined by counting the number of unique vessel names. A unique combination of HDAR Commercial Marine License numbers, landing month and day was used to define an aku boat trip. The calculation for aku boat trips included zero landing trips.

Year	Vessels	Aku boat trips
1987	13	958
1988	13	945
1989	10	757
1990	8	541
1991	7	561
1992	7	621
1993	9	528
1994	7	425
1995	7	460
1996	8	530
1997	8	540
1998	7	341
1999	8	466
2000	6	210
2001	6	248
2002	6	197
2003	7	225
2004	4	199
2005	3	238
2006	5	155
Average	**7.5**	**457.3**
SD	**2.5**	**239.3**

Figure 54. Hawaii aku boat (pole and line) landings and revenue, 1987-2006.

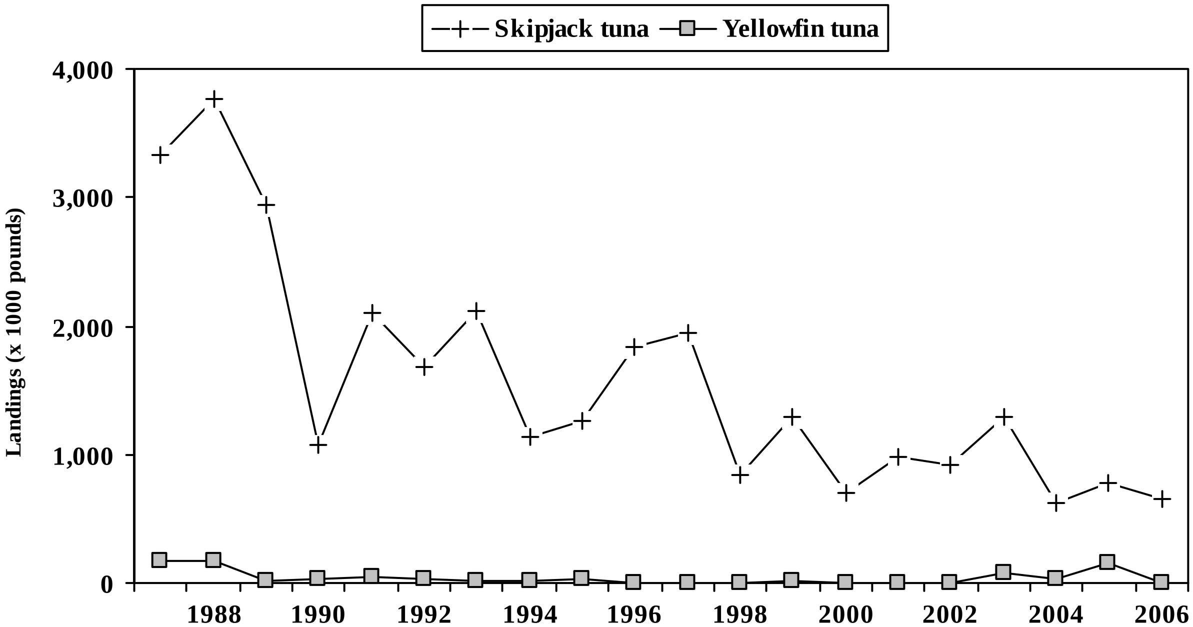


Interpretation: Aku boat landings were 661,000 pounds, worth an estimated $880,000 in 2006, down 59% and 69% from their respective long-term averages. The trends for total landings and revenue were similar to the number of aku boat vessels and trip activity. Aku boat landings and revenue peaked in 1988, then decreased sharply in 1990, and have continued to decline slowly since.

Source and Calculations: Total landings and nominal revenue for the aku boat fishery were derived from HDAR Commercial Aku Boat Fish Catch and Marine Dealer data. The total catch and nominal revenue values were obtained by adding the catch and revenue values for all species caught by the aku boat fishery. The adjusted revenue is calculated by dividing the nominal revenue by the Honolulu CPI then multiplying the result by the current Honolulu CPI.

Year	Total landings (1000 lbs)	Adjusted revenue ($1000)	Nominal revenue ($1000)	Honolulu CPI
1987	3,503	$6,840	$3,751	114.9
1988	3,940	$6,990	$4,063	121.7
1989	2,962	$6,750	$4,146	128.7
1990	1,116	$2,840	$1,873	138.1
1991	2,146	$3,830	$2,706	148.0
1992	1,735	$3,260	$2,415	155.1
1993	2,137	$3,160	$2,415	160.1
1994	1,159	$2,340	$1,835	164.5
1995	1,291	$1,930	$1,550	168.1
1996	1,844	$2,930	$2,389	170.7
1997	1,947	$2,920	$2,393	171.9
1998	845	$1,350	$1,106	171.5
1999	1,312	$2,020	$1,674	173.3
2000	708	$1,390	$1,167	176.3
2001	994	$1,640	$1,399	178.4
2002	932	$1,460	$1,256	180.3
2003	1,375	$1,510	$1,327	184.5
2004	656	$950	$861	190.6
2005	931	$1,140	$1,074	197.8
2006	661	$880	$880	209.4
Average	**1,609.7**	**$2,806.5**	**$2,014.0**	
SD	**940.1**	**$1,936.5**	**$1,018.1**	

Figure 55. Hawaii aku boat (pole and line) fishery landings, 1987-2006.

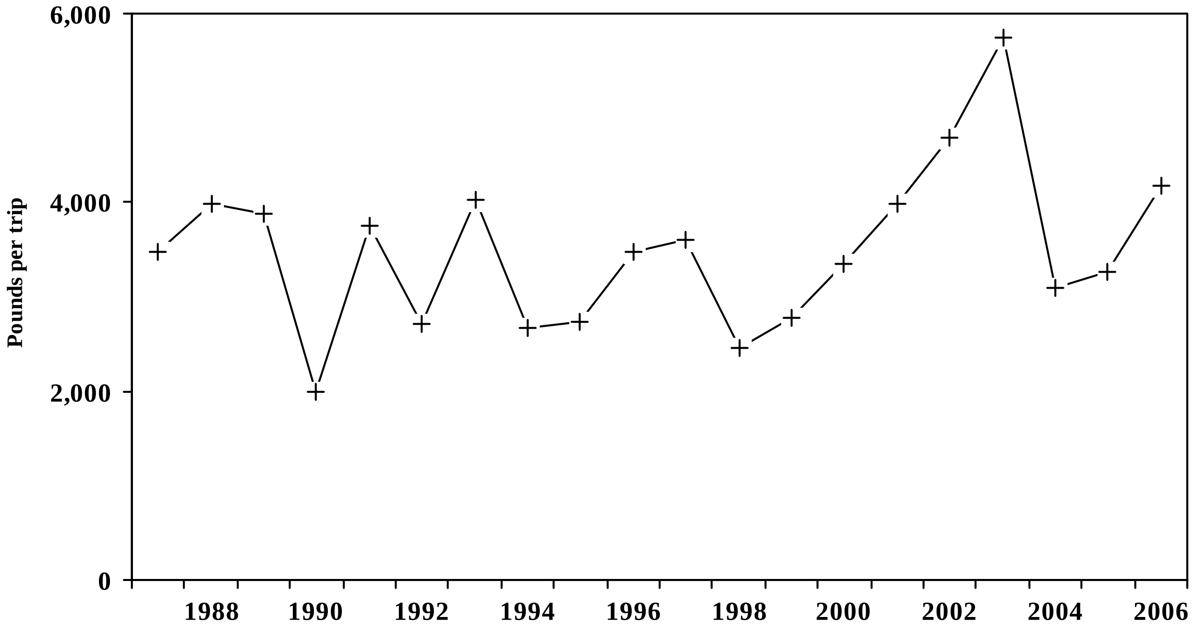


Interpretation: Total aku boat landings in 2006 were 661,000 pounds, 60% below the long-term average. The aku boat fishery lands consisted primarily of skipjack tuna. There were small landings of yellowfin tuna also. Skipjack tuna landings varied annually with an overall downward trend. Part of the reason for the decline in landings from this fishery was the closure of the tuna cannery in 1985. After the closure of the cannery, the aku boat fishery was left with only the fresh fish market.

Source and Calculations: The landing statistics for the aku boat fishery were derived from HDAR Commercial Aku Boat Fish Catch data. The aku boat catch was calculated by totaling catch by species.

	Aku boat landings (x 1000 pounds)				
Year	Skipjack tuna	Yellowfin tuna	Other tunas	Mahimahi	Total
1987	3,328	173	0	2	3,503
1988	3,768	168	0	4	3,940
1989	2,938	21	2	1	2,962
1990	1,073	39	4	0	1,116
1991	2,102	44	1	0	2,146
1992	1,682	36	4	14	1,735
1993	2,121	10	3	3	2,137
1994	1,133	19	6	0	1,159
1995	1,256	34	0	0	1,291
1996	1,842	2	0	0	1,844
1997	1,942	0	0	5	1,947
1998	842	3	0	0	845
1999	1,291	21	0	0	1,312
2000	704	2	1	1	708
2001	988	4	1	0	994
2002	925	5	2	0	932
2003	1,292	72	10	1	1,375
2004	615	38	1	2	656
2005	779	149	3	0	931
2006	648	6	7	0	661
Average	**1,563.5**	**42.3**	**2.2**	**1.7**	**1,609.7**
SD	**909.6**	**55.4**	**2.7**	**3.2**	**940.1**

Figure 56. Hawaii aku boat (pole and line) fishery total landings per trip, 1987-2006.



Interpretation: The CPUE for skipjack tuna in the aku boat fishery was 3,988 pounds per trip in 2006, 21% higher than the long-term average. The aku boat skipjack tuna landings per trip varied substantially between 1987 and 2006, but there has been no clear trend.

Source and Calculations: Aku boat CPUE was measured as pounds per trip. The aku boat fishery CPUE statistics were derived from the HDAR Commercial Aku Boat Fish Catch data and measured as landings (in pounds) per trip. Landings per trip was calculated by dividing the pounds by the total number of aku boat trips. The calculation for aku boat CPUE included zero landing trips.

	Aku boat CPUE (pounds per trip)	
Year	**Skipjack tuna**	**Total catch**
1987	3,474	3,657
1988	3,987	4,169
1989	3,881	3,913
1990	1,983	2,063
1991	3,746	3,826
1992	2,709	2,794
1993	4,017	4,047
1994	2,667	2,727
1995	2,731	2,806
1996	3,475	3,479
1997	3,596	3,606
1998	2,469	2,478
1999	2,770	2,815
2000	3,354	3,364
2001	3,974	3,994
2002	3,411	3,430
2003	3,911	4,026
2004	2,747	2,905
2005	3,157	3,788
2006	3,988	4,069
Average	**3,302.4**	**3,397.8**
SD	**611.0**	**620.4**

D. Commonwealth of the Northern Marianas Islands

Introduction
The Northern Mariana Islands pelagic fishery occurs primarily from the island of Farallon de Medinilla south to the island of Rota. The fishery is characterized using data in the Commercial Purchase Data Base. The collection system for the data is dependent upon first-level purchasers of local fresh fish to accurately record all fish purchases by species categories on specially designed invoices. Staff from the Department of Lands and Natural Resources, Division of Fish and Wildlife (DFW) routinely distributes and collects invoice books from 30 participating local fish purchasers on Saipan. Purchasers include practically all fish markets, stores, restaurants, hotels and roadside vendors ("fish-mobiles").

The current commercial purchase database collection system only documents landings on Saipan. The establishment of a data collection system for the islands of Tinian and Rota are in the process. It is believed that the commercial purchase database landings include around 90% of all commercial landings on Saipan. There is also a subsistence fishery on Saipan were profit making is made by selling a small portion of their catch to cover fishing expense. Usually fishermen selling their catch going “door to door” which results in around 30% of the unreported commercial landings do this.

Although the Saipan data collection system has been in operation since the mid-1970s, only data collected since 1983 are considered accurate enough to be used. It is assumed that data in this report are credible.

This database lacks information concerning fishing method, location, and effort because previous data generated from Creel Survey are believed to be unreliable.

Summary
Trolling is the primary fishing method utilized in the pelagic fishery. The pelagic fishing fleet, other than charter boats, consists primarily of vessels less than 24 ft in length which usually has a limited 20-mile travel radius from Saipan.

In the past charter vessels generally retain their catches, selling half or more to local markets. However in recent times, charter vessels rarely sell any of their landings. No logbook system is in effect.

The primary target and most marketable species for the pelagic fleet are skipjack tuna. In 2006 Skipjack Tuna comprised around 77% of the entire pelagic landings. Schools of skipjack tuna have historically been common in near shore waters, providing an opportunity to catch numerous fish with a minimum of travel time and fuel costs. Skipjack is readily consumed by the local populace and several Korean restaurants, primarily as sashimi.

Yellowfin tuna and mahimahi are also easily marketable species but are seasonal. During their seasonal runs, these fish are usually found close to shore and provide easy targets for the local fishermen. In addition to the economic advantages of being near shore and their relative ease of capture, these species are widely accepted by all ethnic groups

2007 Recommendations

1. To implement an area closure/exclusion zone for Long Line fishing around or near islands and banks to avoid gear conflicts with the local artisinal fishing community.
2. NMI recommends to Council/WPacFIN/NMFS to provide or assess data acquisition needs of this Longline Fishery.

Table 1.—CNMI Consumer Price Indices (CPIs)

Year	CPI	CPI Adjuste Factor
1983	140.90	2.03
1984	153.20	1.87
1985	159.30	1.80
1986	163.50	1.75
1987	170.70	1.68
1988	179.60	1.59
1989	190.20	1.50
1990	199.33	1.43
1991	214.93	1.33
1992	232.90	1.23
1993	243.18	1.18
1994	250.00	1.14
1995	254.48	1.12
1996	261.98	1.09
1997	264.95	1.08
1998	264.18	1.08
1999	267.80	1.07
2000	273.23	1.05
2001	271.01	1.06
2002	271.55	1.05
2003	268.92	1.06
2004	271.28	1.05
2005	271.90	1.05
2006	**285.96**	**1.00**

Calculation: The Commonwealth of the Northern Mariana Islands' Consumer Price Index is computed by the CNMI Department of Commerce using the Laspeyres' formula.

Table 2. NMI 2006 Commercial Pelagic Landings, Revenues and Price

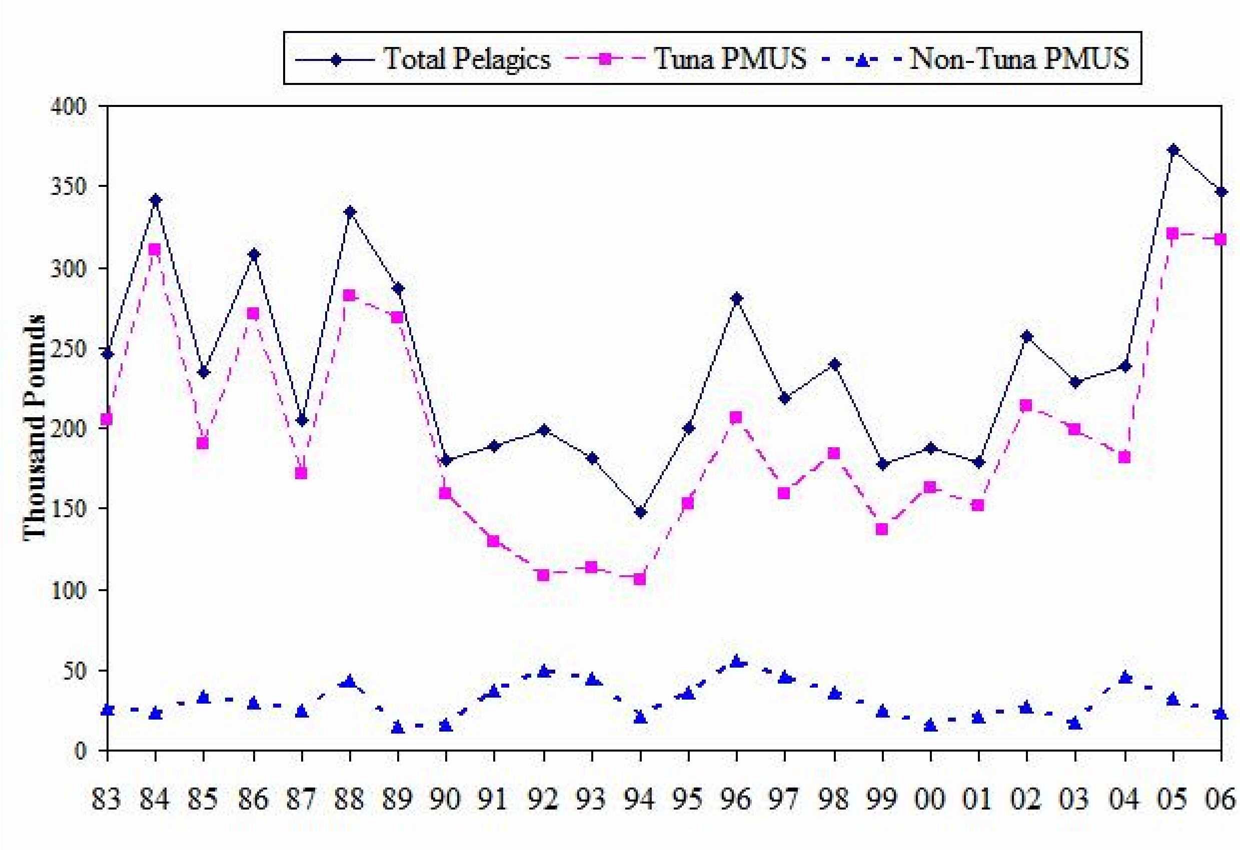
Species	Landing (Lbs)	Value ($)	Avg Price ($/Lb)
Skipjack Tuna	265,753	398,386	1.50
Yellowfin Tuna	41,996	81,325	1.94
Saba (kawakawa)	8,682	13,036	1.50
Tunas (misc.)	15	15	1.00
Tuna PMUS	**316,446**	**492,762**	**1.56**
Mahimahi	17,181	35,902	2.09
Wahoo	3,116	6,484	2.08
Blue Marlin	1,402	2,304	1.64
Sailfish	315	590	1.87
Sickle Pomfret (w/woman)	1,065	2,747	2.58
Non-tuna PMUS	**23,080**	**48,026**	**2.08**
Dogtooth Tuna	3,435	6,512	1.90
Rainbow Runner	3,828	6,891	1.80
Barracuda	33	65	2.00
Troll Fish (misc.)	62	116	1.88
Non-PMUS Pelagics	**7,358**	**13,584**	**1.85**
Total Pelagics	**346,885**	**554,373**	**1.60**

Interpretation: Skipjack tuna continues to dominate the pelagic landings, comprising around 77 % of the (commercially receipted) industry's pelagic catch. Skipjack landings increased 3% in 2006. Yellowfin tuna and mahimahi ranked second and third in total landings during 2006. Mahi landings decreased 36% for 2006. Yellowfin landings also decreased 19%. Increase in yellowfin landings in 2002 is partly due to landings from the Northern Islands and by a longline experiment conducted by a fishing company. Skipjack tunas are easily caught in near shore waters throughout the year. Mahimahi is seasonal with peak catch usually from February through April. Yellowfin season usually runs from April to September. The overall pelagic catch decreased by 6% in 2006.

The highest average price of identified pelagic species was $2.58/lb for Sickle Pomfret. The lowest priced species is blue marlin. The average price per pound for Skipjack tuna, the species with the greatest landings, decreased 15% from $1.75/lb in 2005 to $1.50/lb in 2006.

In 2006, Blue Marlin landings was 1,402 pounds with an average price per pound of $1.64. The low ex-vessel price may be partially related to the manner in which the fish is kept prior to sale. Blue Marlin is rarely a target by commercial fishermen except during fishing tournaments and by Charter boats.

Figure 1. NMI Annual Commercial Landings:
All Pelagics, Tuna PMUS, and Non-Tuna PMUS



Source and Calculation: Annual summaries for each species are from the Commercial Purchase Data Base invoices.

