Pelagic Fisheries of the Western Pacific Region

2008 Annual Report

Updated April 2010
Western Pacific Regional Fishery Management Council
Honolulu, Hawaii

Cover photo: *Longline fishing vessels docked in Saipan, CNMI (Photo by Jack Ogumoro, Council Island Coordinator)*

A report of the Western Pacific Regional Fishery Management Council

Pelagic Fisheries of the Western Pacific Region

2008 Annual Report

June 30, 2009

(Updated April 8, 2010)

Prepared by the Pelagics Plan Team and Council Staff

for the

Western Pacific Regional Fishery Management Council
1164 Bishop Street, Suite 1400, Honolulu, Hawaii 96813

Table of Contents

Tables

Appendices

Appendix 1-2007 Pelagics Plan Team Members

Appendix 2-Glossary of Terms and List of Acronyms

Appendix 3-Pelagics FMP Plan Administration and Management Actions

Appendix 4-Protected Species Conservation

Appendix 5-US Coast Guard Enforcement Activities

Appendix 6-NOAA Office for Law Enforcement Activities

Appendix 7-NMFS Pacific Islands Fisheries Science Center Publications

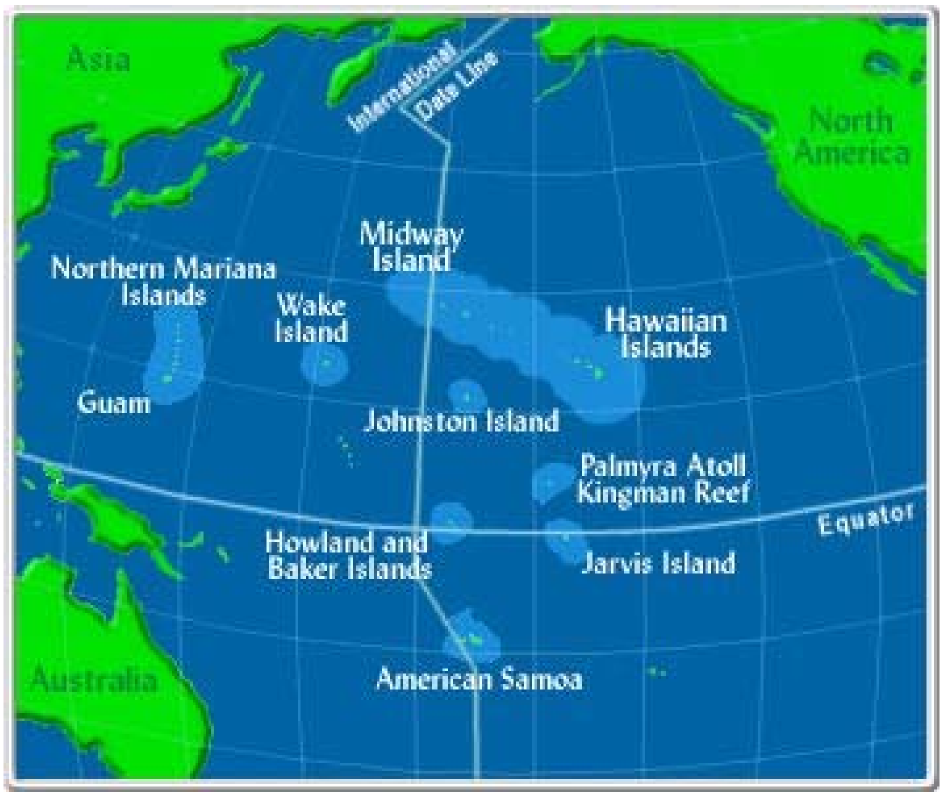
Appendix 8-The Pelagic Fisheries Research Program Publications

Pelagic Fisheries of the Western Pacific Region — 2008 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 2008, 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

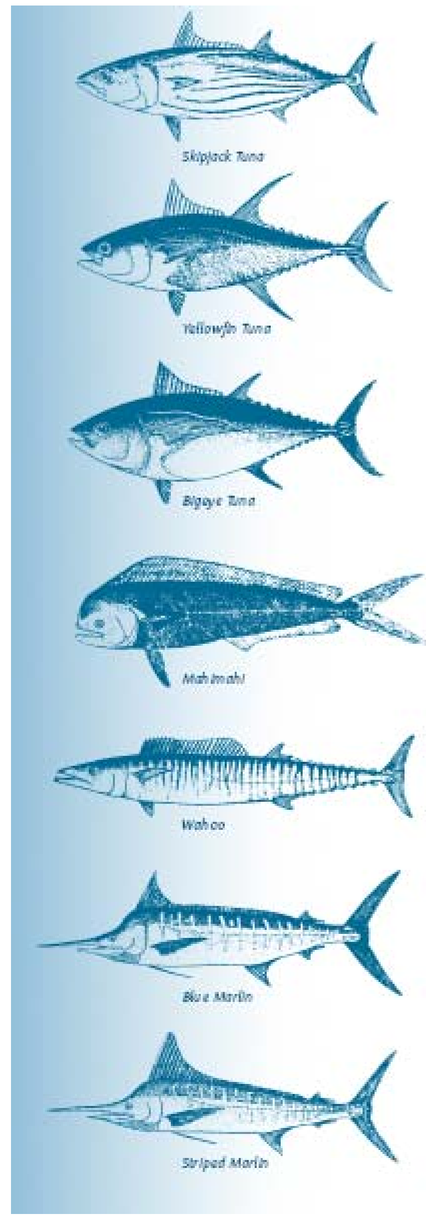
A list of the Pelagic Plan Team members during 2008 and persons responsible for compilation of this report are included in Appendix 1.