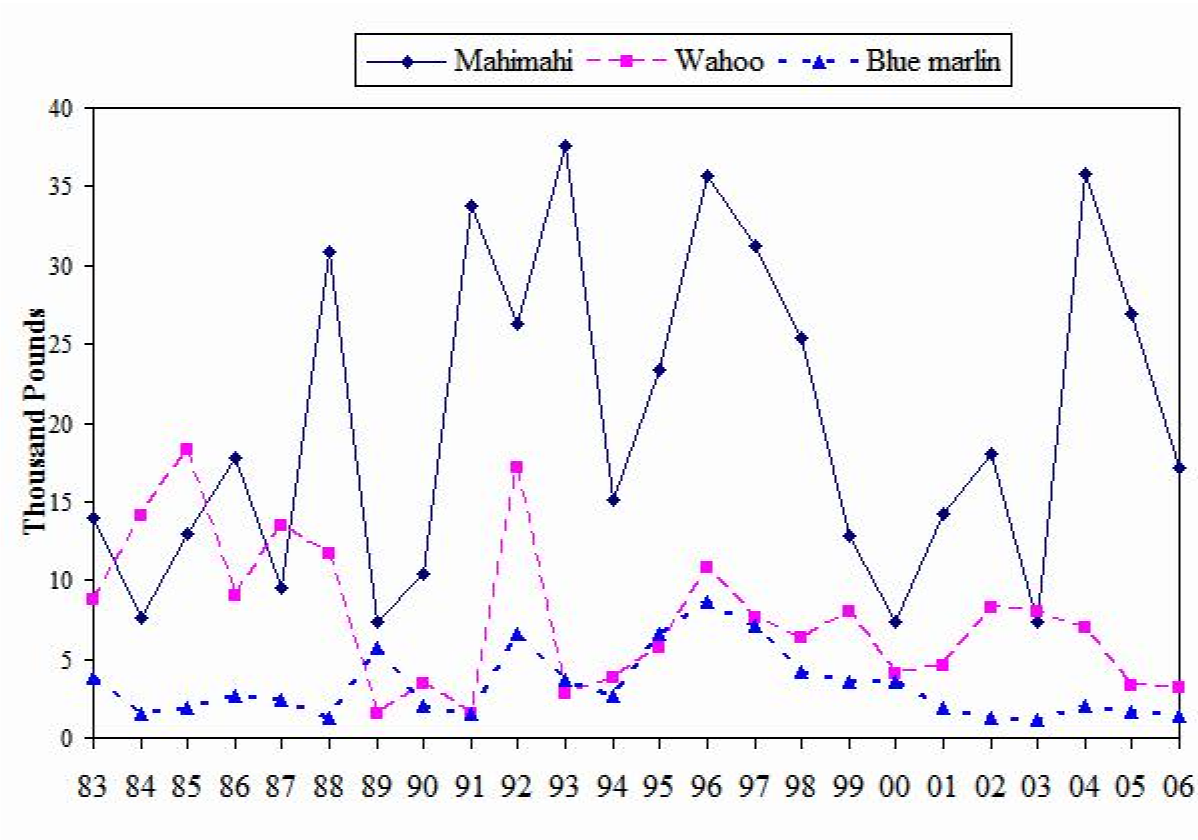
Interpretation: Total weight of pelagics landed in 2006 decreased 7% from 2005 level which is still above the 24 year mean. Drop in total pelagic landings is mostly due to the decrease in landing by 28% in the Non-tuna PMUS and a 62% decrease in the Non-PMUS Pelagic species.

Source and Calculation: All pelagics, tuna and Non-Tuna PMUS landings were summed from the Commercial Purchase Data Base.

Total Commercial Landings (Lb)

Year	All Pelagics	Tuna PMUS	Non-Tuna PMUS
1983	245,985	204,692	26,544
1984	341,136	310,424	23,244
1985	234,178	189,809	33,143
1986	307,459	271,279	29,626
1987	205,068	171,957	25,450
1988	334,523	281,872	43,805
1989	286,784	267,811	14,595
1990	180,450	158,430	15,936
1991	188,561	128,848	36,975
1992	199,228	108,314	50,159
1993	181,328	113,207	44,518
1994	147,329	105,942	21,657
1995	200,180	152,756	35,759
1996	281,277	206,247	55,712
1997	218,873	159,626	46,049
1998	240,263	184,450	35,979
1999	177,031	136,907	24,768
2000	187,295	162,747	15,551
2001	179,181	152,144	21,198
2002	256,982	213,565	27,876
2003	228,416	198,843	17,346
2004	239,007	181,331	45,737
2005	372,375	321,089	32,136
2006	**346,885**	**316,446**	**23,080**
Average	240,825	195,781	31,118
Standard Deviation	62,766	66,331	11,768

Figure 2. NMI Annual Commercial Landings: Mahimahi, Wahoo, and Blue Marlin.



Interpretation: Mahimahi landings continue to decline since increasing 376% in 2004, which is the highest recording in 22 years. In 2005 landings decreased 25% which is still above the 23 year mean. This declined continued in 2006 by 36% which is below the 24 year mean. It is noteworthy that the NMI and Guam mahimahi catches have been fluctuating similarly since 1987, which may indicate a strong biological influence in local landing patterns.

From 1983 to 1988, wahoo landings were somewhat consistent and did not fall below 7,000 lbs., but in 1989 landings notably declined by 86% and remained at depressed levels until the dramatic increase in landings during 1992. Following the near-record 1992 landings, the 1993 wahoo landings again decreased by 84%, falling below the mean. Wahoo landings in 2001 increased by 362 pounds or 11% over the 2000 landings. Wahoo landings continued to increase in 2002 by 80% then drop slightly in 2003 and continued to decline by 14% in 2004. 2005 landings decreased 52% and declined 12% in 2006, which is the the lowest recording in the past 13 years.

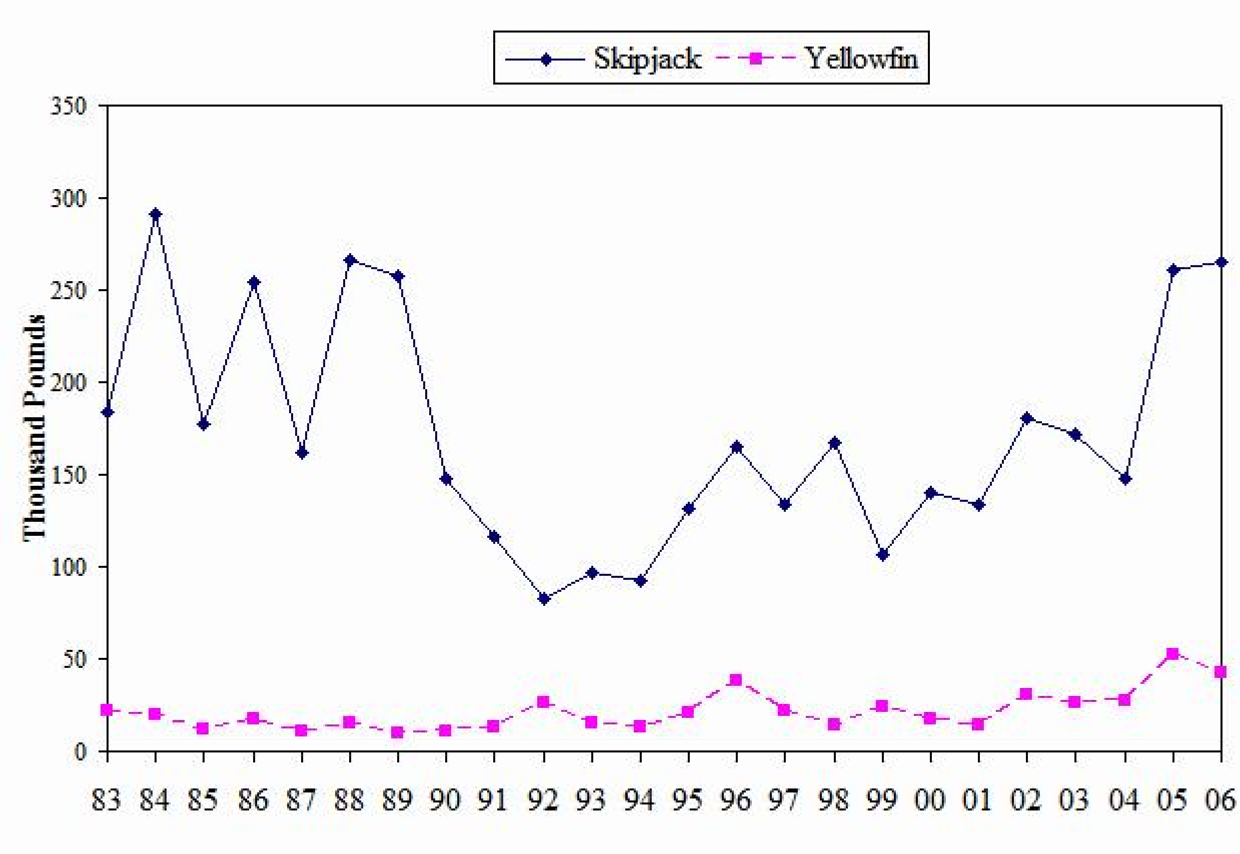
In 2004 Blue Marlin landing increased 77% from the 2003 figures. 2005 landings decreased 20%. In 2006 Blue Marlin decline 12% from the 2005 figures. Blue marlin is rarely a target by the commercial fishermen except for charter boats and during fishing tournaments. If blue marlins are landed, they are often kept by the fishermen and therefore rarely ever recorded in the Commercial Purchase Data Base.

Source and Calculation: The annual commercial landings of the three major PMUS species (mahimahi, wahoo and blue marlin) were summed directly from the Commercial Purchase Data Base.

Total Commercial Landings (Lb)

Year	Mahimahi	Wahoo	Blue Marlin
1983	13,939	8,760	3,787
1984	7,614	14,087	1,544
1985	12,955	18,251	1,860
1986	17,796	9,062	2,654
1987	9,502	13,404	2,460
1988	30,799	11,697	1,309
1989	7,320	1,571	5,704
1990	10,439	3,462	2,034
1991	33,756	1,521	1,568
1992	26,257	17,172	6,603
1993	37,545	2,779	3,687
1994	15,063	3,863	2,635
1995	23,321	5,722	6,619
1996	35,655	10,783	8,593
1997	31,277	7,580	7,068
1998	25,375	6,299	4,201
1999	12,882	8,063	3,541
2000	7,324	4,097	3,608
2001	14,229	4,550	1,924
2002	18,042	8,212	1,261
2003	7,357	7,950	1,130
2004	35,808	6,936	2,001
2005	26,891	3,349	1,595
2006	**17,181**	**3,116**	**1,402**
Average	19,930	7,595	3,283
Standard Deviation	10,236	4,686	2,142

Figure 3. NMI Annual Commercial Landings: Skipjack and Yellowfin Tuna.



Interpretation: Historically, skipjack landings exhibited an alternating two-year cycle from 1983 to 1988 and comprised more than 73% by weight of the total pelagic landings each year from 1983 to 1989 (data taken from Table 1 and Fig. 3). Skipjack tuna landings declined after that, reaching record lows from 1990 through 1994. In 1993 and 1994 skipjack landings showed signs of stabilizing at about half of their respective eleven and twelve year means, while the nearly 32,000 pounds increase in 1995 landings attained 61% of the 1983-1990 averages of 174,020 pounds. Skipjack landings for the year 2002 increased by 25% or over 43,000 pounds. In 2003 Skipjack landings declined 14% in 2004. In 2005 skipjack landings showed a significant increase of 75%, well above the 23 year mean. For 2006 skipjack landings increased slightly by 2%, and still well above the 24 year mean.

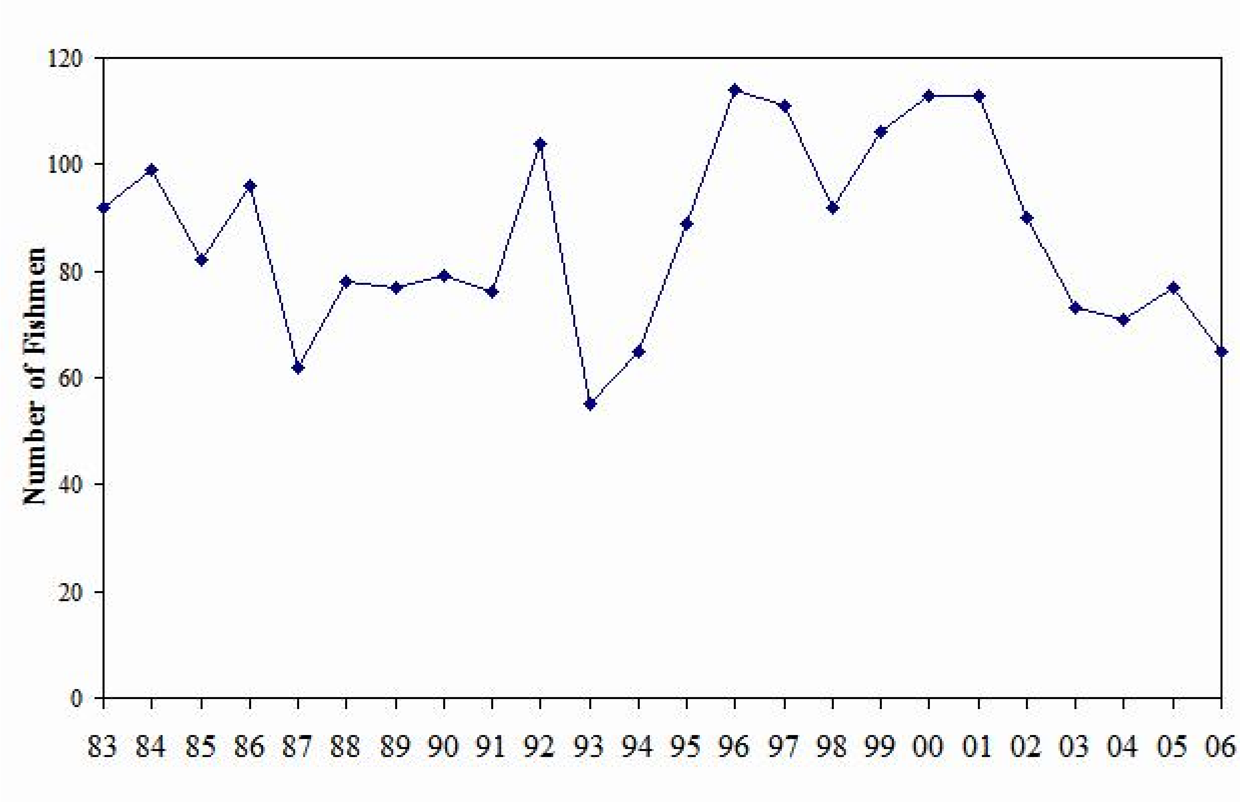
Although more highly prized than skipjack, yellowfin tuna are not as common, and therefore not landed as often. The average fish size tends to be smaller when compared with yellowfin tuna from other geographic areas. The total landings for yellowfin tuna increased in 2002 by 51% from the 2001 figures. This increase is partly due to landings from the Northern Islands bottom fishing fleet and a long lining experiment by one fishing company whom applied and received a federal long lining permit. However due to the high cost associated with lonlining, permit holder did not continue longlining in 2003. This caused a decrease in landings by 13% for 2003. 2004 landings increased 3%. 2005 landings increased more than 24,000 pounds or 89% from 2004 fiqures. 2006 yellowfin landings decreased by 19% but still above the 24 year mean.

Source and Calculation: Landings were summed directly from the Commercial Purchase Data Base.

Total Commercial Landings (Lb)

Year	Skipjack	Yellowfin
1983	183,411	21,281
1984	290,843	19,580
1985	177,344	12,466
1986	254,362	16,917
1987	161,504	10,454
1988	266,497	15,375
1989	257,703	10,109
1990	147,962	10,468
1991	115,802	13,042
1992	82,280	25,687
1993	97,268	14,898
1994	92,212	13,445
1995	131,377	20,918
1996	165,037	38,043
1997	133,446	21,352
1998	167,114	14,570
1999	106,297	24,419
2000	140,389	17,673
2001	133,769	14,543
2002	179,966	30,017
2003	171,574	26,042
2004	148,328	27,548
2005	260,614	52,014
2006	**265,753**	**41,996**
Average	172,119	21,369
Standard Deviation	62,010	10,610

Figure 4. Number of NMI Fishermen (Boats) Making Commercial Pelagic Landings



Interpretation: The number of fishers (boats) making commercial pelagic landings was relatively constant from 1988-91 compared to earlier years, but a record high number was recorded for 1992. Part of the increase in 1992 was attributable to the influx of new fishing boats as a result of money obtained by leasing property. In addition, it was discovered that some fishermen were using several different boats, thus artificially inflating the total number of boats making pelagic landings.

Many of the 1992's "new" fishermen, with their new boats, are believed to have left the fishery during 1993. It has been suggested that the increase from 1994 to 1997 might be due to the re-entry of repaired and refurbished boats from the 1992 fleet.

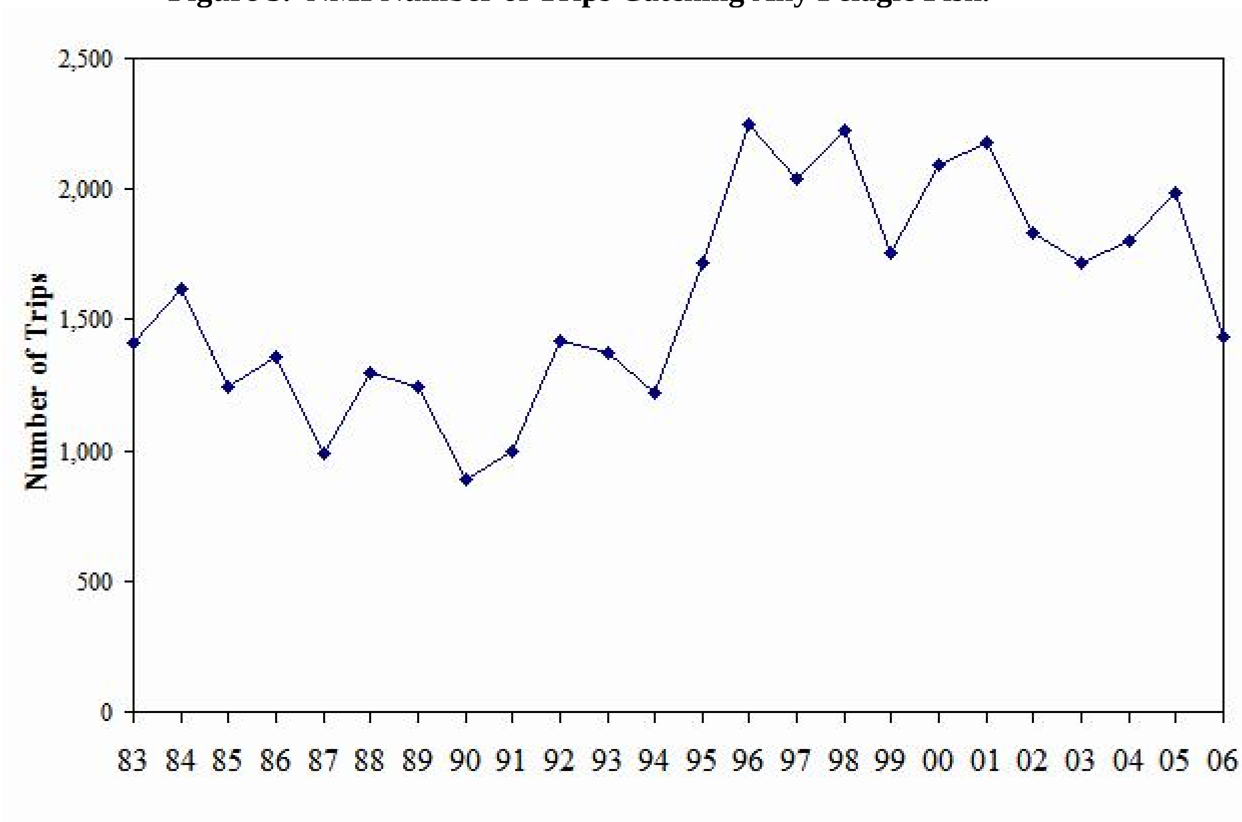
The number of fishermen making pelagic landings decreased 20% from 113 in 2001 to 90 in 2002. Data indicates a continued decline of 23% in 2003 and a 7% drop in 2004. The decrease is partly due to vendors whom own multiple fishing boats entering all their landings on a single receipt and at times combining monthly total landings onto a single receipt. Other factors that may have influenced a drop in fishermen making pelagic landings are the bad weather that plagued the Marianas throughout 2003 and early 2004. The continued increase in fuel price also has affected many fishing boat in the CNMI. There was a slight increase of 4% in 2005. In 2006, the number of fishermen decreased by 16%. This decrease is partly due to the increasing price of fuel and the continued decline in the average price per pound of Skipjack tuna.

Source and Calculation: Each invoice from the Commercial Purchase Data Base records the fisherman's name from which the fish were purchased. The number of fishermen who sold any pelagic species was calculated directly from the data invoices.

Fishermen Landing any Pelagic Species

Year	Num. of Fishmen
1983	92
1984	99
1985	82
1986	96
1987	62
1988	78
1989	77
1990	79
1991	76
1992	104
1993	55
1994	65
1995	89
1996	114
1997	111
1998	92
1999	106
2000	113
2001	113
2002	90
2003	73
2004	71
2005	77
2006	**65**
Average	87
Standard Deviation	18

Figure 5. NMI Number of Trips Catching Any Pelagic Fish.



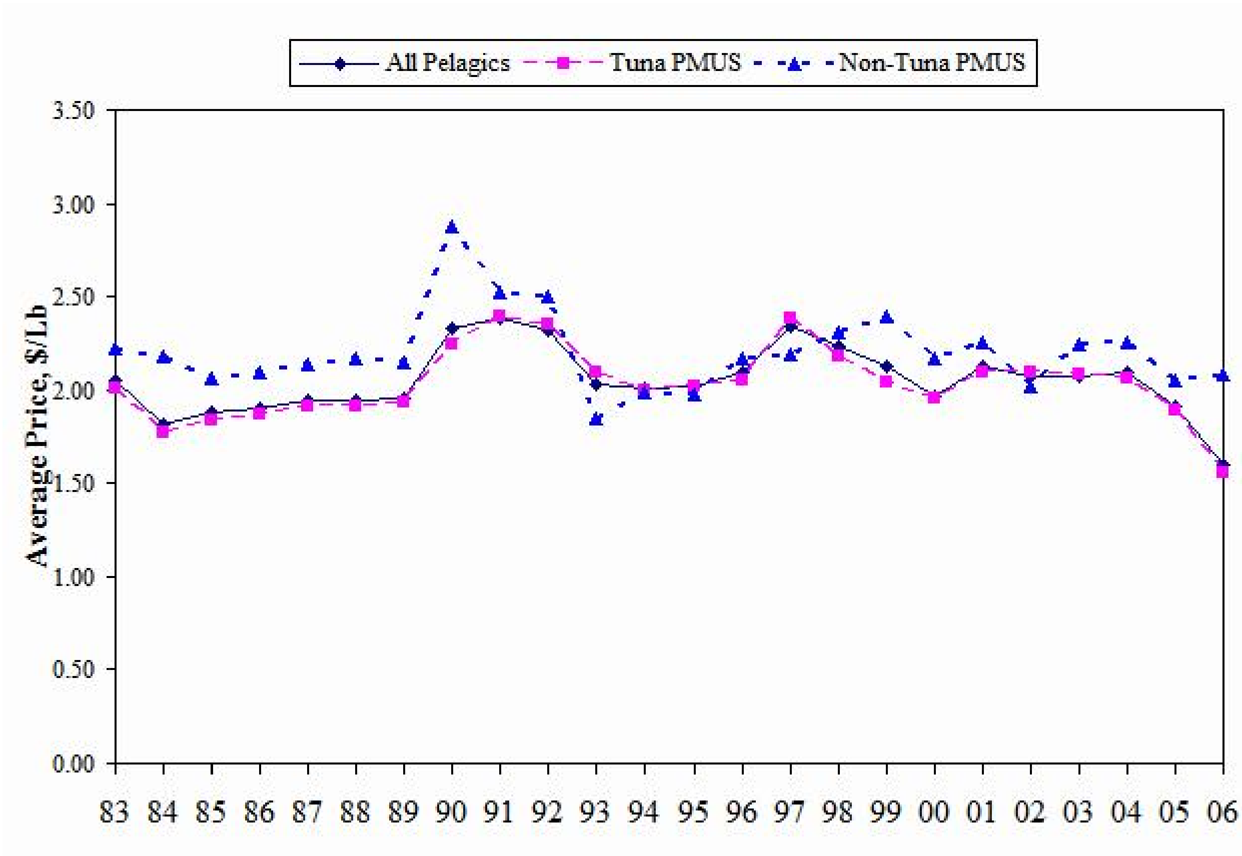
Interpretation: The number of pelagic trips rose in 1998, the decrease in 1999 figures may be caused by the refusal of vendors to participate in the Ticket System. The number of pelagic trips decreased in 2002 by 16% from 2,179 to 1835 and continued to decline in 2003 by 6% and remained near that level for 2004. There was a 10% increase in 2005 followed by a significant drop of 28% in 2006. Typhoons hit the Marianas region frequently, this may attributed to some decline in fishing trips from the chart above and the increasing price of fuel cost. In 2006, the CNMI saw the highest price of gasoline per gallon ($3.58 per gallon).

Source and Calculation: The total trips for all pelagic species were summed from the Commercial Purchase Data Base. Trips were calculated based on the assumptions that no fisherman makes more than one trip per day, and that all sales from a single trip are made on a single day.

NMI Numbers Of Trips Catching Any Pelagic Fish

Year	Num. of Trip
1983	1,408
1984	1,621
1985	1,240
1986	1,356
1987	992
1988	1,298
1989	1,242
1990	888
1991	999
1992	1,419
1993	1,372
1994	1,218
1995	1,721
1996	2,249
1997	2,042
1998	2,223
1999	1,759
2000	2,095
2001	2,178
2002	1,835
2003	1,715
2004	1,801
2005	1,990
2006	**1,436**
Average	1,587
Standard Deviation	408

Figure 6. NMI Average Inflation-Adjusted Price of All Pelagics, Tuna PMUS, and Non-Tuna PMUS



Interpretation: The inflation-adjusted average price of tuna was stable from 1983 until 1989, when an obvious rise was observed. The 1990-92 rise in price corresponds with the notable decrease in Skipjack tuna landings (Fig. 3) during the same period of time. In 1994 commercially receipted tunas commanded a lower price than in recent years. However, considering the inflation-adjusted prices from 1983 to 1996, it would appear that tuna prices have, on the whole, kept pace with inflation. The average price of tuna has continued to decrease since 1997. The inflation-adjusted average price of tuna increased by 7% from 2000 to 2001 and increased less than 1% for 2002. However since 2003 the inflation adjusted average price for tuna has decreased. There was a decrease of 2% in 2004, 8% in 2005 and 17% in 2006 which is below the 24 year mean.

The average for the inflation-adjusted price of “Non-Tuna PMUS” increased to $2.14 or 11% in 2003 and remained at near that level for 2004. In 2005, there was a 9% decrease and continued to decline 1% in 2006.

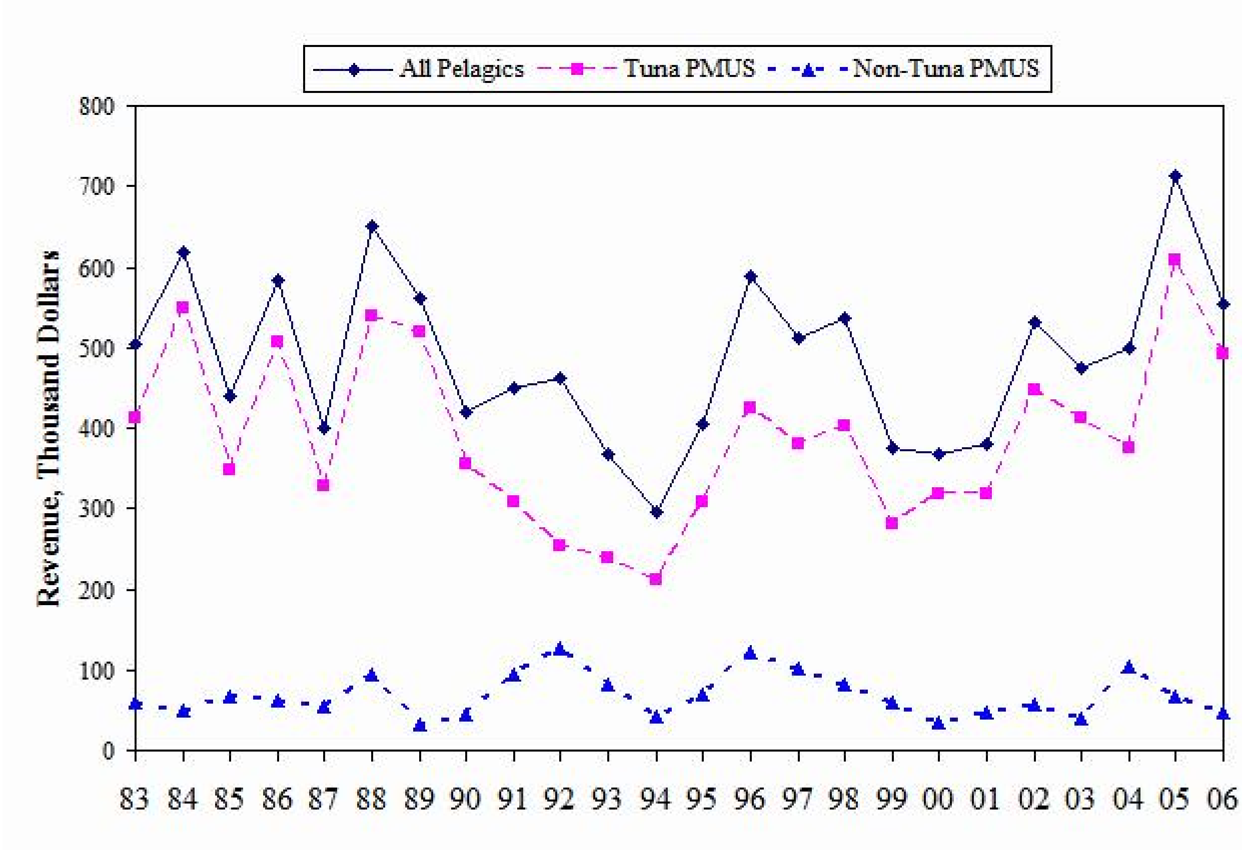
Although in 2001 there was a loss of the large Korean tourist market in the CNMI, there appears to be no substantial loss to revenue. This may be attributed to a redirection of the market toward the local community.

Source and Calculation: The unadjusted average price is calculated by dividing the total revenues generated by the total weight sold. The inflation adjustment is made using the 1998 NMI Consumer Price Index (CPI) as the basis by which calculations of previous years' prices are made.

Inflation-Adjusted Average Price ($/Lb)

Year	All Pelagics		Tuna PMUS		Non-Tuna PMUS	
	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
1983	1.01	2.05	0.99	2.01	1.09	2.22
1984	0.97	1.81	0.95	1.77	1.16	2.18
1985	1.04	1.88	1.02	1.84	1.14	2.06
1986	1.09	1.90	1.07	1.87	1.20	2.10
1987	1.16	1.95	1.14	1.91	1.27	2.14
1988	1.22	1.94	1.20	1.91	1.36	2.17
1989	1.30	1.96	1.29	1.94	1.43	2.15
1990	1.63	2.33	1.57	2.24	2.01	2.88
1991	1.80	2.39	1.80	2.40	1.90	2.53
1992	1.88	2.32	1.91	2.35	2.04	2.50
1993	1.72	2.03	1.78	2.10	1.56	1.84
1994	1.76	2.01	1.75	1.99	1.75	1.99
1995	1.81	2.02	1.80	2.02	1.76	1.97
1996	1.92	2.09	1.88	2.05	1.99	2.17
1997	2.17	2.34	2.20	2.38	2.03	2.19
1998	2.07	2.23	2.02	2.18	2.14	2.31
1999	1.98	2.12	1.91	2.04	2.24	2.39
2000	1.87	1.96	1.86	1.95	2.07	2.17
2001	2.00	2.12	1.97	2.09	2.12	2.25
2002	1.97	2.07	1.99	2.09	1.92	2.01
2003	1.96	2.08	1.96	2.08	2.12	2.25
2004	1.99	2.09	1.96	2.06	2.15	2.26
2005	1.82	1.91	1.80	1.89	1.95	2.05
2006	**1.60**	**1.60**	**1.56**	**1.56**	**2.08**	**2.08**
Average	1.66	2.05	1.64	2.03	1.77	2.20
Standard Deviation	0.38	0.18	0.39	0.19	0.38	0.21

Figure 7. NMI Annual Commercial Inflation-Adjusted Revenues for All Pelagics, Tuna PMUS, and Non-Tuna PMUS



Interpretation: The erratic fluctuations of the inflation-adjusted revenues for Tunas and for All Pelagics prior to 1990 is most likely due to the annual variations in skipjack tuna landings (see Fig. 3) which completely dominated the tuna category and the “All Pelagic” category.

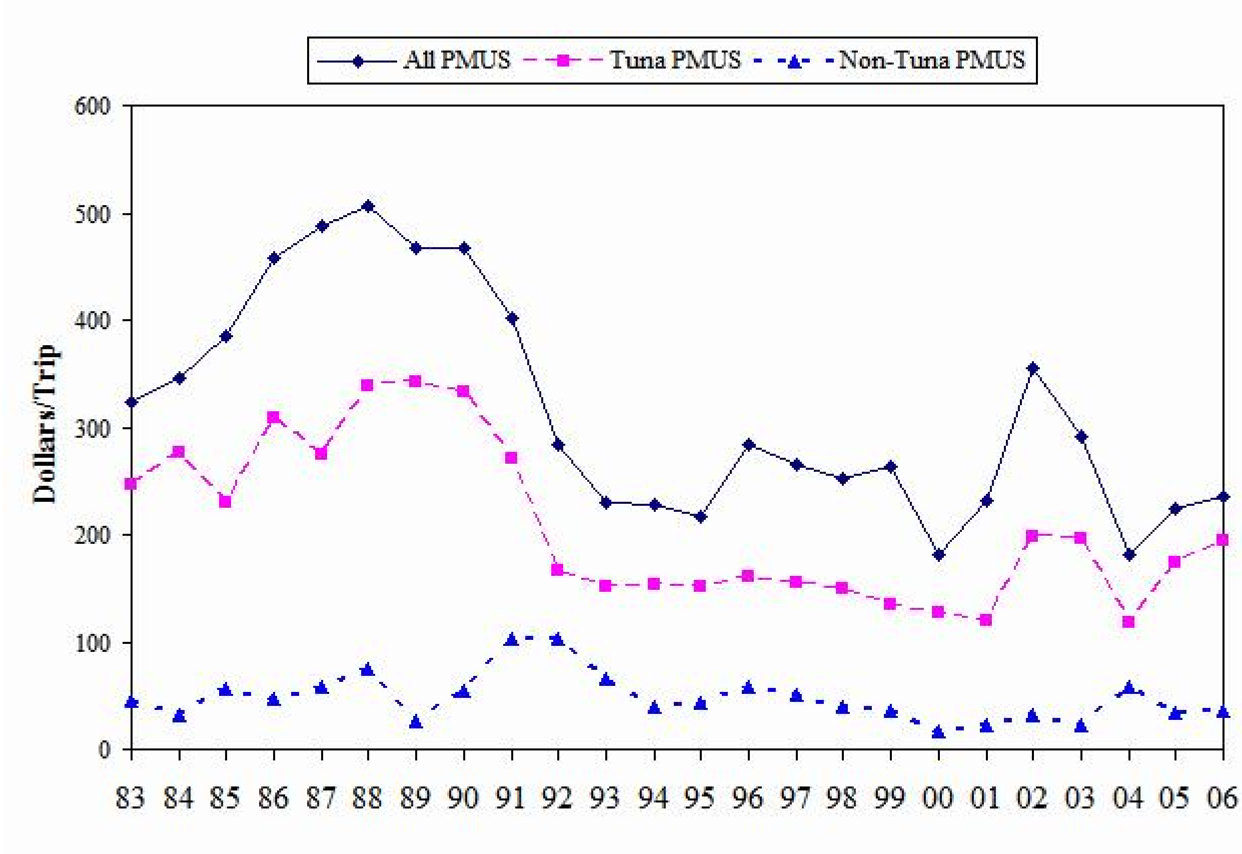
In 2003 the tunas' inflation-adjusted revenues decreased 8% from the 2002 figures and continued to decline to 11% for 2004. This is due to the decrease in landings of Skipjack tuna, which in 2004 comprised only of 67% of the total pelagic landings compared to 2003 where it comprised 87% of the total pelagic landings. The Tunas' Inflation-Adjusted Revenues increase significantly by 38% in 2005 but drop 19% in 2006 In 2003 a drop of 31% occurred for the "Non-Tuna PMUS" inflation-adjusted revenues however 2004 data indicates an increase of 158% compared to the previous year. This is due to the mahimahi landings increasing by 387%. The 2005 Inflation Adjusted Revenues decreased by 36% and decreased again in 2006 by 27%.

Source and Calculation: Annual revenue in dollars was summed separately for all pelagic fish, tunas and Non-Tuna PMUS. Inflation-adjusted revenues were calculated using the Consumer Price Index, with 1998 as a base by which previous years' nominal prices are adjusted.

Inflation-Adjusted Commercial Revenues ($)

Year	All Pelagics		Tuna PMUS		Non-Tuna PMUS	
	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
1983	248,387	504,226	202,800	411,684	29,059	58,990
1984	330,254	617,575	294,077	549,924	27,044	50,572
1985	244,171	439,508	193,920	349,056	37,882	68,188
1986	333,766	584,091	289,681	506,942	35,488	62,104
1987	237,687	399,314	195,793	328,932	32,344	54,338
1988	409,075	650,429	338,348	537,973	59,701	94,925
1989	373,927	560,891	345,839	518,759	20,917	31,376
1990	293,993	420,410	248,144	354,846	32,102	45,906
1991	338,643	450,395	232,077	308,662	70,235	93,413
1992	374,977	461,222	206,950	254,549	102,133	125,624
1993	311,342	367,384	201,350	237,593	69,592	82,119
1994	259,470	295,796	185,381	211,334	37,818	43,113
1995	361,511	404,892	275,080	308,090	62,920	70,470
1996	539,628	588,195	388,691	423,673	110,939	120,924
1997	474,509	512,470	351,492	379,611	93,306	100,770
1998	496,652	536,384	372,142	401,913	77,011	83,172
1999	351,062	375,636	261,394	279,692	55,404	59,282
2000	350,468	367,991	302,473	317,597	32,186	33,795
2001	358,656	380,175	300,154	318,163	44,987	47,686
2002	506,302	531,617	425,961	447,259	53,468	56,141
2003	447,647	474,506	390,100	413,506	36,764	38,970
2004	476,543	500,370	356,110	373,916	98,417	103,338
2005	678,773	712,712	578,914	607,860	62,759	65,897
2006	**554,373**	**554,373**	**492,762**	**492,762**	**48,026**	**48,026**
Average	389,659	487,107	309,568	388,929	55,438	68,297
Standard Deviation	111,843	102,586	100,397	105,850	25,876	26,661

Figure 8. NMI Annual Inflation-Adjusted Revenue Per Trip for PMUS trips



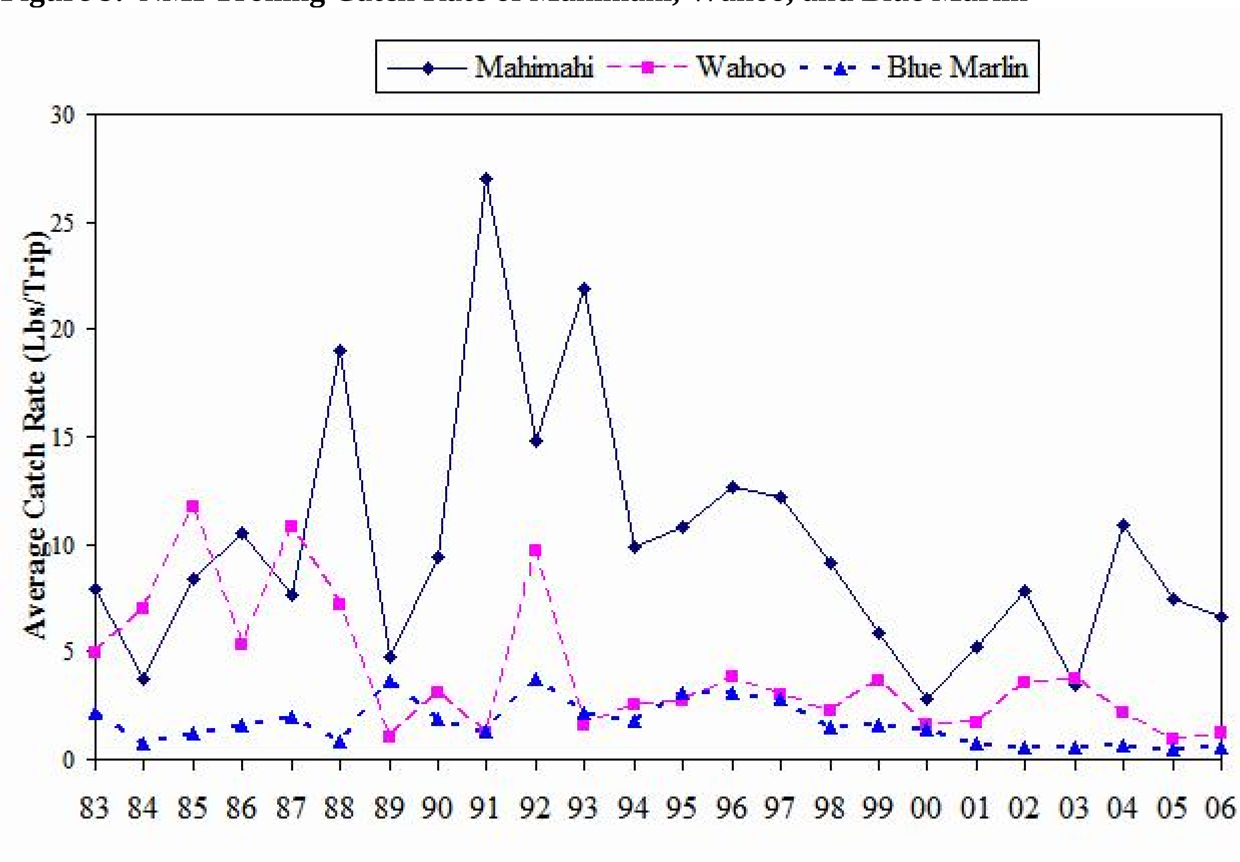
Interpretation: The inflation-adjusted revenue per trip for "All Species" decreased 4% in 2003 and 29% for 2004. In 2005, inflation-adjusted revenue per trip for "All Species" increased 19% and 6% in 2006. "Non-Tuna PMUS" decreased 26% in 2003 however 2004 revenue increased significantly to 157% or 57$/per trip. This is the highest it has been for the past 10 years which is above the 22 year mean. In 2005 this drop by 43% but increased 4% in 2006. "Tunas" remained relatively stable in 2003 at 196 $/Trip but dropped significantly to 117 $/Trip in 2004. For 2005 the Inflation Adjusted revenues for "Tuna PMUS" increased 47% and increased another 13% in 2006.