---

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*).



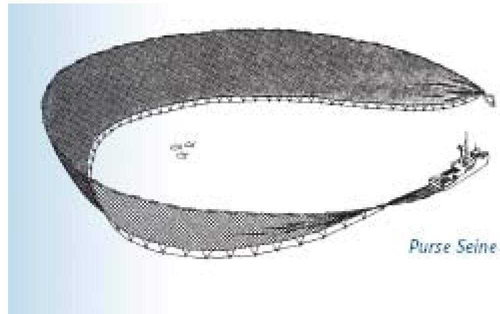
The previous MUS shark listing used to include oceanic species of the families *Alopiidae, Carcharinidae, Lamnidae, Sphynidae*. However, this could be construed to mean all members of these four shark families, which would also include nearshore and demersal sharks. The Pelagics Plan Team recommended 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)

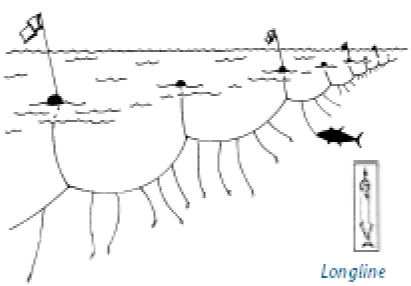
C. Pelagic Gear Types and Fisheries of the Western Pacific Region

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.



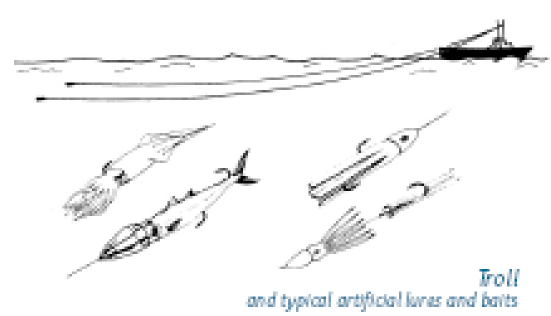
The largest fishery in terms of tonnage of fish landed is the U.S. purse-seine fishery, with catches of skipjack, yellowfin and bigeye tuna, amounting to 87,994 mt. However, this fleet has been decreasing in size from a peak in 1984 of 61 vessels to 14 vessels in 2004. Catches of blue marlins by this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



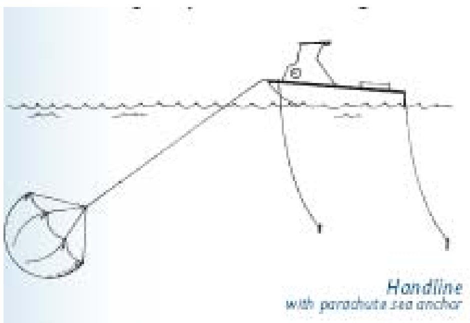
U.S. longline vessels in the Western Pacific Region are based primarily in Hawaii and American Samoa, although Hawaii-based vessels targeting swordfish have also fished seasonally out of California. The Hawaii fishery, with about 125 vessels targets a range of species, with vessels setting shallow longlines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

In 2006 NMFS notified the Council that overfishing of Western and Central Pacific yellowfin tuna was occurring and requested the Council to take appropriate action to end the overfishing. The Council was informed that the entire U.S. harvest of yellowfin tuna in the Western and Central Pacific was only about 4 percent of the total area's catch and that NMFS welcomed the Council's participation as a member in international fishery management organizations.

AMENDMENT 14 (partially approved by NMFS on May 16, 2007) was developed in response to NMFS' notifications that Pacific-wide bigeye and Western and Central Pacific yellowfin tuna were subject to overfishing. It contained recommendations regarding both international and domestic management, including a mechanism by which the Council could participate in international negotiations regarding these stocks.

REGULATORY AMENDMENT 7 (effective May 17, 2007) provided pelagic fishery participants the option of using NMFS approved electronic logbooks in lieu of paper logbooks. This measure was implemented to improve the efficiency and accuracy of catch reporting.

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.

AMENDMENT 15 (effective December 22, 2008) designated three species of pelagic squid as management unit species, and established permitting, reporting, and observer requirements for squid jig fishing vessels over 50ft (15.4 m) in length.

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.
In 2006 NMFS notified the Council that overfishing of Western and Central Pacific yellowfin tuna was occurring and requested the Council to take appropriate action to end the overfishing. The Council was informed that the entire U.S. harvest of yellowfin tuna in the Western and Central Pacific was only about 4 percent of the total area's catch and that NMFS welcomed the Council's participation as a member in international fishery management organizations.

AMENDMENT 14 (partially approved by NMFS on May 16, 2007) was developed in response to NMFS' notifications that Pacific-wide bigeye and Western and Central Pacific yellowfin tuna were subject to overfishing. It contained recommendations regarding both international and domestic management, including a mechanism by which the Council could participate in international negotiations regarding these stocks.

REGULATORY AMENDMENT 7 (effective May 17, 2007) provided pelagic fishery participants the option of using NMFS approved electronic logbooks in lieu of paper logbooks. This measure was implemented to improve the efficiency and accuracy of catch reporting.

AMENDMENT 15 (effective December 22, 2008) designated three species of pelagic squid as management unit species, and established permitting, reporting, and observer requirements for squid jig fishing vessels over 50ft (15.4 m) in length.

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.