Source and Calculation: Values were obtained by selecting, from the Commercial Purchase Data Base, all trips which landed at least one PMUS, and then calculating a) the average revenue of all species combined, b) the average revenue of Non-Tuna PMUS only, and c) the average revenue of tuna only.

Commercial Adjusted Revenues Per Trip ($/Trip)

Year	All PMUS		Tuna PMUS		Non-Tuna PMUS	
	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
1983	159.00	322.77	122.00	247.66	22.00	44.66
1984	185.00	345.95	148.00	276.76	17.00	31.79
1985	214.00	385.20	128.00	230.40	31.00	55.80
1986	262.00	458.50	176.00	308.00	27.00	47.25
1987	290.00	487.20	163.00	273.84	34.00	57.12
1988	318.00	505.62	213.00	338.67	47.00	74.73
1989	312.00	468.00	228.00	342.00	17.00	25.50
1990	327.00	467.61	233.00	333.19	38.00	54.34
1991	302.00	401.66	204.00	271.32	77.00	102.41
1992	231.00	284.13	135.00	166.05	83.00	102.09
1993	195.00	230.10	128.00	151.04	55.00	64.90
1994	200.00	228.00	135.00	153.90	35.00	39.90
1995	193.00	216.16	136.00	152.32	39.00	43.68
1996	261.00	284.49	148.00	161.32	53.00	57.77
1997	245.00	264.60	143.00	154.44	47.00	50.76
1998	234.00	252.72	138.00	149.04	36.00	38.88
1999	246.00	263.22	125.00	133.75	33.00	35.31
2000	172.00	180.60	121.00	127.05	16.00	16.80
2001	219.00	232.14	113.00	119.78	21.00	22.26
2002	339.00	355.95	189.00	198.45	30.00	31.50
2003	275.00	291.50	185.00	196.10	22.00	23.32
2004	172.00	180.60	112.00	117.60	56.00	58.80
2005	213.00	223.65	165.00	173.25	32.00	33.60
2006	**236.00**	**236.00**	**195.00**	**195.00**	**35.00**	**35.00**
Average	241.67	315.27	157.63	207.12	37.63	47.84
Standard Deviation	52.66	102.59	36.82	73.73	17.50	22.16

Figure 9. NMI Trolling Catch Rate of Mahimahi, Wahoo, and Blue Marlin



Interpretation: The mahimahi catch rate drop significantly 57% from 2002, which also fell 67% below the twenty-year mean. It may also be biological because it appears that the trolling catch rates of Guam and the NMI have fluctuated similarly over the last twenty-two years. 2003 catch rate was 3.37lbs/trip. In 2004, mahimahi catch rate rebounded a surprising 218% or 10.94 lbs./trip. 2005 catch rates delined 11% from the 2004 fiqures but still above the 24 year mean. Mahi catch rates continued to decline by 11% in 2006.

Prior to the 1989 record low, wahoo catch rates rivaled those for mahimahi. Wahoo catch rates have generally never regained those historical levels. The 2002 catch rate increased 114% from 2001, and again increased 4% for 2003. 2004 catch rates declined to 2.19 lbs/trip or 41% this decline continued in 2005 by another 56%. For 2006, Wahoo catch rates increased slightly by 28% from the 2005 figures.

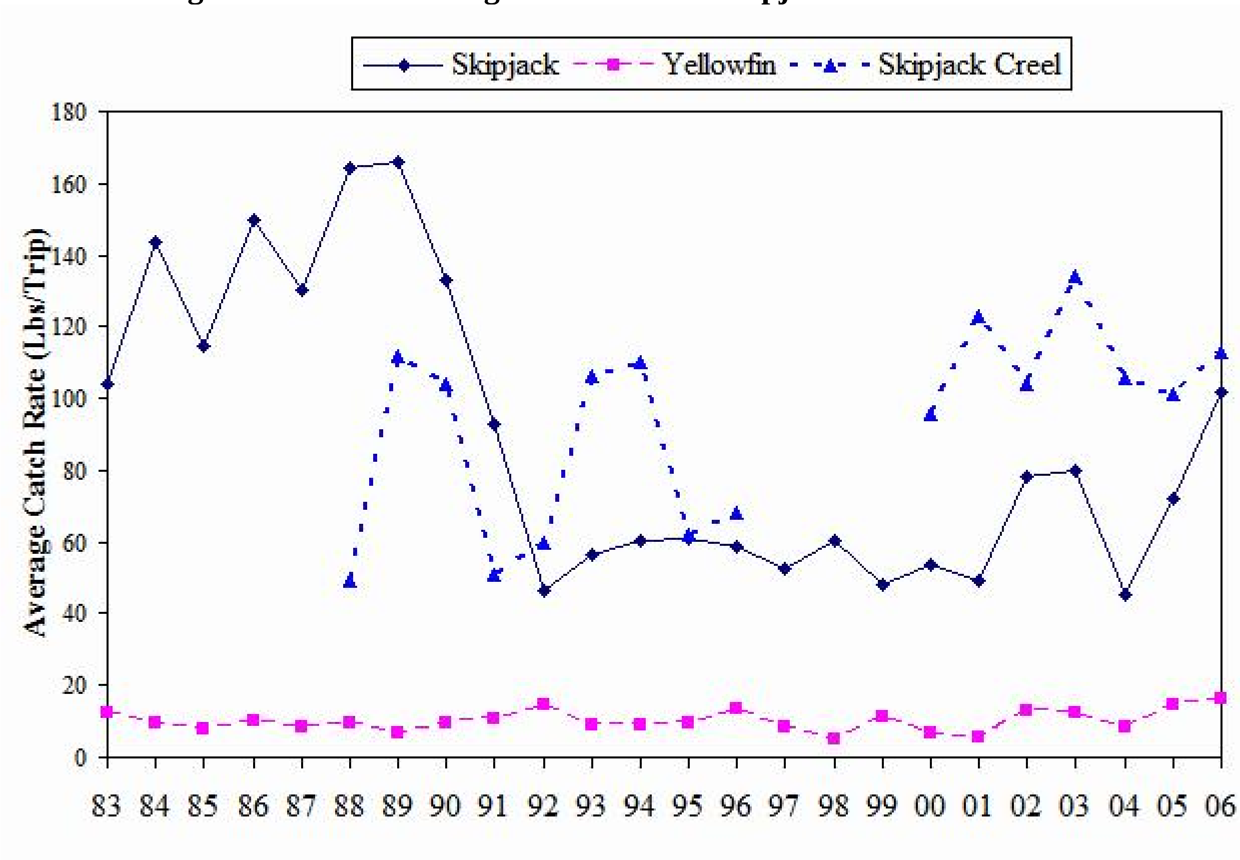
Blue marlins are not a marketable species and are rarely a target by fishermen except during fishing tournaments. When landed, it is rarely sold to vendors participating in the Commercial Purchase Data Collection Program; therefore it would not be recorded in the Commercial Purchase Data Base used to generate these reports. During the 2000 Saipan International Fishing Derby a 996-pound blue marlin was landed. 2005 catch rate decreased 28% from 2004 but increased slightly in 2006 by 23%.

Source and Calculation: Annual catch rates for selected species were obtained by calculating the average weight per trip for each year. Trips were assumed to be one day in length and each commercial invoice assumed to represent one trip.

Trolling Catch Rate (Lb/Trip)

Year	Mahimahi	Wahoo	Blue Marlin
1983	7.92	4.98	2.15
1984	3.76	6.95	0.76
1985	8.36	11.77	1.20
1986	10.50	5.35	1.57
1987	7.66	10.81	1.98
1988	18.98	7.21	0.81
1989	4.71	1.01	3.67
1990	9.40	3.12	1.83
1991	27.03	1.22	1.26
1992	14.80	9.68	3.72
1993	21.89	1.62	2.15
1994	9.89	2.54	1.73
1995	10.84	2.66	3.08
1996	12.68	3.84	3.06
1997	12.25	2.97	2.77
1998	9.13	2.27	1.51
1999	5.86	3.67	1.61
2000	2.80	1.56	1.38
2001	5.23	1.67	0.71
2002	7.87	3.58	0.55
2003	3.43	3.71	0.53
2004	10.94	2.12	0.61
2005	7.43	0.93	0.44
2006	**6.58**	**1.19**	**0.54**
Average	10.00	4.02	1.65
Standard Deviation	5.85	3.12	1.01

Figure 10. NMI Trolling Catch Rates of Skipjack and Yellowfin Tuna.



Interpretation: Catch rates for Skipjack tuna decreased dramatically commencing in 1990. The 1992 through 1997 catch rates have appeared to stabilize around the six-year mean of 55.7lb/trip. The Creel Survey data on skipjack tuna catch rates show a very different pattern from the Commercial Purchase data. Creel survey catch rates show catch rates oscillating between 50 and 100 lb/trip both before and after 1991 whereas, the Commercial Purchase data indicate sustained high catch rates before, and low catch rates after 1991. Reason for pattern remains obscure despite several attempts to clarify. Catch rate based on the Commercial Purchase Data Base for 2003 of 80 lbs/trip increased 3% in comparison with the 2002 catch rate of 78. 2004 catch rates declined 44% or 45 lbs/trip but 2005 catch rates increased 60% or 72 lbs/trip. This increased continued in 2006 by 42% or 102 lbs/trip. Previous discussions have suggested that non-tuna PMUS may be increasing in value and a slight shift in target troll fish may be occurring. Catch rates of yellowfin tuna per trip more than doubled from 1998 levels. However, 2000 catch rates declined by 39% and continued to decline 21% in 2001. Yellowfin catch rates in 2002 increased by 59% partly due to landings from the Northern Islands Bottom fishing feet and a longline experiment with gear less than 1 mile long that was conducted by a fishing company. In 2003 Yellowfin catch rates remain relatively stable at 12 lbs/trip despite bad weather that plagued through the Marianas nearly the entire 2003. 2004 yellowfin catch rates fell to 8 lbs/trip but in increased to 14 lbs/trip in 2005. This increase carried over in 2006 by 14% or 16 lbs/trip.

Source and Calculation: Data were summarized from the Commercial Purchase Data Base, which provides average pounds caught per trip. Annual catch rates for selected species were obtained by calculating the average weight per trip for each year. Trips were assumed to be one day in length and each commercial invoice represents one trip. Creel skipjack CPUE was calculated by dividing the sum of skipjack weight from all trolling trip interviews by the number of trolling trips interviewed.

Trolling Catch Rate (Lb/Trip)

Year	Skipjack	Yellowfin	Skipjack Creel
1983	104	12	
1984	144	10	
1985	114	8	
1986	150	10	
1987	130	8	
1988	164	9	49
1989	166	7	112
1990	133	9	104
1991	93	10	51
1992	46	14	60
1993	57	9	106
1994	61	9	110
1995	61	10	62
1996	59	14	68
1997	52	8	
1998	60	5	
1999	48	11	
2000	54	7	95
2001	49	5	123
2002	78	13	104
2003	80	12	134
2004	45	8	106
2005	72	14	101
2006	**102**	**16**	**113**
Average	88	10	94
Standard Deviation	40	3	27

Offshore Daytime Creel Survey Bycatch Summary
Based on the Interview Catch Data in Year 2000-2006
Method: Trolling

		Number Caught					Trip		
	Species	Released	Dead/Injd	Both	All	BC%	With BC	All	BC%
Non Charter							3	1,255	0.24
	Mahimahi	4		4	1,426	0.28			
	Yellowfin Tuna		1	1	1,249	0.08			
	Skipjack Tuna	1		1	27,242				
	Total			6	29,917	0.02			
	Compared With All Species			4	32,292	0.02			
Charter							0	141	0.00
	Compared With All Species			0	726	0.00			

Interpretation: With the assistance of NMFS staff, the implementation of an Offshore Day Time Creel Survey program began on April 2000. One of the main purposes of reimplementing the Offshore Creel Survey was to address the issue of bycatch.

A summary report from the year 2000 to 2006 by both non-charter and charter boats indicate less than 1% or 4 out of 20,435 of the total pelagic species landed is released. The only three species reported as bycatch was Mahimahi, Yellowfin Tuna and Skipjack Tuna. 4 out of 1,426 Mahimahi or .28% landed was released. And 1 out of 1,249 Yellowfin Tuna or .08% landed was released. There was 1 out of 27,242 Skipjack Tuna recorded to be released. Charter boats had no bycatch reported.

Bycatch in the CNMI has been believed in the past not to exist, which is further supported by the results of the Offshore Creel Survey. The CNMI will continue sampling in order to monitor this issue however it is a common practice by fishermen to keep all species caught regardless of size, species or condition.

Source: Offshore Daytime Creel Survey Expansion Program.

E. International Pelagic Fisheries

The U.S Pacific island Exclusive Economic Zones managed by the Council are surrounded by large and diverse fisheries targeting pelagic species. The International Module contains reported catches of pelagic species in the entire Pacific Ocean by fleets of Pacific Island nations and distant water fishing nations (DWFN) and information for a Stock Assessment and Fishery Evaluation (SAFE) report that includes the most recent assessment information in relation to status determination criteria. The spatial distribution of catch is illustrated in 2006 for the purse seine fishery and 2004 for longline and pole-and-line fisheries. Fishery trends in the Pacific Ocean are illustrated for the purse seine, longline and pole-and-line fisheries.

The 2006 purse-seine fishery in the WCPFC Convention Area (WCP-CA). Source: WCPFC-SC3-2007/GN WP-1

Vessels	The majority of the WCP–CA purse seine catch has come from the four main DWFN fleets – Japan, Korea, Chinese-Taipei and USA, which numbered 147 vessels in 1995, but has gradually declined in numbers to 112 vessels in 2006. In contrast, there has been a steady increase in the number of vessels from Pacific Islands fleets, which totaled 63 vessels in 2006. The remainder comes from a large number of smaller vessels in the Indonesian and Philippines domestic fisheries, and a variety of other domestic and foreign fleets, including several recent distant-water entrants into the tropical fishery (e.g. China, New Zealand and Spain).
Catch	During the mid-1980s, the purse seine fishery (400,000-450,000 mt) accounted for only 40% of the total catch, but has grown in significance to a level now contributing around 72% of total tuna catch volume (~1,500,000 mt). The provisional 2006 purse-seine catch of 1,573,447 mt was the second highest on record but only 12,000 mt less than the record in 2005 (1,586,064 mt). The 2006 purse seine catch was dominated by a record catch of skipjack tuna (1,305,405 mt – 83% of the total catch), but experienced a drop in yellowfin tuna catch (243,620 mt – 15%) compared to the relatively high level taken during 2005 (258,273 mt). The estimated purse seine bigeye catch for 2006 (24,180 mt – 2%) was slightly less than the average since 2000. The total estimated purse-seine effort for 2006 was lower than the previous two years, even though the 2006 catch level is similar to 2005, which suggests good catch rates were experienced during 2006. The Chinese-Taipei fleet had been the highest producer in the tropical purse seine fishery until 2004, when surpassed by the combined Pacific Islands purse seine fleets fishing under the FSM Arrangement, until 2006, when the Korean purse seine fleet took the highest catch. The fleet sizes and effort by the Japanese and Korean purse seine fleets have been relatively stable for most of this time series. Several Chinese-Taipei vessels re-flagged in 2002, dropping the fleet from 41 to 34 vessels, with fleet numbers stable since. The increase in annual catch by the FSM Arrangement fleet until 2005 corresponds to an increase in vessel numbers, and coincidently, mirrors the decline in US purse seine catch, vessel numbers and effort over this period. The total 2006 tuna catch by the FSM Arrangement was lower than the previous two years, mainly due to a reduction in the number of vessels in this fleet. The total number of Pacific-island domestic vessels has now stabilized at 63 vessels after a period of sustained growth over more than a decade – at its highest level, there were 66 vessels (2005) in this category.
Fleet distribution	The purse seine catch distribution in tropical areas of the WCP–CA is strongly influenced by El Nino–Southern Oscillation Index (ENSO) events with fishing effort typically distributed further to the east during El Nino years and a contraction westwards during La Nina periods. The weak La Nina established at the end of 2005 continued into the first part of 2006, but soon dissipated and a weak El Nino event then presided over the remainder of 2006. Fishing activity remained concentrated in the PNG, FSM and Solomon Islands area in the first six months of 2006 (as in previous years), but there was a clear movement eastwards by fleets into Nauru and Kiribati waters in the 3rd and 4th quarters of 2006, perhaps related to the prevailing ENSO conditions.

Table 1. Total reported purse seine catch (metric tonnes) of skipjack, yellowfin and bigeye tuna in the Pacific Ocean. Source: WCPFC Yearbook 2006.

Year	Skipjack	Yellowfin	Bigeye	Total
1967	115,859	68,869	1,757	186,485
1968	67,229	93,647	4,801	165,677
1969	51,076	117,521	1,141	169,738
1970	58,052	148,708	3,136	209,896
1971	111,536	115,703	5,235	232,474
1972	51,468	176,056	4,837	232,361
1973	62,547	211,100	4,420	278,067
1974	95,046	211,199	2,943	309,188
1975	138,767	198,415	7,902	345,084
1976	153,453	232,182	18,526	404,161
1977	125,403	203,431	12,749	341,583
1978	216,402	173,061	19,690	409,153
1979	199,520	202,014	14,128	415,662
1980	213,612	178,743	24,099	416,454
1981	214,152	231,156	19,190	464,498
1982	274,399	189,744	12,190	476,333
1983	381,751	193,317	14,017	589,085
1984	397,330	254,585	18,475	670,390
1985	359,786	317,790	13,000	690,576
1986	433,773	370,874	10,397	815,044
1987	439,284	420,254	12,392	871,930
1988	584,165	376,462	9,755	970,382
1989	577,720	441,303	14,660	1,033,683
1990	677,717	442,448	18,331	1,138,496
1991	839,579	450,184	18,620	1,308,383
1992	809,417	467,483	26,330	1,303,230
1993	703,722	464,525	24,231	1,192,478
1994	837,156	431,434	47,791	1,316,381
1995	893,700	407,445	60,983	1,362,128
1996	898,941	360,951	90,222	1,350,114
1997	877,036	510,727	110,040	1,497,803
1998	1,179,055	523,602	73,999	1,776,656
1999	1,182,493	496,188	92,506	1,771,187
2000	1,186,552	465,758	136,777	1,789,087
2001	1,084,888	606,864	91,949	1,783,701
2002	1,286,495	595,216	84,263	1,965,974
2003	1,385,863	601,284	81,642	2,068,789
2004	1,420,654	443,896	98,293	1,962,843
2005	1,585,562	524,518	104,683	2,214,763
2006	1,628,010	389,779	98,419	2,116,208
Average	594,979	332,711	37,713	965,403
STD Deviation	486,120	156,669	39,302	660,992

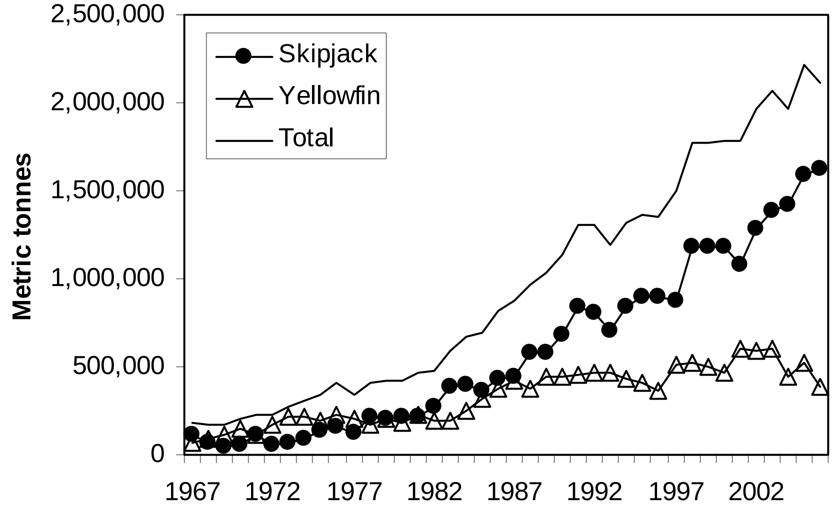


Figure 1. Total purse seine catch of skipjack and yellowfin tuna in the Pacific Ocean, 1967–2006. Source: WCPFC Yearbook 2006.

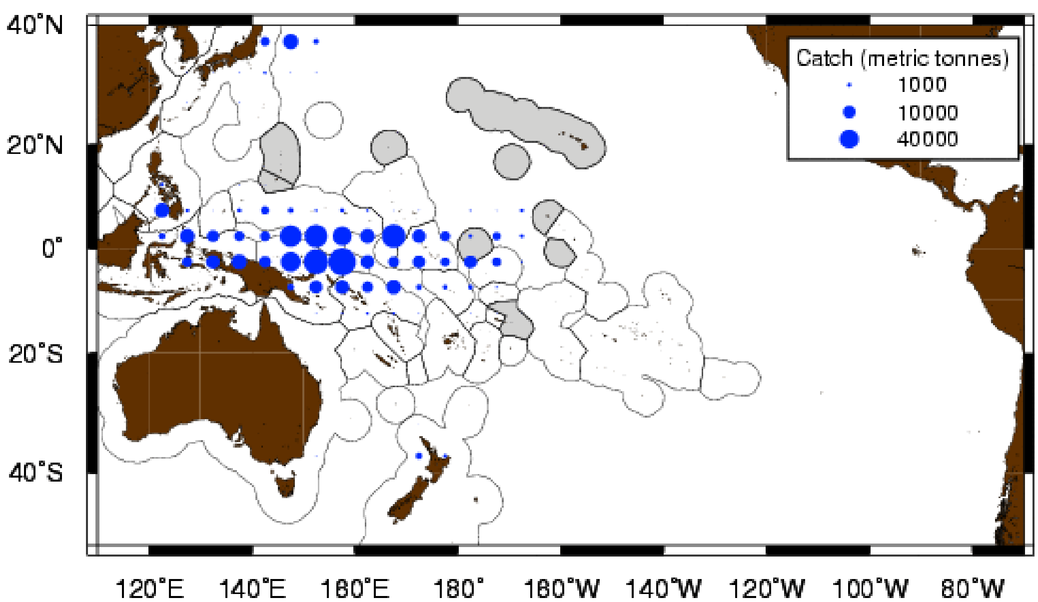


Figure 2. Distribution of total purse seine WCP-CA skipjack catch in 2006. Source: SPC public domain data.

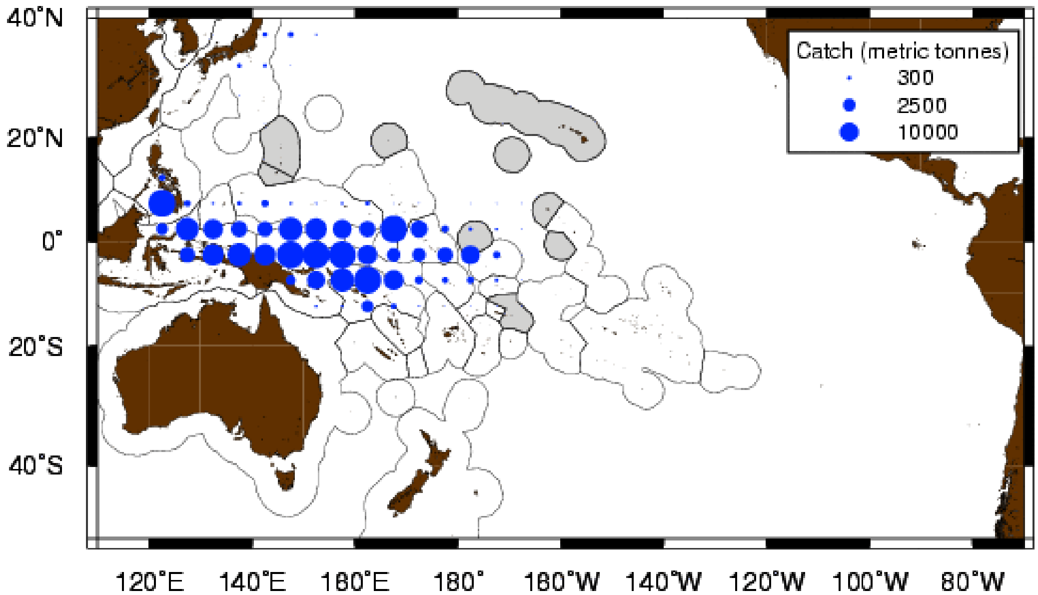


Figure 3. Distribution of total purse seine WCP-CA yellowfin catch in 2006. Source: SPC public domain data.

The 2006 longline fishery in the WCP-CA. Source: WCPFC-SC3-2007/GN WP-1

Vessels	The diverse longline fleet in the WCP-CA was composed of roughly 5,000 vessels in 2005. The fishery involves two main types of operation – large distant-water freezer vessels (typically >250 GRT) which undertake long voyages (months) and operate over large areas of the region. These vessels may target either tropical species (e.g. yellowfin, bigeye tuna) or subtropical species (e.g. albacore , swordfish). Some voluntary reduction by one major fleet (Japan distant-water) has occurred in recent years; smaller offshore vessels (typically <100 GRT) which are usually domestically-based, undertaking trips less than one month, with ice or chill capacity, and serving fresh or air-freight sashimi markets or albacore canneries. These vessels operate mostly in tropical areas. Additionally, small vessels in Indonesia, Philippines and more recently in Papua New Guinea target yellowfin and bigeye by handlining and small vertical longlines, usually around the numerous arrays of anchored FADs in home waters.
Catch	The provisional WCP–CA longline catch (229,323 mt) for 2006 was the lowest since 2000 and around 10% lower than the highest on record which was attained in 2004 (261,038 mt). The WCP–CA albacore longline catch (78,921 mt – 34%) for 2006 was similar to the (high) catch levels experienced in recent years. The provisional bigeye catch (75,496 mt – 33%) for 2006 was the lowest for 5 years, and the yellowfin catch (70,021mt – 31%), the lowest for 7 years. A significant change in the WCP–CA longline fishery over the past 10 years has been the growth of Pacific Islands domestic albacore fishery, which has gone from taking 33% of the total south Pacific albacore longline catch in 1998, to accounting for over 59% of the catch in 2006. The combined national fleets making up the Pacific Islands domestic albacore fishery have numbered around 300 (mainly small "offshore") vessels in recent years. The clear shift in effort by some vessels in the Chinese-Taipei distant-water longline fleet to targeting bigeye in the eastern equatorial waters of the WCP–CA resulted in a reduced contribution to the albacore catch in recent years which was compensated by the increase in Pacific-Islands fleet albacore catches, and a significant increase in bigeye catches. During the 1990s, this fleet consistently took less than 2,000 mt of bigeye tuna each year, but in 2002, the bigeye catch went up to 8,741 mt, and by 2004 it was up to 16,888 mt.
Fleet distribution	Effort by the large-vessel, distant-water fleets of Japan, Korea and Chinese-Taipei account for most of the effort but there has been some reductions in vessel numbers in some fleets over the past decade. Effort is widespread as sectors of these fleets target bigeye and yellowfin for the frozen sashimi market in central and eastern tropical waters, and albacore in the more temperate waters for canning. Activity by the foreign-offshore fleets from Japan, mainland China and Chinese-Taipei are restricted to the tropical waters, targeting bigeye and yellowfin for the fresh sashimi market; these fleets have limited overlap with the distant-water fleets. The substantial "offshore" effort in the west of the region is primarily by the Indonesian and Chinese-Taipei domestic fleets targeting yellowfin and bigeye. The growth in domestic fleets in the South Pacific over recent years has been noted; the most significant examples are the increases in the American Samoan, Fijian and French Polynesian fleets and the recent establishment of the Niue fleet.

Table 2. Total reported longline catch (metric tonnes) of PMUS in the Pacific Ocean. Source: WCPFC Yearbook 2006 and SPC public domain data. 2005 data are not available for non-tuna species.

Year	Albacore	Yellowfin	Bigeye	Striped Marlin	Black Marlin	Blue Marlin	Swordfish	Total
1962	50,990	65,758	80,945	26,639	2,229	18,169	11,216	255,946
1963	44,566	72,158	109,157	29,733	2,342	18,341	11,414	287,712
1964	38,312	62,216	77,257	41,462	1,876	13,055	8,615	242,793
1965	39,420	61,107	59,008	34,712	2,375	10,068	9,665	216,355
1966	63,990	70,720	66,749	29,485	2,172	9,462	11,615	254,193
1967	73,468	45,006	68,669	32,841	1,825	8,804	12,041	242,653
1968	57,038	60,558	62,432	40,280	1,883	8,026	11,477	241,694
1969	43,459	66,701	84,442	26,463	2,073	9,118	14,358	246,613
1970	52,522	68,124	67,689	37,376	1,605	11,301	10,329	248,945
1971	51,653	64,940	66,602	33,168	2,127	6,727	9,410	234,626
1972	55,226	77,110	85,462	22,663	1,884	8,129	9,102	259,576
1973	63,548	73,515	91,062	20,333	1,935	8,313	9,604	268,310
1974	46,901	64,680	78,748	19,930	1,620	7,634	8,693	228,207
1975	37,013	79,056	99,356	16,308	1,845	5,797	9,434	248,809
1976	46,744	91,995	122,804	16,903	1,056	7,244	11,259	298,004
1977	55,177	105,035	140,335	9,623	936	7,244	10,892	329,242
1978	46,290	118,743	121,034	10,309	1,624	8,196	10,887	317,084
1979	40,719	116,538	112,621	16,658	1,950	8,658	11,162	308,305
1980	46,485	133,850	120,888	18,449	1,652	9,722	17,675	348,721
1981	51,251	101,124	94,980	21,430	2,067	10,875	22,507	304,234
1982	46,011	94,975	98,569	22,641	2,277	10,943	19,151	294,567
1983	40,297	94,557	101,455	14,917	1,916	8,615	20,666	282,423
1984	35,904	80,603	92,823	12,530	1,524	11,252	16,323	250,958
1985	41,702	87,164	117,651	13,164	1,234	9,744	18,698	289,356
1986	45,688	85,422	149,166	17,411	1,250	11,335	20,542	330,814
1987	37,255	93,003	159,478	20,728	1,814	12,580	25,285	350,142
1988	43,600	99,462	122,421	19,071	2,726	12,845	24,294	324,418
1989	32,102	82,555	124,136	13,763	1,510	10,437	16,527	281,031
1990	35,541	105,657	164,110	9,661	1,806	9,845	14,941	341,561
1991	40,884	86,899	151,438	10,553	2,047	10,601	17,413	319,835
1992	50,015	88,355	146,771	8,948	2,045	10,296	18,962	325,392
1993	60,779	87,840	128,839	10,715	1,646	11,377	18,923	320,119
1994	64,490	99,985	137,463	10,807	1,786	14,048	15,580	344,158
1995	61,633	98,688	114,710	11,934	1,332	13,675	13,956	315,928
1996	62,778	91,744	92,962	8,352	818	8,511	15,180	280,346
1997	74,469	90,983	111,011	9,956	1,510	9,808	15,850	313,588
1998	85,395	78,491	118,995	6,752	1,838	9,318	15,071	315,860
1999	77,669	68,819	101,465	5,600	1,597	8,876	14,404	278,429
2000	74,688	97,244	108,172	4,703	2,170	9,837	17,949	314,763
2001	84,710	100,830	131,631	4,599	1,583	11,180	18,007	352,541
2002	83,604	96,686	152,762	4,092	1,439	10,235	16,907	365,725
2003	85,707	96,315	128,499	6,345	944	14,510	19,574	351,894
2004	83,648	95,729	130,947	4,998	1,211	20,306	21,843	358,682
2005	83,758	80,988	115,399					
Average	55,389	85,953	109,343	17,605	1,746	10,583	15,056	294,990
STD deviation	16,235	17,665	28,058	10,341	417	3,031	4,529	41,172

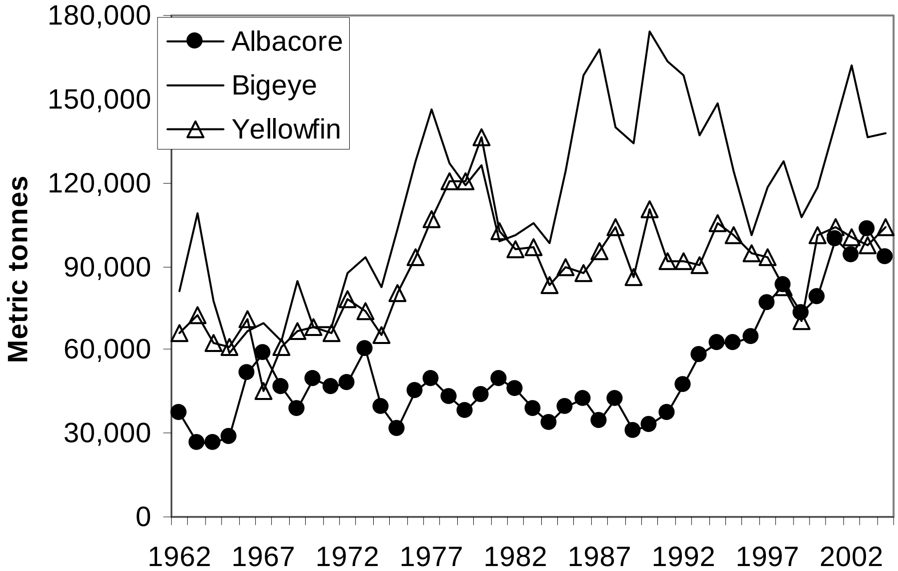


Figure 4. Reported longline tuna catches in the Pacific Ocean. Source: SPC public domain data.

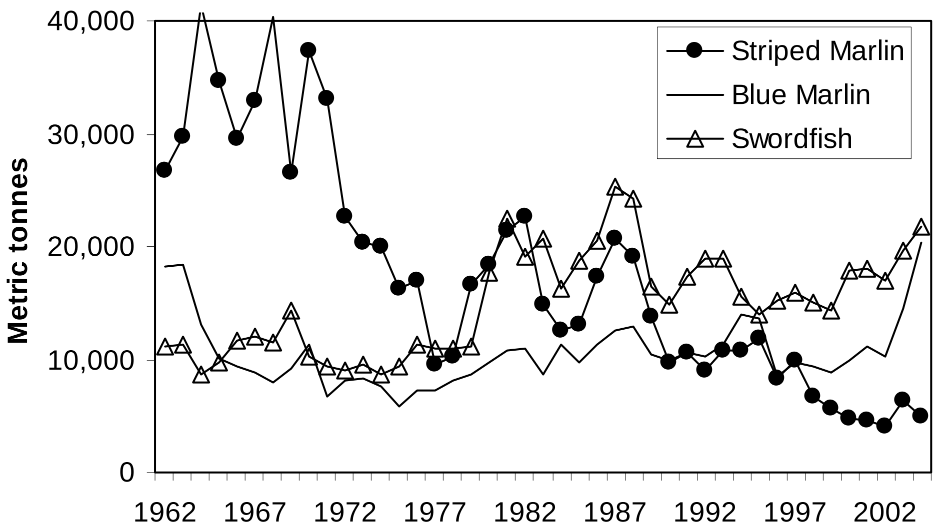


Figure 5. Reported longline billfish catches in the Pacific Ocean. Source: SPC public domain data.

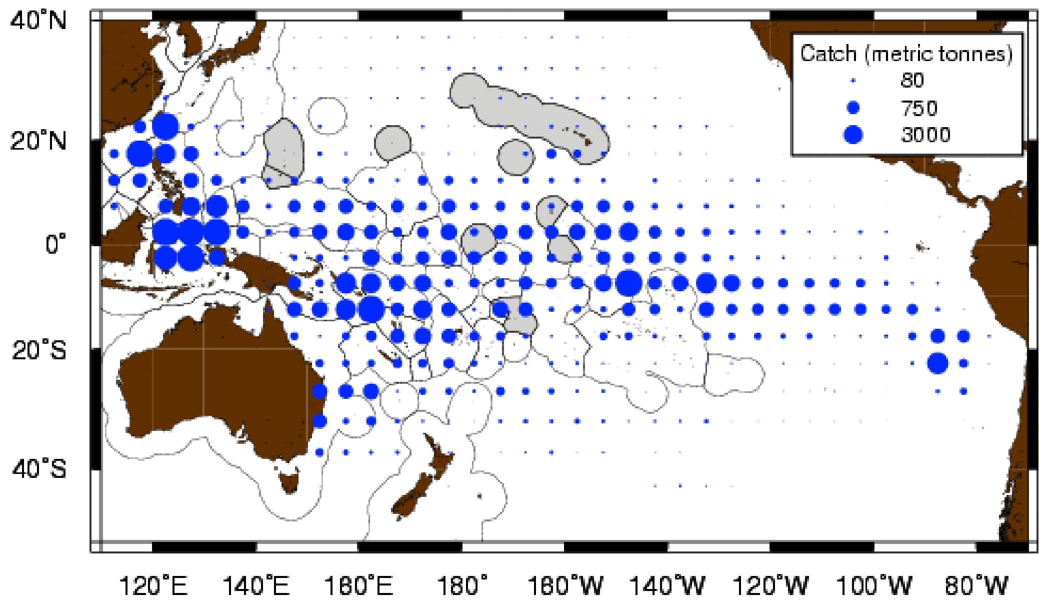


Figure 6. Distribution of longline catches of yellowfin tuna reported in 2004. Source: SPC public domain data.

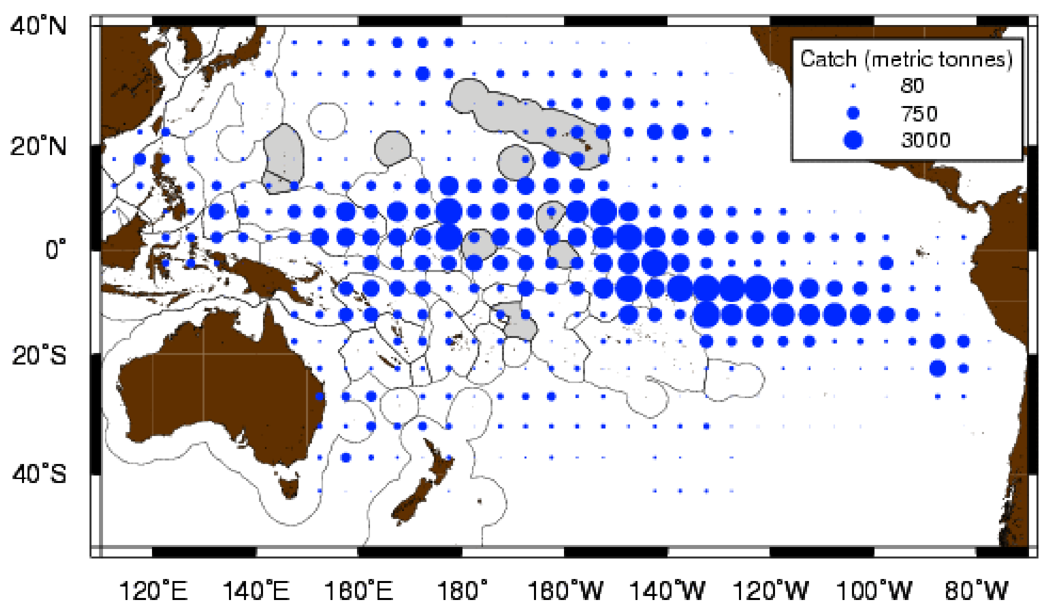


Figure 7. Distribution of longline catches of bigeye tuna reported in 2004. Source: SPC public domain data.