In 2006 NMFS notified the Council that overfishing of Western and Central Pacific yellowfin tuna was occurring and requested the Council to take appropriate action to end the overfishing. The Council was informed that the entire U.S. harvest of yellowfin tuna in the Western and Central Pacific was only about 4 percent of the total area's catch and that NMFS welcomed the Council's participation as a member in international fishery management organizations.

AMENDMENT 14 (partially approved by NMFS on May 16, 2007) was developed in response to NMFS' notifications that Pacific-wide bigeye and Western and Central Pacific yellowfin tuna were subject to overfishing. It contained recommendations regarding both international and domestic management, including a mechanism by which the Council could participate in international negotiations regarding these stocks. Amendment 14 also contained measures to implement control dates for Hawaii's non-longline commercial pelagic vessels (70 FR 47781, see above) and purse seine and longline vessels (70 FR 47782, see above), as well as requirements for federal permits and reporting for Hawaii-based non-longline commercial pelagic vessels. NMFS disapproved the Amendment's international measures as premature given ongoing international negotiations as well as the development of a memorandum of understanding by the Councils and the Secretary of Commerce, in consultation with the

Secretary of State, regarding participation in U.S. delegations and other issues. NMFS disapproved Amendment 14's domestic permit and reporting requirements as duplicative of existing requirements imposed by the State of Hawaii and stated that they were working with the State to improve their data collection and processing system. NMFS also noted that Amendment 14 met the requirements of the Magnuson-Act regarding overfishing of fisheries that have been determined to be subject to overfishing due to excessive international fishing pressure.

At the request of the Council NMFS issued a control date of March 16, 2007 to notify persons who entered the Hawaii-based pelagic charter fishery after that date that they would not necessarily be assured of continuing participation if a limited entry program was subsequently implemented for their fishery. The control date was issued in response to concerns regarding significant expansion of the charter vessel fleet and its potential to impact billfishes and other pelagic species.

AMENDMENTS 9, 12 and 13 were intended to address issues which have now become moot due to changing circumstances, thus these amendment numbers may be used to designate future amendments.

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.

REGULATORY AMENDMENT 5 (effective January 18, 2006) allowed operators of Hawaii-based longline vessels fishing north of 23 degrees north latitude, as well as those targeting swordfish south of 23 degrees north, to utilize side-setting to reduce seabird interactions in lieu of the seabird mitigation measures required by Framework Measure 1. Side-setting was tested on Hawaii-based longline vessels and found to be highly effective in reducing seabird interactions.

At the request of the Council NMFS published a temporary rule removing the delay in effectiveness for closing the Hawaii-based longline shallow-set swordfish fishery as a result of it having reached one of its turtle interaction limits (71 FR 14416). This rule was implemented as vessel communications had improved to the point that vessel operators could be immediately notified of a closure, thus removing the possibility of exceeding a turtle limit during the notification period. This rule was effective March 20, 2006 through September 18, 2006.

REGULATORY AMENDMENT 6 (effective March 28, 2007) made the above temporary rule permanent.

REGULATORY AMENDMENT 7 (effective May 17, 2007) provided pelagic fishery participants the option of using NMFS approved electronic logbooks in lieu of paper logbooks. This measure was implemented to improve the efficiency and accuracy of catch reporting.

NMFS published a temporary rule effective March 20, 2006 through December 31, 2006 closing the Hawaii-based longline swordfish fishery for the remainder of the calendar year due to its having reached its annual limit of 17 interactions with loggerhead turtles.

CONTROL DATE of June 19, 2008 set for Hawaii-based pelagic charter fishery. Anyone who enters this fishery after this control date is not guaranteed future participation in the fishery if the Western Pacific Regional Fishery Management Council recommends, and NMFS approves, management measures for this fishery (e.g. limited entry).

AMENDMENT 15 (effective December 22, 2008) designated three species of pelagic squid as management unit species, and established permitting, reporting, and observer requirements for squid jig fishing vessels over 50ft (15.4 m) in length.

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.

In 2006 NMFS notified the Council that overfishing of Western and Central Pacific yellowfin tuna was occurring and requested the Council to take appropriate action to end the overfishing. The Council was informed that the entire U.S. harvest of yellowfin tuna in the Western and Central Pacific was only about 4 percent of the total area's catch and that NMFS welcomed the Council's participation as a member in international fishery management organizations.

AMENDMENT 14 (partially approved by NMFS on May 16, 2007) was developed in response to NMFS' notifications that Pacific-wide bigeye and Western and Central Pacific yellowfin tuna were subject to overfishing. It contained recommendations regarding both international and domestic management, including a mechanism by which the Council could participate in international negotiations regarding these stocks.

REGULATORY AMENDMENT 7 (effective May 17, 2007) provided pelagic fishery participants the option of using NMFS approved electronic logbooks in lieu of paper logbooks. This measure was implemented to improve the efficiency and accuracy of catch reporting.

CONTROL DATE of June 19, 2008 was set for the CNMI pelagic longline fishery. Anyone who enters this fishery after this control date is not guaranteed future participation in the fishery if the Western Pacific Regional Fishery Management Council recommends, and NMFS approves, management measures for this fishery (e.g. limited entry).

AMENDMENT 15 (effective December 22, 2008) designated three species of pelagic squid as management unit species, and established permitting, reporting, and observer requirements for squid jig fishing vessels over 50ft (15.4 m) in length.

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 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

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

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:

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.