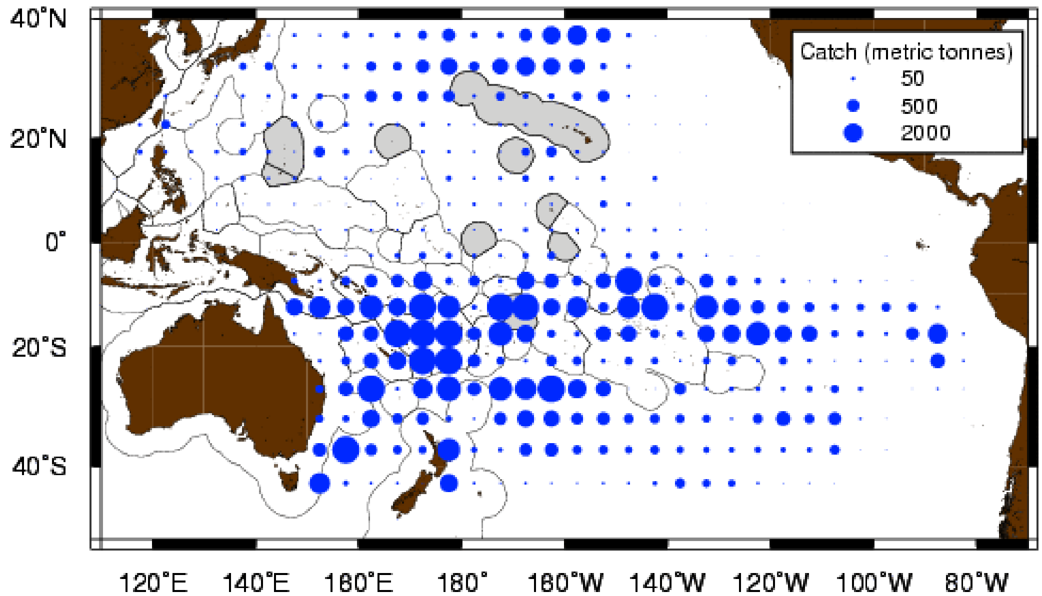


Figure 8. Distribution of longline catches of albacore tuna reported in 2004. Source: SPC public domain data.

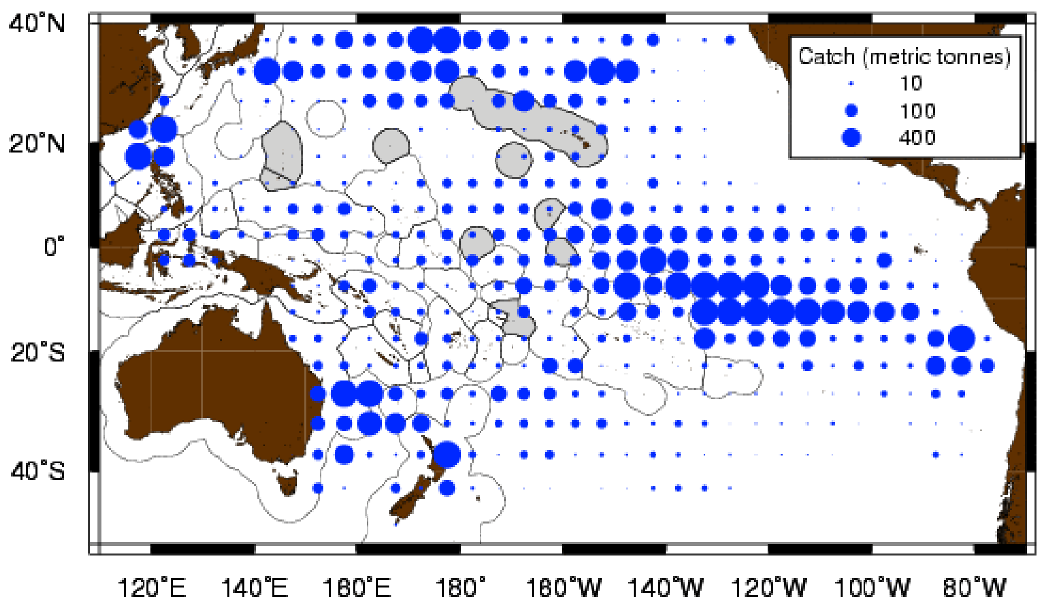


Figure 9. Distribution of longline catches of swordfish reported in 2004. Source: SPC public domain data.

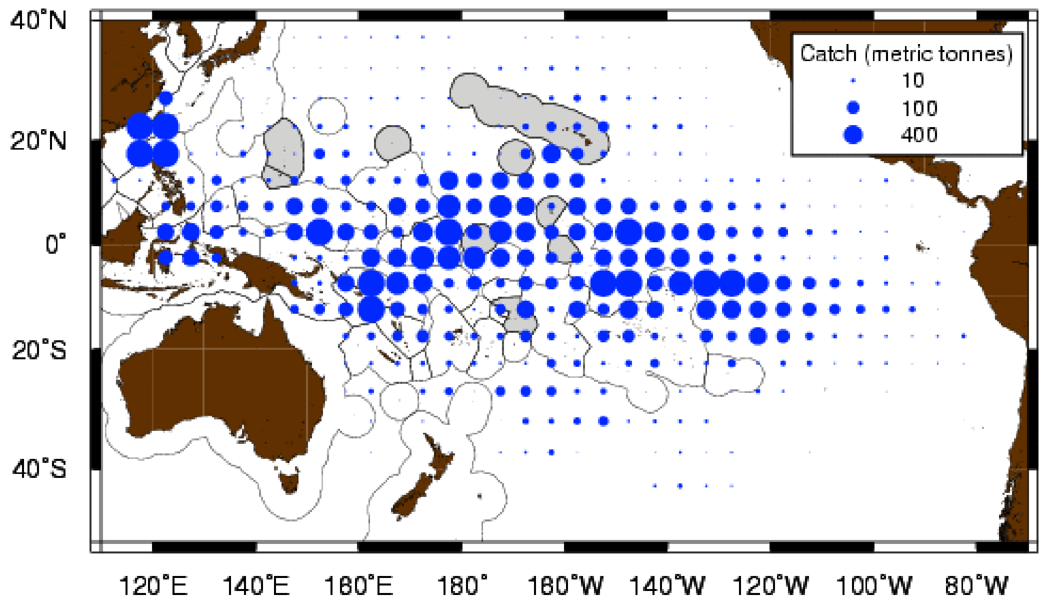


Figure 10. Distribution of longline catches of blue marlin reported in 2004. Source: SPC public domain data.

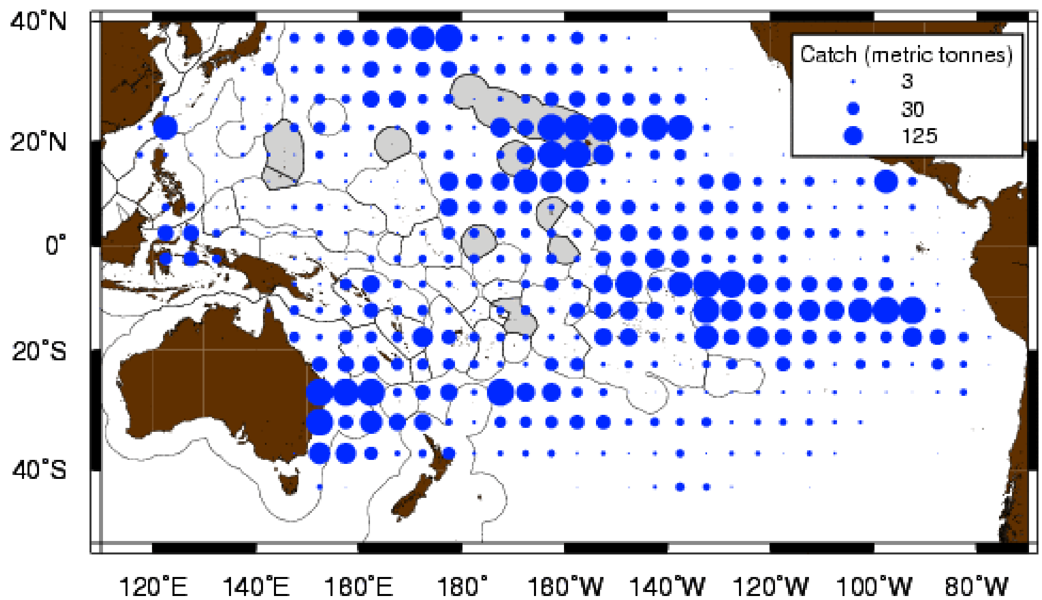


Figure 11. Distribution of longline catches of striped marlin reported in 2004. Source: SPC public domain data.

The 2006 pole-and-line fishery in the WCP-CA. Source: WCPFC-SC3-2007/GN WP-1

Vessels	The pole-and-line fleet was composed of approximately 500 vessels in the 2006 fishery which excludes vessels in the Indonesia domestic fishery.
Catch	The 2006 catch estimates for most pole-and-line fleets operating in the WCP–CA have yet to be provided, although the total catch estimate is expected to be similar to the level of recent years (i.e. 200,000–220,000 mt). Skipjack tends to account for the vast majority of the catch (typically more than 85% of the total catch in tropical areas), while albacore, taken by the Japanese coastal and offshore fleets in the temperate waters of the north Pacific, yellowfin (5–7%) and a small component of bigeye (1–4%) make up the remainder of the catch. The Japanese distant-water and offshore (144,012 mt in 2005) and the Indonesian fleets (51,949 mt in 2005) account for most of the WCP–CA pole-and-line catch. The Solomon Islands fleet (6,988 mt in 2006) has recovered from low catch levels experienced in the early 2000s (only 2,778 mt in 2000 due to civil unrest), but is still far from the level (of over 20,000 mt annually) experienced during the 1990s.
Fleet distribution	The WCP–CA pole-and-line fishery has several components: the year-round tropical skipjack fishery, mainly involving the domestic fleets of Indonesia, Solomon Islands and French Polynesia, and the distant water fleet of Japan seasonal sub-tropical skipjack fisheries in the home waters of Japan, Australia, Hawaii and Fiji a seasonal albacore/skipjack fishery east of Japan (largely an extension of the Japan home-water fishery).

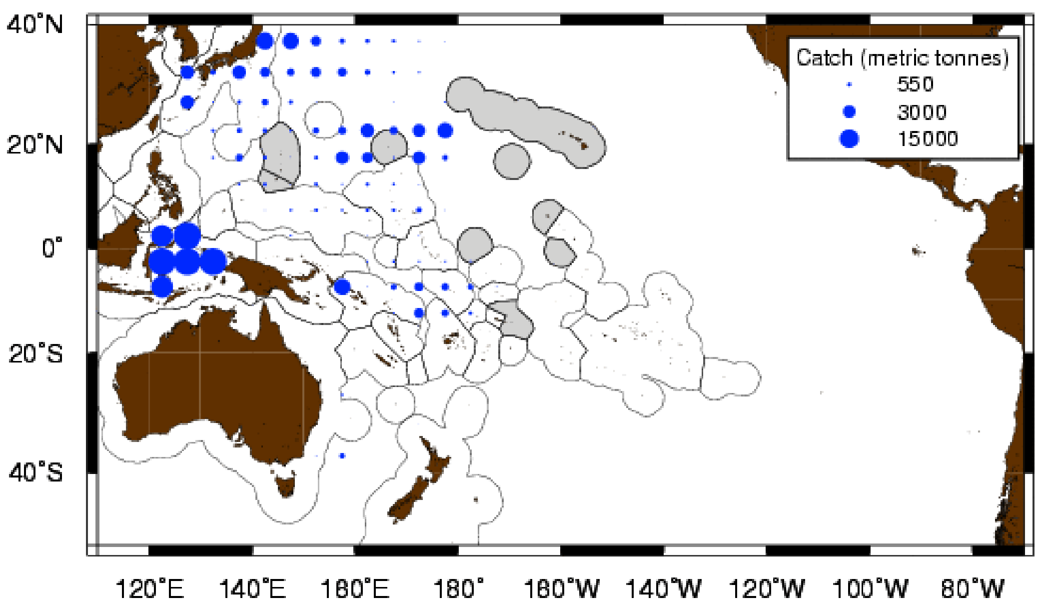


Figure 12. Distribution of pole-and-line catch of skipjack reported in 2004. Source: SPC public domain data.

Table 3. Total reported pole-and-line catch (metric tonnes) of skipjack in the Pacific Ocean. Source: WCPFC Yearbook 2006.

Year	Skipjack
1970	205,343
1971	192,625
1972	179,382
1973	262,352
1974	296,831
1975	232,119
1976	287,838
1977	302,162
1978	337,449
1979	292,204
1980	338,683
1981	300,198
1982	266,004
1983	304,149
1984	382,358
1985	250,956
1986	338,616
1987	264,699
1988	305,356
1989	292,647
1990	225,415
1991	294,667
1992	253,674
1993	283,838
1994	231,161
1995	261,715
1996	214,648
1997	228,872
1998	246,130
1999	237,783
2000	223,783
2001	163,776
2002	153,103
2003	172,645
2004	147,486
2005	170,337
2006	172,812
Average	251,725
STD deviation	58,422

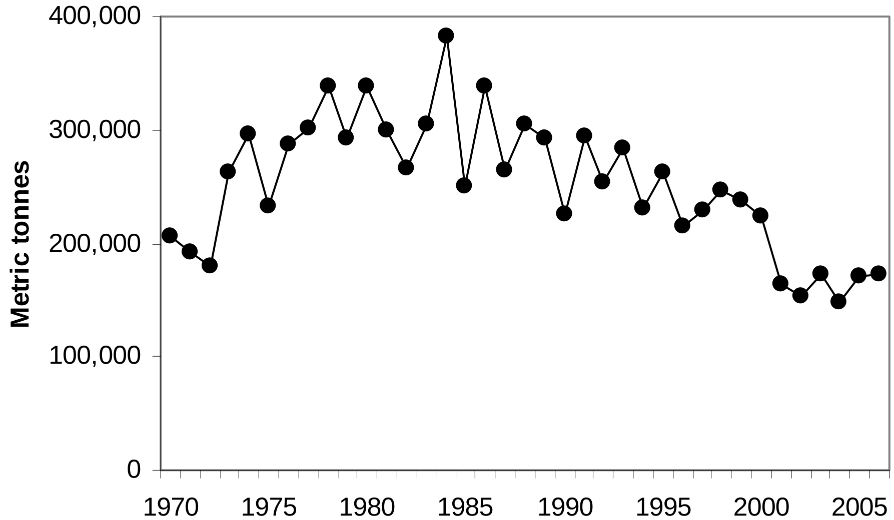


Figure 13. Reported pole-and-line catch (metric tonnes) of skipjack in the Pacific Ocean. Source: WCPFC Yearbook 2006.

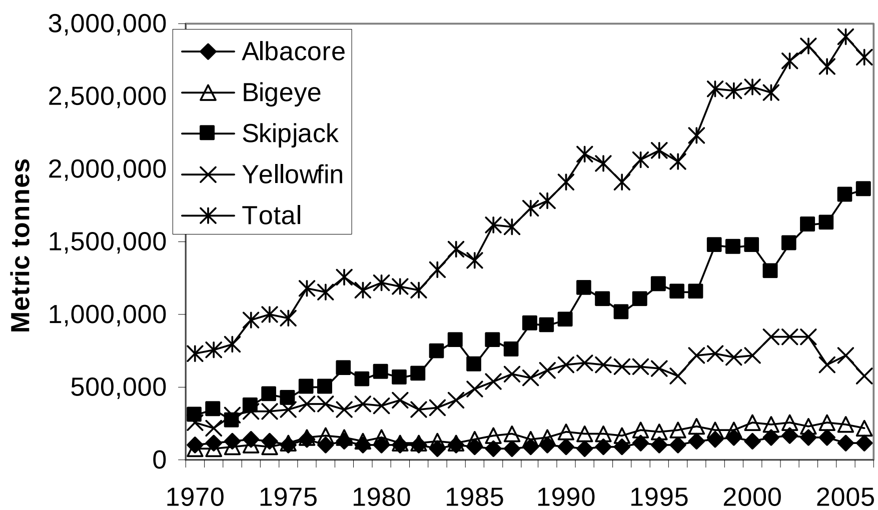


Figure 14. Estimated total annual catch of tuna species in the Pacific Ocean. Source: WCPFC Yearbook 2006.

Table 4. Estimated annual catch (metric tonnes) of tuna species in the Pacific Ocean. Source: WCPFC Yearbook 2006.

Year	Albacore	Bigeye	Skipjack	Yellowfin	Total
1970	98,267	75,227	304,411	258,044	735,949
1971	121,492	75,887	341,468	222,510	761,357
1972	124,611	95,684	275,301	303,499	799,095
1973	140,328	101,194	377,782	338,391	957,695
1974	134,002	87,449	444,003	338,876	1,004,330
1975	102,684	113,566	423,495	340,006	979,751
1976	145,791	148,958	495,276	385,662	1,175,687
1977	106,752	162,038	499,131	380,918	1,148,839
1978	133,810	148,292	632,048	348,069	1,262,219
1979	96,687	133,905	555,802	381,579	1,167,973
1980	102,469	151,537	597,703	371,989	1,223,698
1981	105,487	121,686	564,244	404,436	1,195,853
1982	99,375	119,647	594,847	348,547	1,162,416
1983	78,848	124,650	745,679	357,122	1,306,299
1984	96,192	119,953	825,419	405,725	1,447,289
1985	92,086	141,110	655,479	485,511	1,374,186
1986	81,215	168,896	822,931	536,810	1,609,852
1987	77,356	180,583	754,177	589,924	1,602,040
1988	87,760	142,751	940,982	559,667	1,731,160
1989	97,030	150,231	922,155	613,532	1,782,948
1990	94,906	195,224	967,087	655,776	1,912,993
1991	72,530	182,883	1,183,594	660,803	2,099,810
1992	95,520	183,062	1,101,759	654,622	2,034,963
1993	86,191	162,501	1,016,817	643,260	1,908,769
1994	116,668	199,000	1,103,759	643,802	2,063,229
1995	106,090	191,605	1,201,348	624,816	2,123,859
1996	107,921	199,685	1,156,088	582,796	2,046,490
1997	130,901	234,236	1,153,730	716,735	2,235,602
1998	138,206	207,156	1,474,636	736,904	2,556,902
1999	158,371	208,115	1,467,350	704,523	2,538,359
2000	122,536	260,883	1,470,675	713,376	2,567,470
2001	150,975	237,469	1,295,687	843,822	2,527,953
2002	166,097	252,494	1,485,643	841,154	2,745,388
2003	158,851	224,993	1,616,683	851,966	2,852,493
2004	159,175	258,600	1,631,378	656,868	2,706,021
2005	119,783	246,302	1,816,690	723,895	2,906,670
2006	112,310	217,569	1,860,117	581,074	2,771,070
Average	114,034	168,244	939,875	535,325	1,757,478
STD deviation	25,619	52,933	451,107	178,092	671,206

Stock status and WPRFMC reference points

This section contains a brief review of the stock status for several pelagic species and the status of these stocks in relation to WPRFMC reference points. Stock assessments are presented annually at the Scientific Committee (SC) of the WCPFC and at the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC). In August 2007, the SC reviewed an assessment for yellowfin in the WCPO. In addition, recent assessments from previous fora are available for Pacific blue marlin, North Pacific blue shark and swordfish (Tables 5 and 6). Stock status for the four tuna species are summarized from the SC species summary statements http://www.wcpfc.int/sc3/pdf/SC3 Summary Report.pdf and http://www.wcpfc.int/sc3/pdf/SC3_GN_WP_1.pdf which also contains additional information on recent developments in the fishery, sizes of fish and trends in catch per unit effort (CPUE), recruitment, biomass and fishing mortality. In July 2007, the 7th meeting of the ISC reviewed assessments for North Pacific albacore and striped marlin and summary statements from the meeting are available (http://isc.ac.affrc.go.jp/isc7/ISC7_Plenary_Report-FINAL.pdf).