In 2006 NMFS notified the Council that overfishing of Western and Central Pacific yellowfin tuna was occurring and requested the Council to take appropriate action to end the overfishing. The Council was informed that the entire U.S. harvest of yellowfin tuna in the Western and Central Pacific was only about 4 percent of the total area's catch and that NMFS welcomed the Council's participation as a member in international fishery management organizations.

AMENDMENT 14 (partially approved by NMFS on May 16, 2007) was developed in response to NMFS' notifications that Pacific-wide bigeye and Western and Central Pacific yellowfin tuna were subject to overfishing. It contained recommendations regarding both international and domestic management, including a mechanism by which the Council could participate in international negotiations regarding these stocks.

REGULATORY AMENDMENT 7 (effective May 17, 2007) provided pelagic fishery participants the option of using NMFS approved electronic logbooks in lieu of paper logbooks. This measure was implemented to improve the efficiency and accuracy of catch reporting.

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.

AMENDMENT 15 (effective December 22, 2008) designated three species of pelagic squid as management unit species, and established permitting, reporting, and observer requirements for squid jig fishing vessels over 50ft (15.4 m) in length.

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

A summary of the total pelagic landings during 2008 in the Western Pacific and the percentage change between 2007 and 2008 is shown in Table 2.

Note: Total Pelagic Landings are based on commercial reports and/or creel surveys. "Other pelagics" includes Dogtooth Tuna, Rainbow Runner, Barracudas, Kawakawa, Pomfrets, Oilfish, and Misc Pelagic Fish categories

Table 2. Total pelagic landings in lbs in the Western Pacific Region in 2008

Species	Am Samoa	% change	Guam	% change	CNMI	% change	Hawaii	% change
Swordfish	14,889	-15.4					4,303,000	+13.4
Blue marlin	76,286	+826.7	9,705	-48.9	1,098	+1222.9	1,142,000	+36.4
Striped marlin	1,582	+91.5					1,023,000	+60.6
Other billfish	3,751	+36.1	283	-93.1	0	-100.0	567,000	+50.0
Mahimahi (dolphinfish)	27,798	+31.0	111,811	-56.7	11,169	-60.9	1,416,000	-74.8
Wahoo	298,246	-31.7	98,345	+121.7	1,388	-48.0	964,000	+14.5
Opah (moonfish)	5,334	+602.8					1,335,000	+9.2
Sharks (whole wgt)	1,300	+892.4	497	---			416,000	-0.2
Albacore tuna	7,804,550	-33.6					873,000	+12.6
Bigeye tuna	273,901	-37.5	0	-100.0			13,511,000	-1.6
Bluefin tuna							2,000	+100.0
Skipjack tuna	358,700	-3.7	295,250	+88.5	157,708	-39.0	1,266,000	+26.3
Yellowfin tuna	741,123	-41.6	19,887	-58.4	16,344	-56.8	3,478,000	+0.1
Other pelagics	2,148	-70.8	14,302	-50.5	9,306	-10.7	1,194,000	+8.3
Total	**9,609,608**	**-33.4**	**550,080**	**-1.8**	**197,013**	**-41.7**	**31,490,000**	**+5.4**

IV. 2008 International and Region-wide Pelagics Plan Team Recommendations

The Pelagics Plan Team met in Honolulu, Hawaii on April 29 – May 1, 2009 and did not make region-wide recommendations. Area specific recommendations are reported under each island area sub-section.

International Recommendations

- The Pelagic Plan Team recommends that the International Module include a table showing the annual catches by weight for species caught by the US longline fishery as submitted to the Inter-American Tropical Tuna Commission (IATTC) and Western & Central Pacific Fisheries Commission (WCPFC).

- The Plan Team recommends that the Council, in its consideration of approaches to implement the WCPFC bigeye tuna (BET) catch limit, consider the implications if the Hawaii-based longline fleet is allowed to continue to fish in the Western and Central Pacific Ocean (WCPO) once the WCPFC bigeye tuna (BET) catch limit has been reached. Vessels may target other tuna species which may have implications on current WCPFC Conservation and Management Measures (CMMs) for WCPO yellowfin and North Pacific albacore. Further, if vessels continue to fish, BET will be caught and discarded. Although many BET discards may survive, additional mortality would occur, contrary to the intent of the WCPFC limit to reduce mortality. The Pelagic Plan Team recommends research on the post-release mortality of longline caught BET.

Region-wide Recommendations

- The Plan Team heard with interest the potential for accessing NOAA Cooperative Research Funds and recommended that the projects be identified that would build on existing or planned research for Council pelagic fishery management needs. An example would be to provide further support for an existing PFRP pilot project to tag seamount monchong on the Cross Seamount. The Pelagic Plan Team also made the following suggestions for potential Cooperative Research Projects:

  American Samoa

  1. Pilot study to quantify catches from the sport fish /recreational fishing vessels through setting up a voluntary logbook system and training fishers to record data.

  2. Study to determine what American Samoa's FADs are producing in terms of catches, size structure, and investigate stock structure by tagging fish at FADs.

  3. Study assessing the feasibility of rebuilding of the alia fleet to characterize the new fleet in terms of: where they fish, what they catch, amount of effort, duration of trips, etc.

  4. Gear testing (large circle hooks, large bait) with regards to reducing sea turtle bycatch in the longline fleet and determining the effectiveness of the proposed gear changes.

CNMI

1. Study to determine the stock structure of the pelagic monchong targeted and caught by both Guam and CNMI fishers.

2. Pilot study to characterize the fledging longline fishery through onboard sampling (size frequency data, etc.).

3. Pilot study to characterize the bottomfish fishery (near and offshore) through onboard sampling (size frequency data, etc.).

4. A fishery development project to determine the feasibility of a swordfish fishery in northern waters through an exploratory fishing survey.

Hawaii

1. Study to determine post-hooking mortality of bigeye tuna when targeted by the longline fleet.

2. A pilot voluntary recreational fishers reporting system.

3. Monchong tagging at Cross and possibly other seamounts to characterize the *Eumegistus illustris* resource in Hawaii.

V. Data Modules

A. American Samoa

Introduction

The pelagic fishery in American Samoa is and has been an important component of the American Samoan domestic economy. Prior to 1995 the pelagic fishery was largely a troll fishery. Horizontal longlining was introduced to the Territory by Western Samoan fishermen in 1995. Local fishers have found longlining worthwhile as they land more pounds with less effort and use less gasoline for trips. Initially the vessels used in longlining were “alias”. These are locally built, twin-hulled (wood with fiberglass or aluminum) vessels about 30 feet long, powered by 40HP gasoline outboard engines. Larger monohull vessels capable longer multi-day trips began joining the longline fleet soon after the alias. Monohull vessels now dominate the fleet and landings. The number of alias participating in the fishery has dropped to near zero at present. Commercial troll vessels have also declined. Federal longline logbooks were required during 1996. Two 50-mile area closures for vessels longer than 50 feet were implemented by WPREMC and NMFS during 2002; one surrounding Swains Island and one surrounding Tutuila and Anu’u Islands. Federal longline limited entry permits were issued during December of 2005. Albacore is the primary species caught longlining; the bulk of the longline catch is sold to the Pago Pago Canneries. Some of the catch is sold to stores, restaurants and local residents. Catch is also donated for family functions.

Pago Pago Harbor on the island of Tutuila is also a regional base for the trans-shipment and processing of tuna taken by domestic fleets from other South Pacific nations, the distant-waters longline fleets, and purse seine fleets. Purse seine vessels land skipjack, yellowfin and other tunas, with little albacore. Purse seine and non-US vessel landings are not included in this report.

Fishery Data History

Prior to 1985, only **commercial landings** were monitored. From October 1985 to the present, data was collected through a **Boat-based 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) 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 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.

"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 boat-based creel survey data. WPacFIN staff has 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 not 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.

One problem with the vessel creel survey was that **spear fishing** and **bottom fishing** trips are usually made 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 Boat-Based Creel Survey landings were replaced by Commercial Purchase System landings for species where the Commercial Purchase System landings exceeded the Vessel 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 Boat-Based creel survey expansion. Since the vessels involved in these unknown trips were 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 method assignment was done except for vessels engaging in multiple fishing methods at the same time. The fishing method for multiple-method vessels remained unknown. The number of unknown fishing trips was greatly reduced and the bottomfishing and spearfishing trips became better represented in the Boat-Based 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 Boat-Based 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 Boat-Based creel survey system.

In 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 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.

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 Boat-Based 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 Boat-Based 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 Boat-Based creel survey system was modified to calculate appropriate round weights from the length measurements using a standard regression formula.

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, allowing the proper percentages of each species to be added to the commercial landings with either the canneries price/pound or the local price/pound.

Cannery Sampling Forms listed the **lengths of individual fish** from which their weights can be calculated. The 1998 forms listed albacore lengths only; in 2001 forms 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, or was taken as the annual average of the cannery sampling data if there were at least 20 samples for the year. If there weren't enough cannery samples for a species, the weight per fish was calculated from the Boat-Based 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 the entire Boat-Based creel survey data or by manually entering a value.

Starting in 2001 the method of determining **price/pound** was revised. Before 2001 price/pound was determined by averaging Boat-Based creel survey data; sometimes resulting in 4-5 samples 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 Boat-Based creel survey data was calculated for each of three price/pound categories; Tutuila-Local, Manua-local and Cannery. Again if there were no monthly samples available for a given month, species and category; an annual average of creel survey data was used. A value was entered manually in cases where there was no creel survey data for a species and category. Values were also entered manually to override calculated values that were determined to be erroneous.

2008 Summary - American Samoan Pelagic Fishery

Total landings data covers all fish caught and brought back to shore whether it enters the commercial market or not. **Commercial landings** cover that portion of the total landings that was sold commercially in Samoa both to the canneries and other smaller local business. The difference between Total landings and the Commercial landings is the recreational/subsistence component of the fishery.

Landings (pounds): A little over 9,669,000 pounds of pelagic species is estimated to have landed by American Samoa vessels during 2008. This is a decrease of about 33% from 2007 total landings of about 14,500,000 pounds. More than 9.6 millions pounds were sold commercially.

Longline vessels 50 feet and up dominate the American Samoa total landings and commercial landings. Tunas account for about 95% of the estimated total landings by American Samoan vessels. Albacore tuna dominated tuna species landings taking up 84% (7,800,696) of the total landings; and yellowfin, skipjack, and bigeye tunas make up the rest of the tuna landings percentile. Non-Tuna and others make up 5% of the total landings with wahoo making 67% of non tuna landings. Longline landings of albacore decreased (34%) to about 7.8 millions pounds in 2008 from about 11.7 millions pounds in 2007.

Effort – Over 14.3 million hooks were set during 377 trips by 28 American Samoan longline vessels during 2008 and they made 4730 1000 hooks sets Longline effort indicators decreased in 2008 than 2007 in (i.e. sets, hours fished, hooks set) and the number of longline vessels landing fish decreased by one vessel. Participation by alias (1 active) in the longline fisheries decreased to beyond a data confidentiality trigger point.