Amendment 10 of the WPRFMC Pelagic FMP provided new specifications of overfishing criteria and control rules that trigger Council action based on the status of pelagic stocks. Amendment 10 defined Maximum Sustainable Yield (MSY) as a control rule that specifies the relationship of Fishing Mortality (F) to Biomass (B) and other indicators of productive capacity under a MSY harvest policy. Because fisheries must be managed to achieve optimum yield, not MSY, the MSY control rule is a benchmark control rule rather than an operational one. However, the MSY control rule is useful for specifying the “objective and measurable criteria for identifying when the fishery to which the plan applies is overfished” that are required under the MSA. The National Standard Guidelines (50 CFR 600.310) refer to these criteria as “status determination criteria” and state that they must include two limit reference points, or thresholds: one for F that identifies when overfishing is occurring and a second for B or its proxy that indicates when the stock is overfished (Figure 15). The status determination criterion for F is the maximum fishing mortality threshold (MFMT). Minimum stock size threshold (MSST) is the criterion for B. If fishing mortality exceeds the MFMT for a period of one year or more, overfishing is occurring. If stock biomass falls below MSST in a given year, the stock or stock complex is overfished. A Council must take remedial action in the form of a new FMP, an FMP amendment, or proposed regulations when it has been determined by the Secretary of Commerce that overfishing is occurring, a stock or stock complex is overfished, either of the two thresholds is being approached, or existing remedial action to end previously identified overfishing has not resulted in adequate progress.

Table 5. Schedule of completed stock assessments for WPRFMC PMUS.

Albacore Tuna (S. Pacific)	2006	Swordfish (N. Pacific)	2004
Albacore Tuna (N. Pacific)	2004	Wahoo	
Other tuna relatives (*Auxis* sp.) (*allothunnus* sp., *Scomber* sp.)		Yellowfin Tuna (WCPO)	2007
		Kawakawa	
Bigeye Tuna (WCPO)	2006	Bluefin Tuna (Pacific)	2004
Black Marlin		Common Thresher Shark	
Blue Marlin	2002	Pelagic Thresher Shark	
Mahimahi		Bigeye Thresher Shark	
Oilfishes		Shortfin Mako Shark	
Opah		Longfin Mako Shark	
Pomfrets		Blue Shark (N. Pacific)	2006
Sailfish		Silky Shark	
Shortbill Spearfish		Oceanic Whitetip Shark	
Skipjack Tuna (WCPO)	2005	Salmon Shark	
Striped Marlin	2006		

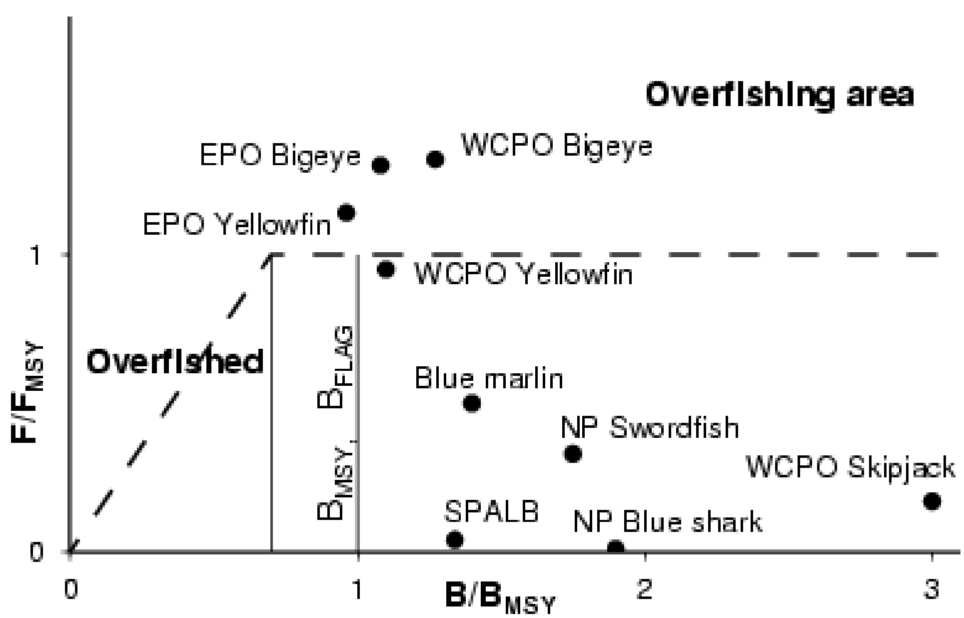


Figure 15. Specification of fishing mortality and biomass reference points in the WPRFMC Pelagics FMP and current stock status in the western-central (WCPO) and eastern Pacific Ocean (EPO).

Skipjack tuna in the WCP-CA

Stock status: A stock assessment was undertaken for skipjack during 2005 and is the first since 2003. The 2005 stock assessment indicates that for the skipjack stock in the WCP-CA overfishing is not occurring (Fcurrent / FMSY < 1), that the stock is not in an overfished state (Bcurrent / BMSY > 1), and that exploitation is modest relative to the stock's biological potential (Figure 16, Table 6).

Management implications: Catches increased in 2005 from their previous historical high in 2004. These high catches are sustainable unless recruitment falls persistently below the long-term average. However, any increases in purse-seine catches of skipjack may result in a corresponding increase in fishing mortality for yellowfin and bigeye tunas.

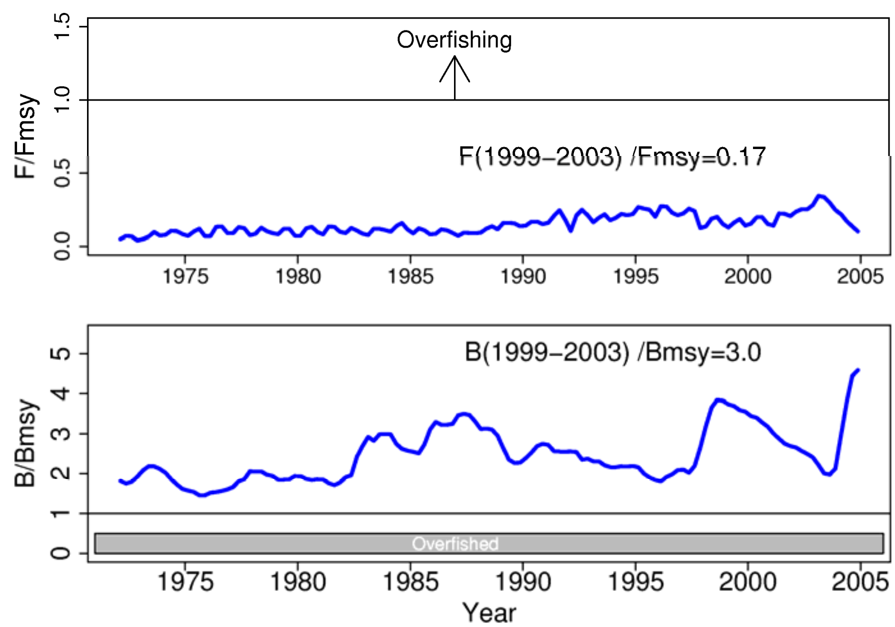


Figure 16. Ratios of F/F_{MSY} (top) and B/B_{MSY} (bottom) for skipjack tuna in the WCP-CA. The horizontal line at 1.0 in the F/F_{MSY} figure indicates an overfishing reference point. The shaded area in the B/B_{MSY} figure indicates an overfished reference point.

Yellowfin tuna in the WCP-CA
Stock status: The 2007 stock assessment conclusions differ slightly from the 2006 assessment, particularly in relation to the Fcurrent/FMSY with the 2007 assessment being slightly more optimistic than the 2006 assessment. While the point estimate of Fcurrent/FMSY is slightly less than 1 (0.95), the probability distribution associated with fishing mortality-based reference point indicates that there is almost an equal probability that the value of Fcurrent/FMSY is less than or greater than the reference point. Therefore, the possibility of overfishing is still relatively high (47%). The reference points that predict the status of the stock under equilibrium conditions are Bcurrent/BMSY (1.10) and SpawningBcurrent/SpawningBMSY ~ (1.12), which indicate that the long-term average biomass would remain slightly above the level capable of producing MSY at 2002–2005 average fishing mortality. Overall, current biomass exceeds the estimated biomass at MSY (Bcurrent/BMSY >1.0) (i.e. the yellowfin stock in the WCPO is not in an overfished state, although there is a small probability (6.2%) that it is in an overfished state).

The attribution of depletion to various fisheries or groups of fisheries indicates that the Indonesian and Philippine domestic fisheries have the greatest impact and contribute significantly to the impact in adjacent regions through fish movement. The purse-seine fishery also has a high impact in the tropical Pacific and accounts for a significant component (~40%) of the recent (2002–2005) impacts in all other regions, except the southwest region. It is notable that the composite longline fishery is responsible for biomass depletion of about 10% in the WCPO during recent years and generally catches larger, older size classes, while purse-seine fisheries are responsible for a larger percentage of the impacts and generally the catch consists of smaller and younger fish.

Management implications: The WCPO yellowfin tuna fishery can be considered to be fully exploited. In order to reduce the likelihood of overfishing, and if the Commission wishes to maintain average biomass at levels greater than 5% above BMSY, reductions in fishing mortality rate would be required. Stock projections for 2007–2011 — which attempt to simulate the conservation and management measures adopted at WCPFC2 and WCPFC3 — indicate that the point estimate of Bcurrent/BMSY remains above 1.0 throughout the projection period. However, the increasing uncertainty in the future projections is likely to result in an increased probability of the biomass declining below BMSY by the end of the projection period.

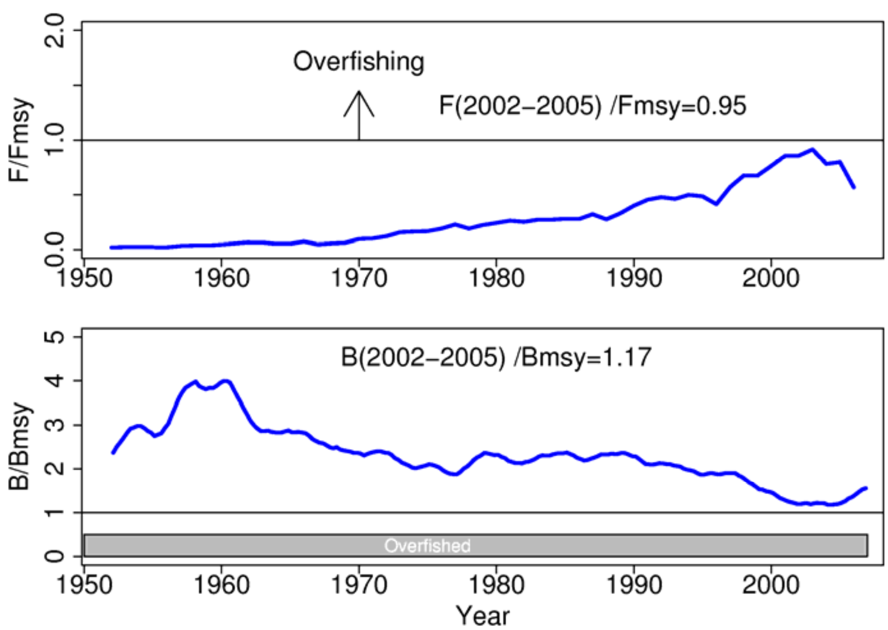


Figure 17. Ratios of F/F_{MSY} (top) and B/B_{MSY} (bottom) for yellowfin tuna in the WCP-CA. The horizontal line at 1.0 in the F/F_{MSY} figure indicates an overfishing reference point. The shaded area in the B/B_{MSY} figure indicates an overfished reference point (MSST).

Bigeye tuna in the WCP-CA
Stock status: The 2006 assessment results were reviewed and confirmed as consistent with the 2005 assessment, although the point estimate for Fcurrent/FMSY was slightly more pessimistic in this assessment. The assessment using the 6 region model indicates that there is a high probability that overfishing of bigeye has been occurring in the WCPO (Fcurrent/FMSY ≥ 1, with >99% probability) since 1997. While the stock is not yet in an overfished state (Bcurrent/BMSY > 1, with >99% probability) further biomass decline is likely to occur at 2001−2004 levels of fishing mortality at long-term average levels of recruitment, moving the stock into an overfished state. The greatest impact from the fishery is in the equatorial region, while the temperate regions are estimated to be moderately exploited. Furthermore, the attribution of depletion to various fisheries or groups of fisheries indicates that the longline fishery has the greatest impact; the purse seine fishery operating on associated sets has a lesser, but still substantial effect, particularly in the equatorial regions.
Management implications: In order to maintain the bigeye stock at a level capable of producing the maximum sustainable yield the Scientific Committee recommends a 25% reduction in fishing mortality from the average levels for 2001-2004. If the WCPF Commission wishes to maintain average biomass at levels above BMSY, further reductions would be required. The various levels of fishing mortality reduction required to maintain the biomass at specified levels above BMSY (relative to the average levels for 2001-2004). For example, a 39% reduction in fishing mortality would be required to maintain biomass at a level 20% above that which will produce the maximum sustainable yield. Fishing impacts in the equatorial WCPO have been increasing over recent years and more urgent management actions may be required for this area.

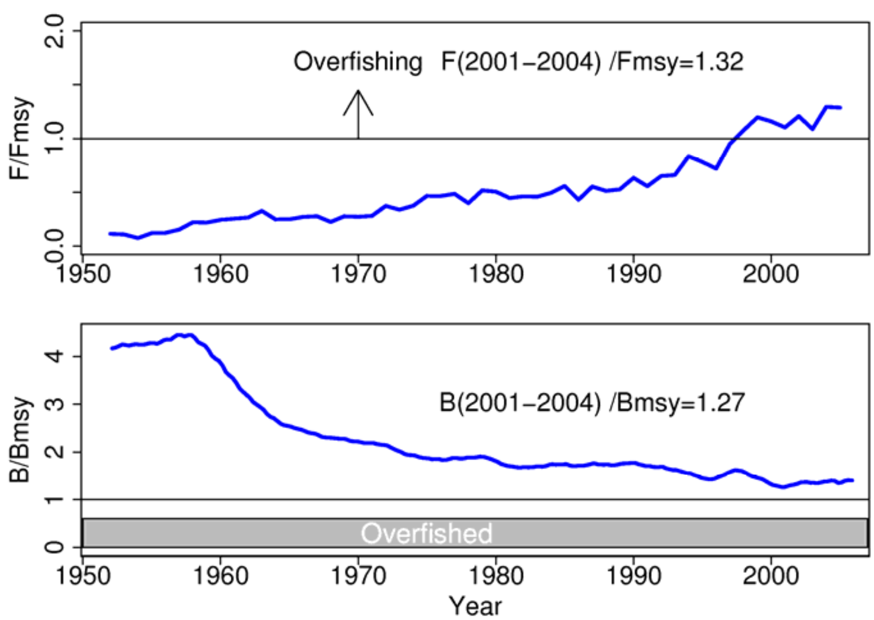


Figure 18. Ratios of F/F_{MSY} (top) and B/B_{MSY} (bottom) for bigeye tuna in the WCP-CA. The horizontal line at 1.0 in the F/F_{MSY} figure indicates an overfishing reference point. The shaded area in the B/B_{MSY} figure indicates an overfished reference point.

South Pacific albacore

Stock status: A full stock assessment was not undertaken for south Pacific albacore in 2006, but the 2005 assessment was updated using new data for 2004 and 2005. The key conclusions were similar to those of the 2003 and 2005 assessments, i.e. that overfishing is not occurring (Fcurrent / FMSY <1) and the stock is not in an over-fished state (Bcurrent / BMSY >1). Overall, fishery impacts on the total biomass are low (10%), although considerably higher impacts occur for the portion of the population vulnerable to longline. The model estimates that recent recruitment is below average and, consequently, the portion of the population vulnerable to longline is predicted to decline further in the next 2−3 years. The assessment conclusions were relatively insensitive to a range of different assumptions regarding the key biological parameters included in the model, although the analysis highlighted the need to refine some of these key parameters.

Management implications: The key management implications are unchanged from the 2005 assessment. Current catch levels from the South Pacific albacore stock appear to be sustainable and yield analyses suggest that increases in fishing mortality and yields are possible. However, given the age specific mortality of the longline fleets, any significant increase in effort would reduce CPUE to low levels with only moderate increases in yields. CPUE reductions may be more severe in areas of locally concentrated fishing effort.

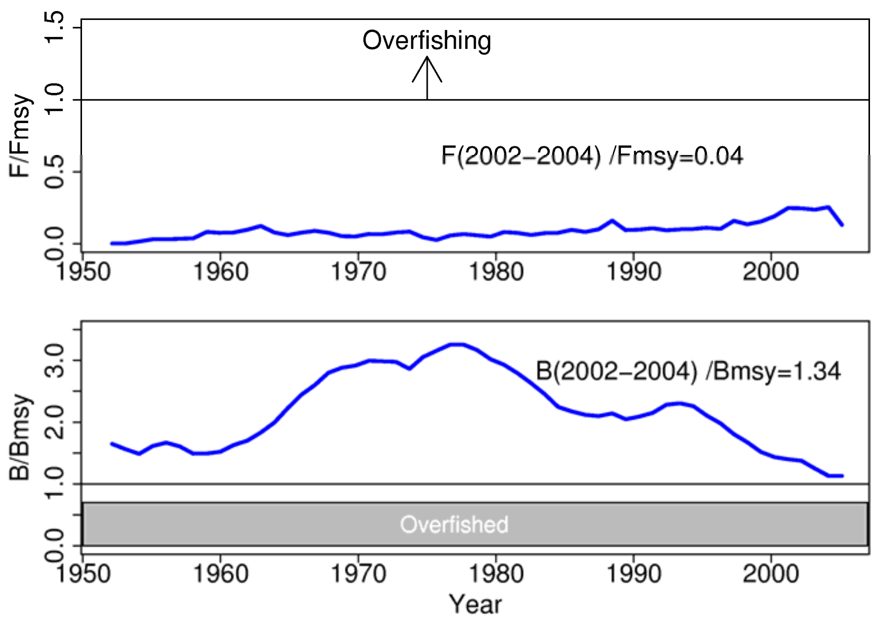


Figure 19. Ratios of F/F_{MSY} (top) and B/B_{MSY} (bottom) for South Pacific albacore. The horizontal line at 1.0 in the F/F_{MSY} figure indicates an overfishing reference point. The shaded area in the B/B_{MSY} figure indicates an overfished reference point.

Stock status – North Pacific albacore
ISC members agreed that stock assessment results indicated that 2006 estimate of spawning stock biomass (SSB) is the second highest in history (roughly, 153,000 t). This high level of SSB is reflective of strong year classes in 1999, 2001 and 2003. On the other hand, it is also indicated that the current fishing mortality rate (F=0.75) is high relative to commonly used reference points. Projected levels of SSB are forecasted to decline from a high level of 166,000 t in 2007 to the equilibrium level of roughly 92,000 t by 2015, if the population is fished at the current F of 0.75, which is near the long-term average (1966-2005).

Stock status – North Pacific striped marlin
Spawning biomass has declined from around 40,000 mt in the early 1970s to about 5,000 mt in the early 2000s. Spawning biomass in 2003 was estimated to be 14–15% of the 1970 level, depending on model scenario. Recruitment estimates also exhibited a long-term decline since the 1970s. Recent average recruitment (1996–2003) is roughly one-half of the long-term average (1965–2003) under both model scenarios. Stock projections from 2004 through 2009 based on re-sampling the distribution of recent average recruitment indicate that both spawning biomass and landings will continue to decline if the current fishing mortality rate (average of F2001-F2003) is maintained, regardless of model scenario. Fishing mortality has increased more than three-fold, from roughly F=0.20 in the early 1970s to over F=0.6 in the early 2000s. The current fishing mortality rate exceeds the F20% reference point by roughly 60% under both model scenarios. It was also noted that the current fishing mortality rate corresponds to maintaining only 9% of maximum spawning potential (F9%).

Stock status – north Pacific swordfish
Assessments of north Pacific swordfish in 2004 included: 1) several different analyses for standardizing CPUE – generalized linear model (GLM) and habitat-based both showing declining CPUE trend, with greater decreases in the northwest Pacific Ocean and 2) a MULTIFAN-CL modeling effort – difficulty with size sampling protocols that ignore small fish (e.g., in Japan) complicate the analysis; overall impact of the fishery is minor at worst; use of a simulation data set to test MULTIFAN-CL indicated a significant tendency to overestimate natural mortality (M) and thus underestimate stock levels.
Conclusions reached by the ISC Swordfish Working Group on the status of swordfish in the North Pacific are: 1) GLM and habitat-based standardization of CPUE based data from Japanese longline vessels show declining trends mainly driven by declines in CPUE in the northwestern portion of the study area; 2) a MULTIFAN-CL assessment also detected such a decline in the northwestern region of the fishery; and 3) in all MULTIFAN-CL model runs, the model showed fisheries as playing no more than a modest role in causing declines in abundance.

Table 6. Estimates of stock status in relation to overfishing and overfished reference points for WPRFMC PMUS.

Stock	Overfishing reference point	Is overfishing occurring?	Approaching Overfishing (2 yr)	Overfished reference point	Is the stock overfished?	Approaching Overfished (2 yr)	Assessment results	Natural mortality[1]	MSST
Skipjack Tuna (WCPO)	F/F_{MSY}=0.17	No	No	B/B_{MSY}=3.0	No	No	Langley et al. 2005	>0.5 yr^{-1}	0.5 B_{MSY}
Yellowfin Tuna (WCPO)	F/F_{MSY}=0.95	No	Yes	B/B_{MSY}=1.17	No	No	Langley et al. 2007	0.8-1.6 yr^{-1}	0.5 B_{MSY}
Albacore Tuna (S. Pacific)	F/F_{MSY}=0.04	No	No	B/B_{MSY}=1.34	No	No	Langley & Hampton 2006	0.3 yr^{-1}	0.7 B_{MSY}
Albacore Tuna (N. Pacific)		Unknown			Unknown			0.3 yr^{-1}	0.7 B_{MSY}
Bigeye Tuna (WCPO)	F/F_{MSY}=1.32	Yes	Not applicable	B/B_{MSY}=1.27	No	No	Hampton et al. 2006	0.4 yr^{-1}	0.6 B_{MSY}
Blue Marlin (Pacific)	F/F_{MSY}=0.50	No	Unknown	B/B_{MSY}=1.4	No	Unknown	Kleiber et al. 2002	0.2 yr^{-1}	0.8 B_{MSY}
Swordfish (N. Pacific)[2]	F/F_{MSY}=0.33	No	Unknown	B/B_{MSY}=1.75	No	Unknown	Kleiber & Yokawa 2004	0.3 yr^{-1}	0.7 B_{MSY}
Blue Shark (N. Pacific)	F/F_{MSY}=0.01	No	Unknown	B/B_{MSY}=1.9	No	Unknown	Kleiber et al. 2001	Unknown	
Other Billfishes		Unknown			Unknown			Unknown	
Other Pelagic Sharks		Unknown			Unknown			Unknown	
Other PMUS		Unknown			Unknown			Unknown	

[1] Estimates based on Boggs et al. 2000

[2] Assssment results based on natural mortality fixed at 0.2 yr^{-1}

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F. Recreational Pelagic Fisheries in the Western Pacific

Currently unavailable. This section will be updated as information is made available.

G. Pelagic fisheries production from the Pacific West Coast States

The following tables include time series for pelagic fisheries production along the US West Coast between 1986 and 2006. All data comes from the Pacific Fisheries Information Network website at http://www.psmfc.org/pacfin/woc.html

Table 1. Annual West Coast highly migratory species landings (mt) by species

Year	Albacore	Yellowfin	Skipjack	Bigeye	Bluefin	Swordfish	Common Thresher	Big-eye Thresher	Pelagic Thresher	Shortfin Mako	Blue shark
1986	5,243	21,517	1,361	29	4,731	2,530	974	<.05	48	312	2
1987	3,160	23,201	5,724	50	823	1,803	562	2	20	403	2
1988	4,908	19,520	8,863	6	804	1,636	500	1	9	322	3
1989	2,214	17,615	4,505	1	1,019	1,357	504	<.05	17	255	6
1990	3,030	8,509	2,256	2	925	1,236	357	1	31	373	20
1991	1,676	4,178	3,407	7	104	1,029	584	0	32	219	1
1992	4,885	3,350	2,586	7	1,087	1,546	292	<.05	22	142	1
1993	6,151	3,795	4,539	26	559	1,771	275	1	44	122	0
1994	10,686	5,056	2,111	47	916	1,700	330	<.05	37	128	12
1995	6,528	3,038	7,037	49	714	1,161	270	5	31	95	5
1996	14,173	3,347	5,455	62	4,688	1,191	319	1	20	96	1
1997	11,292	4,774	6,070	82	2,251	1,448	319	35	32	132	1
1998	13,785	5,799	5,846	53	1,949	1,378	326	2	11	98	3
1999	9,629	1,353	3,759	105	179	1,992	320	10	5	6	0
2000	9041	1148	780	87	312	2652	295	5	3	80	1
2001	11,183	655	58	53	196	2195	373	2	2	46	2
2002	10,028	544	236	10	11	1697	315	0	0	82	42
2003	16,643	465	349	35	36	2126	294	5	4	69	<1
2004	14,469	488	307	22	38	1185	115	5	2	54	<1
2005	9,083	285	522	0	206	294	178	10	<1	33	<1
2006	12,749	77	48	0	<1	539	159	4	<1	46	<1

Table 2. Annual value ($) of West Coast highly migratory landings by species

Year	Albacore	Yellowfin	Skipjack	Bigeye	Bluefin	Swordfish	Common Thresher	Pelagic Thresher	Bigeye Thresher	Shortfin Mako	Blue Shark
1986	8,895,672	25,475,289	1,367,387	129,108	6,618,473	18,256,026	2,412,160	277	95,181	611,399	1,886
1987	7,085,992	33,183,108	5,982,568	244,701	2,902,340	15,405,478	1,638,772	2,560	30,721	989,632	2,566
1988	12,280,116	34,161,742	12,618,821	33,772	4,445,064	13,007,930	1,310,935	1,097	13,328	868,676	2,923
1989	4,873,362	24,112,994	5,086,365	3,004	1,684,134	10,579,050	1,202,991	191	31,313	707,408	4,631
1990	6,911,021	10,485,225	2,361,619	10,928	1,433,788	8,811,042	786,534	2,067	42,599	909,368	15,834
1991	3,349,988	4,721,908	3,130,649	50,650	137,612	7,497,271	1,145,001	0	28,944	491,477	892
1992	13,214,373	4,412,452	1,606,563	51,444	1,360,230	8,709,765	521,922	693	17,108	266,344	2,056
1993	13,001,721	6,440,417	3,498,178	238,527	841,129	10,062,551	520,120	509	32,498	248,651	681
1994	22,293,343	4,947,988	1,916,462	336,130	1,834,094	10,504,630	632,555	46	37,579	270,088	17,572
1995	12,377,227	3,260,929	5,125,387	268,465	1,129,006	7,013,279	510,733	9,389	26,730	177,076	2,994
1996	28,583,043	3,388,536	4,185,411	273,321	4,238,678	6,363,798	634,493	1,635	18,591	174,621	616
1997	20,529,493	5,254,042	5,639,463	370,331	2,896,450	6,297,358	609,285	64,543	35,781	232,737	287
1998	19,068,271	5,976,102	5,322,183	277,238	3,058,769	6,052,792	574,795	2,635	9,513	173,349	6,094
1999	17,515,551	1,468,743	2,748,208	639,668	961,423	8,309,539	616,407	18,424	5,876	109,767	83
2000	17,154,639	1,294,388	483,242	579,384	577,095	11,772,245	587,702	2,738	4,636	132,970	909
2001	20,687,195	465,558	33,633	320,855	473,821	8,696,689	595,542	2,767	8,428	75,780	1,501
2002	14,291,939	588,677	128,425	87,304	43,512	6,320,439	517,715	N.A.	N.A.	124,522	18,598
2003	24,424,823	450,925	159,961	262,768	75,396	7,797,738	476,067	2,907	3,463	113,689	714
2004	27,345,860	447,555	109,254	147,696	53,613	4,824,309	196,360	2,500	4,060	97,280	972
2005	21,002,429	316,368	292,121	0	136,848	1,872,431	271,451	588	6,234	57,758	1,610
2006	23,759,098	175,646	40,384	0	3,790	2,695,302	299,709	271	4,509	79,313	632

[1]Real values are current values adjusted to eliminate the effects of inflation by dividing current values by the current year GDP implicit price deflator, with a base year of 1999.

Table 3. Pacific coast commercial landings of highly migratory species by state, 1986-2006

	Landings (mt)										
Year	**Albacore**	**Yellowfin**	**Skipjack**	**Bigeye**	**Bluefin**	**Swordfish**	**Common Thresher**	**Pelagic Thresher**	**Bigeye Thresher**	**Shortfin Mako**	**Blue Shark**
Washington											
1986	845	N.A.	0	N.A.	0	0	82	N.A.	N.A.	N.A.	<.05
1987	529	N.A.	0	N.A.	0	0	65	N.A.	N.A.	N.A.	<.05
1988	1,900	N.A.	0	N.A.	0	2	6	N.A.	N.A.	N.A.	<.05
1989	855	N.A.	0	N.A.	0	0	3	N.A.	N.A.	N.A.	0
1990	1,225	N.A.	0	N.A.	0	0	<.05	N.A.	N.A.	N.A.	0
1991	428	N.A.	<.05	N.A.	0	0	<.05	N.A.	N.A.	N.A.	<.05
1992	1,864	N.A.	<.05	N.A.	0	0	1	N.A.	N.A.	N.A.	<.05
1993	2,167	N.A.	0	N.A.	0	1	<.05	N.A.	N.A.	N.A.	<.05
1994	5,377	N.A.	0	N.A.	0	0	<.05	N.A.	N.A.	N.A.	0
1995	3,413	N.A.	0	N.A.	0	<.05	5	N.A.	N.A.	N.A.	<.05
1996	4,969	N.A.	0	N.A.	0	0	4	N.A.	N.A.	N.A.	<.05
1997	3,775	N.A.	0	N.A.	0	0	2	N.A.	N.A.	N.A.	<.05
1998	6,517	N.A.	0	N.A.	0	0	6	N.A.	N.A.	N.A.	<.05
1999	2,074	N.A.	0	N.A.	12	4	65	N.A.	N.A.	N.A.	0
2000	3,185	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	<0.5
2001	4,152	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	0
2002	5,358	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	0
2003	0	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	0
2004	8,310	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	0
2005	4,900	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	0
2006	8677	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	0
Oregon											
1986	1,116	<.05	<.05	N.A.	0	0	424	N.A.	N.A.	0	0
1987	1,038	0	0	N.A.	<.05	0	92	N.A.	N.A.	0	0
1988	1,799	0	0	N.A.	0	0	81	N.A.	N.A.	0	0
1989	490	0	0	N.A.	0	0	<.05	N.A.	N.A.	0	0
1990	943	0	0	N.A.	0	0	<.05	N.A.	N.A.	0	<.05
1991	571	0	0	N.A.	0	0	0	N.A.	N.A.	0	<.05
1992	1,764	0	0	N.A.	0	0	1	N.A.	N.A.	0	<.05
1993	2,157	0	0	N.A.	0	0	<.05	N.A.	N.A.	0	<.05
1994	2,131	0	0	N.A.	0	0	0	N.A.	N.A.	0	<.05
1995	2,283	<.05	<.05	N.A.	<.05	3	1	N.A.	N.A.	0	<.05
1996	4,059	<.05	0	N.A.	<.05	16	<.05	N.A.	N.A.	0	1
1997	4,158	<.05	<.05	N.A.	1	6	<.05	N.A.	N.A.	0	<.05
1998	4,808	0	0	N.A.	3	35	<.05	N.A.	N.A.	1	2
1999	2,064	<.05	0	N.A.	6	6	1	N.A.	N.A.	<.05	<.05
2000	3,972	0	0	N.A.	0	0	0	N.A.	N.A.	0	1
2001	4,058	0	0	N.A.	0	0	0	N.A.	N.A.	0	2
2002	1,979	0	0	N.A.	0	0	0	N.A.	N.A.	0	<0.5
2003	4,139	0	0	N.A.	0	0	0	N.A.	N.A.	0	<1
2004	4,807	0	0	N.A.	0	0	0	N.A.	N.A.	0	<0.5
2005	3,704	0	0	N.A	0	0	0	N.A.	N.A.	0	<1
2006	3,864	0	0	N.A.	0	0	<1	N.A.	N.A.	0	<1
California											
1986	3,282	21,517	1,361	29	4,731	2,530	468	<.05	48	312	2
1987	1,592	23,201	5,724	50	823	1,803	405	2	20	403	2
1988	1,209	19,520	8,863	6	804	1,634	414	1	9	322	3
1989	870	17,615	4,505	1	1,019	1,357	501	<.05	17	255	6
1990	862	8,509	2,256	2	925	1,236	356	1	31	373	20
1991	677	4,178	3,407	7	104	1,029	584	0	32	219	1
1992	1,257	3,350	2,586	7	1,087	1,546	291	<.05	22	142	1
1993	1,827	3,795	4,539	26	559	1,770	275	1	44	122	<.05
1994	3,177	5,056	2,111	47	916	1,700	330	<.05	37	128	12
1995	832	3,038	7,037	49	714	1,159	264	5	31	95	5
1996	5,146	3,347	5,455	62	4,687	1,175	316	1	20	96	<.05
1997	3,358	4,774	6,070	82	2,250	1,442	317	35	32	132	<.05
1998	2,459	5,799	5,846	53	1,946	1,343	319	2	11	97	1
1999	5,491	1,353	3,759	105	161	1,982	253	10	5	62	<.05
2000	1,884	1,148	780	87	312	2,612	250	3	5	80	<0.5
2001	2,972	642	57	53	196	2,194	360	2	2	46	0
2002	2,692	544	236	10	9.7	1,697	315	N.A.	N.A.	82	41
2003	1,711	465	349	35	36	2,126	294	4	5	68	0
2004	1,352	488	307	22	38	1,185	114	2	5	53	0
2005	478	285	522	0	206	294	178	<1	9	33	0
2006	208	77	48	0	<1	539	159	<1	4	46	0

Table 4. Pacific coast real commercial ex-vessel revenues (1999)[1] from highly migratory species by state

	Revenues ($)										
Year	Albacore	Yellowfin	Skipjack	Bigeye	Bluefin	Swordfish	Common Thresher	Pelagic Thresher	Bigeye Thresher	Shortfin Mako	Blue Shark
Washington											
1986	1,348,513	N.A.	0	N.A.	0	0	303,270	N.A.	N.A.	N.A.	170
1987	1,160,514	N.A.	0	N.A.	0	0	298,466	N.A.	N.A.	N.A.	580
1988	4,666,429	N.A.	0	N.A.	0	13,526	31,385	N.A.	N.A.	N.A.	65
1989	1,730,680	N.A.	0	N.A.	0	0	10,541	N.A.	N.A.	N.A.	0
1990	2,693,806	N.A.	0	N.A.	0	0	33	N.A.	N.A.	N.A.	0
1991	818,179	N.A.	17	N.A.	0	0	287	N.A.	N.A.	N.A.	52
1992	5,014,569	N.A.	82	N.A.	0	0	655	N.A.	N.A.	N.A.	39
1993	4,603,209	N.A.	0	N.A.	0	5,907	953	N.A.	N.A.	N.A.	34
1994	10,609,267	N.A.	0	N.A.	0	0	102	N.A.	N.A.	N.A.	0
1995	6,429,656	N.A.	0	N.A.	0	328	16,541	N.A.	N.A.	N.A.	16
1996	9,515,982	N.A.	0	N.A.	0	0	11,619	N.A.	N.A.	N.A.	44
1997	7,000,641	N.A.	0	N.A.	0	0	10,922	N.A.	N.A.	N.A.	10
1998	8,962,842	N.A.	0	N.A.	0	0	19,243	N.A.	N.A.	N.A.	71
1999	3,637,282	N.A.	0	N.A.	27,772	9,445	144,232	N.A.	N.A.	N.A.	0
2000	5,837,871	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	9
2001	7,951,774	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	0
2002	7,441,030	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	0
2003	0	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	0
2004	15,891,469	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	0
2005	11,009,583	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	0
2006	15,176,684	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	0
Oregon											
1986	1,891,052	173	4	N.A.	0	0	874,406	N.A.	N.A.	0	0
1987	2,319,249	0	0	N.A.	9	0	214,998	N.A.	N.A.	0	0
1988	4,444,898	0	0	N.A.	0	0	180,477	N.A.	N.A.	0	0
1989	1,142,060	0	0	N.A.	0	0	19	N.A.	N.A.	0	0
1990	2,167,028	0	0	N.A.	0	0	664	N.A.	N.A.	0	69
1991	1,166,314	0	0	N.A.	0	0	0	N.A.	N.A.	0	73
1992	4,554,091	0	0	N.A.	0	0	1,228	N.A.	N.A.	0	99
1993	4,350,334	0	0	N.A.	0	0	498	N.A.	N.A.	0	130
1994	4,103,617	0	0	N.A.	0	0	0	N.A.	N.A.	0	93
1995	4,332,302	336	9	N.A.	454	25,141	1,681	N.A.	N.A.	0	192
1996	7,801,152	9	0	N.A.	1,203	125,422	234	N.A.	N.A.	0	438
1997	7,567,729	536	424	N.A.	3,332	51,790	199	N.A.	N.A.	0	209
1998	6,665,217	0	0	N.A.	15,783	263,820	114	N.A.	N.A.	2,726	5,628
1999	3,782,057	198	0	N.A.	38,117	46,955	2,588	N.A.	N.A.	787	48
2000	7,487,569	0	0	N.A.	0	0	1,190	N.A.	N.A.	0	529
2001	7,544,089	0	0	N.A.	0	0	0	N.A.	N.A.	0	1,211
2002	2,951,707	0	0	N.A.	0	0	0	N.A.	N.A.	0	244
2003	6,125,406	0	0	N.A.	0	0	0	N.A.	N.A.	0	677
2004	9,006,482	0	0	N.A.	0	0	0	N.A.	N.A.	0	871
2005	8,890,821	0	0	N.A.	0	0	0	N.A.	N.A.	0	1,391
2006	8,046,824	0	0	N.A.	0	0	693	N.A.	N.A.	0	374
California											
1986	5,656,107	25,475,116	1,367,383	129,108	6,618,473	18,256,026	1,234,483	277	95,181	611,399	1,716
1987	3,606,229	33,183,108	5,982,568	244,701	2,902,331	15,405,478	1,125,308	2,560	30,721	989,632	1,986
1988	3,168,789	34,161,742	12,618,821	33,772	4,445,064	12,994,405	1,099,073	1,097	13,328	868,676	2,858
1989	2,000,622	24,112,994	5,086,365	3,004	1,684,134	10,579,050	1,192,430	191	31,313	707,408	4,631
1990	2,050,187	10,485,225	2,361,619	10,928	1,433,788	8,811,042	785,836	2,067	42,599	909,368	15,765
1991	1,365,494	4,721,908	3,130,632	50,650	137,612	7,497,271	1,144,714	0	28,944	491,477	767
1992	3,645,713	4,412,452	1,606,481	51,444	1,360,230	8,709,765	520,038	693	17,108	266,344	1,918
1993	4,048,179	6,440,417	3,498,178	238,527	841,129	10,056,643	518,669	509	32,498	248,651	517
1994	7,580,459	4,947,988	1,916,462	336,130	1,834,094	10,504,630	632,452	46	37,579	270,088	17,479
1995	1,615,269	3,260,593	5,125,378	268,465	1,128,552	6,987,810	492,511	9,389	26,730	177,076	2,785
1996	11,265,909	3,388,527	4,185,411	273,321	4,237,475	6,238,375	622,640	1,635	18,591	174,621	135
1997	5,961,123	5,253,506	5,639,039	370,331	2,893,118	6,245,568	598,164	64,543	35,781	232,737	67
1998	3,440,213	5,976,102	5,322,183	277,238	3,042,986	5,788,972	555,437	2,635	9,513	170,623	395
1999	10,102,663	1,468,544	2,748,208	639,668	895,534	8,253,140	469,587	18,424	5,876	108,980	35
2000	3,829,200	1,294,388	483,242	579,384	576,439	11,770,080	485,073	2,736	4,636	136,698	294
2001	5,191,333	445,861	32,878	320,753	472,785	8,695,855	584,636	2,767	8,428	75,572	0
2002	3,899,203	588,677	128,245	87,304	33,148	6,320,439	517,427	N.A.	N.A.	124,522	18,351
2003	2,600,649	450,925	159,961	262,768	73,863	7,796,022	475,014	2,907	3,463	113,502	0
2004	2,447,909	447,555	109,254	147,696	53,483	4,824,134	195,373	2,500	4,060	97,141	0
2005	1,102,025	316,368	292,121	0	136,848	1,872,431	270,449	588	6,234	57,577	0
2006	535,590	175,646	40,346	0	3,790	2,695,302	298,843	271	4,509	79,144	0