Pounds-Per-Hour Trolling – Average pounds-per-hour (PPH) trolling increased by 32% to 62.38 pph in 2008 from 36.10 pph in 2007 for American Samoa's vessels. The 2008 PPH is the highest ever in the 27 year history. The previous peak value was 38 pph in 1988. Pounds per troll hour have generally been increased since 2001. Effective troll hours also increased by 30% to 1025 in 2008 from 724 hrs in 2007.

Longline CPUE -The 2008 longline CPUE decreased by 22% from 26.0 fish-per-hour recorded for 2007. Total catch for tunas decreased by 23%.The albacore catch rate dominates the 2008 tunas catch but decreased by 4.1 to 14.2. Skipjack catch per hour rate increased by 0.1 from 2.3 in 2007. Yellowfin decreased by 0.9 to 1.0 fish per hour and Bigeye also decreased by 0.4 to 0.5 in 2008. Non-tuna PMUS total catch rate also decreased by 0.4 to 2.0 fish-per-hour. Wahoo dominates the non-tuna catch rate but decreased by 0.3 in 2008 from 1.0 in 2007.

Fish Size – Albacore average weight-per-fish increased by 2.7 pounds (7%) to 41.1 pounds between 2007 and 2008 from the creel survey. The cannery samples show an increase of 2.3 pounds (6%) to 37.9 pounds in 2008. Skipjack shows a slight increase by 0.1 to 12.1 pounds from the cannery samples; but a 53% increase to 14.6 pounds from the creel survey. Average weight-per-fish for Yellowfin and Bigeye tunas decreased in the creel samples with Bigeye showing a 37% decrease but both increased in the cannery samples. Both the cannery (by 2,9lbs) and creel (by 0,6) samples show increases in average weight for wahoo between 2007 and 2008.

Revenues- Inflation-adjusted revenue for 2008 amounts to over $9.4mllions, a decrease of about 37% from $15 millions in 2007.Tuna sales decreased by 35% to $9.2 millions from $14.5 in 2007.
For the Non-tuna the adjusted revenue amounts to $307,574 in 2008 a decrease of 36% from 2007 revenue.

Bycatch – Longline bycatch by all boats totaled 9.5 percentages in 2007. Skipjack tunas dominate tuna bycatch percentages. Oilfish and all sharks dominate Non-tuna PMUS percentages of bycatch. A total of 266,753 fishes were kept and 26,641 fishes were released by longline vessels in 2008. Tuna species topped, 96%, the total fish kept; Albacore dominate the number kept with a 0.2 percent released while Skipjack tunas tops the number of releases for Tunas at 4,442 fishes. Non- tuna PMUS releases were dominated by Oilfish – 5,227 and allsharks 5,819 fishes.

Conclusion - Longline fishing by large monohull vessels (>50ft and >70ft) continues to dominate American Samoa's pelagic fishery. Alia longline and trolling fishing fleet continues to decline. During 2008, only one Alia boat participated in the longline fishery, .and one only actively participated in the trolling fishery; however the pounds per hour trolling for 2008 is the highest ever recorded. Adjusted revenues and pelagic landings for Tunas also decreased. The number of alias that participated in other fishing methods increased. We still have to see any indicators that the alia longline fishery fleet will increase.

Plan Team Recommendations

2008 Recommendations

- The Plan team recommends that the Department of Marine & Wildlife Resources (DMWR) consider establishing a recreational fisheries log book program for boat based recreational fishing.
- The Plan Team recommends that the American Samoa pelagic module include a new table to provide information on the magnitude of expansion factors for various effort and catch estimates. The table will incorporate the following columns:
  - The number of interviews for pelagic troll fishing
  - Number of boats out fishing on a sample day
  - Total expanded number of pelagic troll trips

Table 1. American Samoa 2008 estimated total landings by pelagic species by gear type.

Species	LongLine Pounds	Troll Pounds	Other Pounds	Total Pounds
Skipjack tuna	358,700	16,303	0	375,003
Albacore tuna	7,804,550	0	0	7,804,550
Yellowfin tuna	741,123	19,983	0	761,106
Kawakawa	0	306	18	324
Bigeye tuna	273,901	0	0	273,901
Tunas (unknown)	90	0	0	90
TUNAS SUBTOTALS	9,178,363	36,592	18	9,214,973
Mahimahi	27,798	888	45	28,730
Black marlin	222	0	0	222
Blue marlin	76,286	0	0	76,286
Striped marlin	1,582	0	0	1,582
Wahoo	298,246	164	0	298,410
Sharks (all)	1,300	0	57	1,357
Swordfish	14,889	0	0	14,889
Sailfish	1,919	151	0	2,071
Spearfish	1,610	0	0	1,610
Moonfish	5,334	0	0	5,334
Oilfish	527	0	139	666
Pomfret	581	0	0	581
NON-TUNA PMUS SUBTOTALS	430,296	1,203	240	431,739
Barracudas	710	184	944	1,839
Rainbow runner	0	67	134	201
Dogtooth tuna	0	168	1,025	1,193
Pelagic fishes (unknown)	240	0	65	306
OTHER PELAGICS SUBTOTALS	951	419	2,168	3,538
TOTAL PELAGICS	**9,609,610**	**38,215**	**2,426**	**9,650,250**

Interpretation: About 9.6 million pounds of pelagic species were landed in American Samoa during 2008. Longline fishing dominated (99%) pelagic landings during 2008. Over 7.8 million pounds of albacore dominated (84%) the tuna species landings during 2008 followed by yellowfin (9%), bigeye (3%) and skipjack (4%) tunas. Wahoo (298,034 pounds) dominated the non-tuna Pelagic Management Unit Species (PMUS) landings.

Calculations: "Longline Pounds" total landing estimates are from the boat-creel survey for the alia longliners. These boat-creel survey landing estimates are augmented with longline logbook data from the larger longliners. 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 includes pelagic species not caught by longlining or trolling such as barracuda, rainbow runner and dogtooth tuna, caught with bottomfishing or spearfishing methods. In addition, the "All Sharks species categorizes all species of sharks that could and could not be identified by the fishermen.

Table 2. American Samoa 2008 estimated commercial landings, value and average price by pelagic species.

Species	Longline			Troll/Non-Longline		
	Pounds	Value($)	Price/ LB	Pounds	Value($)	Price/ LB
Skipjack tuna	358,521	$215,628	$0.60	16,215	$31,022	$1.91
Albacore tuna	7,802,216	$7,835,667	$1.00	0	$0	
Yellowfin tuna	741,123	$713,286	$0.96	19,712	$47,398	$2.40
Kawakawa	0	$0		284	$385	$1.36
Bigeye tuna	273,169	$315,421	$1.15	0	$0	
TUNAS SUBTOTALS	9,175,029	$9,080,003	$0.99	36,211	$78,806	$2.18
Mahimahi	16,680	$33,743	$2.02	888	$1,858	$2.09
Black marlin	200	$300	$1.50	0	$0	
Blue marlin	55,049	$61,323	$1.11	0	$0	
Striped marlin	1,151	$1,151	$1.00	0	$0	
Wahoo	298,246	$181,958	$0.61	164	$347	$2.11
Sharks (all)	0	$0		6	$3	$0.50
Swordfish	10,671	$17,208	$1.61	0	$0	
Sailfish	1,575	$1,583	$1.00	151	$154	$1.02
Spearfish	840	$924	$1.10	0	$0	
Moonfish	3,810	$5,487	$1.44	0	$0	
Oilfish	154	$154	$1.00	0	$0	
Pomfret	444	$962	$2.17	0	$0	
NON-TUNA PMUS SUBTOTALS	388,821	$304,792	$0.78	1,209	$2,362	$1.95
Barracudas	1,020	$2,290	$2.25	1,738	$3,827	$2.20
Rainbow runner	0	$0		124	$319	$2.57
Dogtooth tuna	0	$0		1,061	$2,930	$2.76
Pelagic fishes (unknown)	0	$0		65	$163	$2.50
OTHER PELAGICS SUBTOTALS	1,020	$2,290	$2.25	2,988	$7,239	$2.42
TOTAL PELAGICS	**9,564,870**	**$9,387,085**	**$0.98**	**40,407**	**$88,407**	**$2.19**

Interpretation More than 9.6 million pounds of pelagic species are estimated to have been sold in 2008; which is 99.5 % of the estimated total pelagic landings, earning an estimated revenue of over $9.5 millions. Longline fishing dominated the sales revenue at about $9.3 millions. Albacore tuna topped the sales at $7.8 millions which is 83% of total revenue, followed by Yellowfin, Bigeye and Skipjack tuna. Longline caught tunas averaged $0.98 per pound and non-tuna at $2.30.

Calculation: Estimated commercial landings, value and price/pound calculations are the same as those described for Table 1 and in greater detail in the Fishery Data History section above. The Troll/Non-Longline category in Table 1 includes pelagic species not caught by longlining such as barracuda, rainbow runner and dogtooth tuna, caught with bottomfishing or spearfishing methods.

Table 3A. Longline Effort by American Samoan Vessels during 2008.

	All Vessels
Boats	28
Trips	287
Sets	4,741
1000 Hooks	14,406
Lightsticks	128

Table 3B. Number of fish kept, released and percent released for all American Samoa longline vessels during 2008

Species	Number Kept	Number Released	Percent Released
Skipjack tuna	30,656	4,442	12.7
Albacore tuna	204,256	499	0.2
Yellowfin tuna	14,613	220	1.5
Bigeye tuna	6,666	380	5.4
Tunas (unknown)	5	1	16.7
TUNAS SUBTOTALS	256,196	5,542	2.1
Mahimahi	1,229	700	36.3
Black marlin	1	44	97.8
Blue marlin	560	2,151	79.3
Striped marlin	23	290	92.7
Wahoo	8,881	1,803	16.9
Sharks (all)	20	5,829	99.7
Swordfish	117	98	45.6
Sailfish	21	430	95.3
Spearfish	35	749	95.5
Moonfish	108	490	81.9
Oilfish	25	5,241	99.5
Pomfret	66	1,043	94.0
NON-TUNA PMUS SUBTOTALS	11,086	18,868	63.0
Barracudas	9	373	97.6
Rainbow runner	0	1	100
Pelagic fishes (unknown)	5	1,900	99.7
OTHER PELAGICS SUBTOTALS	14	2,274	99.4
TOTAL PELAGICS	267,296	26,684	9.1

Interpretation – Table 3A lists 28 vessels landed pelagic species in American Samoa during 2008. The vessels conducted a total of 287 fishing trips that accomplished 4730 longline sets, while using 14,372,000 hooks and 128 lightsticks during 2008. Table 3A values were used to calculate that on average for longline vessels landing in American Samoa during 2008:

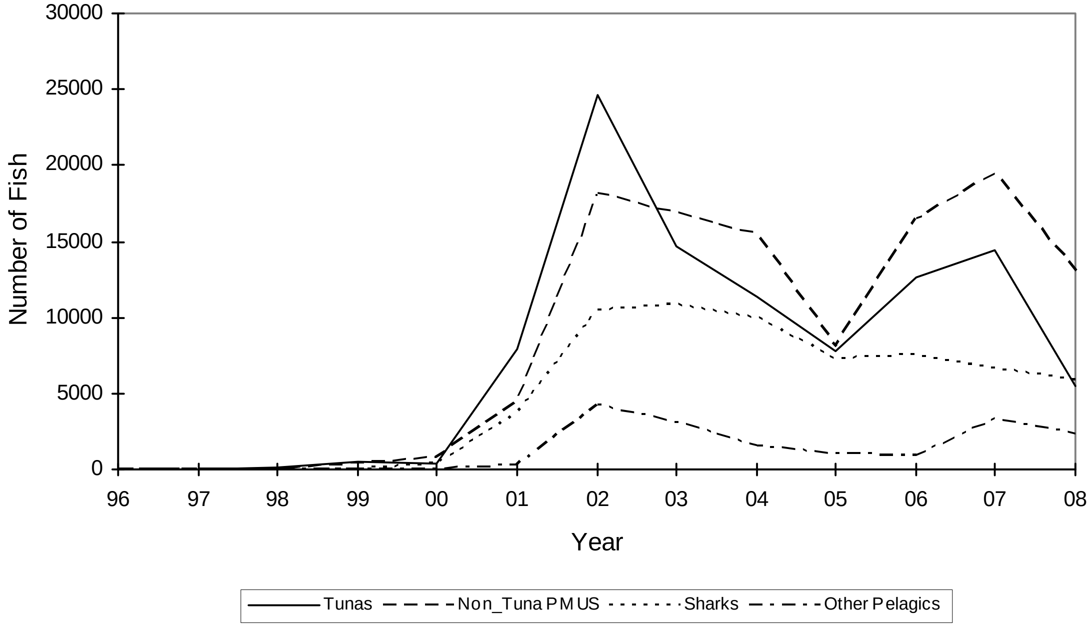
10 trips and 169 sets were made per boat
513,286 hooks and 6 lightsticks were used per boat
16.5 sets were made, 50,077 hooks were set, and 2 lightsticks were used per trip
3038 hooks and .03 lightsticks were used per set

More than 200,000 individual albacore were kept by longline fishermen landing in American Samoa during 2008; these calculate to 76 percent of the fish kept by these fishermen. Over 30,000 skipjack, about 14,000 yellowfin, 6,000 bigeye tunas were kept during 2008. Over 8800 Wahoo, 1228 mahimahi, 560 bluemarlin and 117 swordfish were also kept during 2008. 14 individuals were kept and 2262 of the other pelagic-species were released during 2008.

More than 4400 skipjack tuna, 5859 all sharks and about 5227 oilfish were released by longline fishermen landing pelagic-species in American Samoa during 2008;. Tuna release rates was highest for skipjack at 80% of the total tuna released.. The non-tuna Pelagic Management Unit Species (PMUS) took most percentages (63%)of released fish..
.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 or the number of fish kept and the number of fish released from Longline Logbook data for all of the longline vessels in Samoa. The percent released is calculated as the number released divided by the sum of the number released and the number kept. The percentages for subtotals and totals is the sum of released species for the subtotal or total divided by the sum of kept plus the sum of released for the subtotal or total. The kept values for sharks include those that were finned. All species of sharks entered in the Longline Logs are combined in the All Sharks species. Rays and Sunfish are included in the Misc Pelagic Fish species. A trip is a unique combination of vessels and return dates where the return date is in the current year.

Figure 1. Number of Fish Released by American Samoa Longline Vessels



Interpretation - The number of fish released by American Samoan longline vessels increased over 13,000 (35%) between 2005 and 2006 to 37,440 fish. All categories increased except for the "other pelagics" group. The number of tuna released by American Samoan longline vessels increased over 4,700 (38%) between 2005 and 2006 to 12,611 tuna. The number of non-tuna Pelagic Management Unit Species (PMUS) released by American Samoan longline vessels increased over 8,400 (51%) between 2005 and 2006 to 16,500 fish. The number of sharks released by American Samoan longline vessels increased 167 (2%) between 2005 and 2006 to 7487 sharks. The number of other pelagic fish released by American Samoan longline vessels decreased 215 (-20%) between 2005 and 2006 to 842 fish

Calculation: These values are sums of Longline Logbook number released data for eac year. They are summed according to the species groups in Tables 1 and 2 with Sharks separated out of the "Non-Tuna PMUS" species group.

	Number of Fish Released			
Year	Tunas	Non-Tuna PMUS	Sharks	Other Pelagics
1996	0	0	37	0
1997	50	36	19	1
1998	71	29	28	0
1999	492	438	37	43
2000	371	815	386	0
2001	7,888	4,457	3,648	239
2002	24,601	18,100	10,459	4,183
2003	14,679	16,826	10,831	3,125
2004	11,323	15,479	9,916	1,521
2005	7,830	8,039	7,318	1,057
2006	12,611	16,500	7,487	842
2007	14,418	19,350	6,667	3,308
2008	5,542	13,039	5,829	2,274

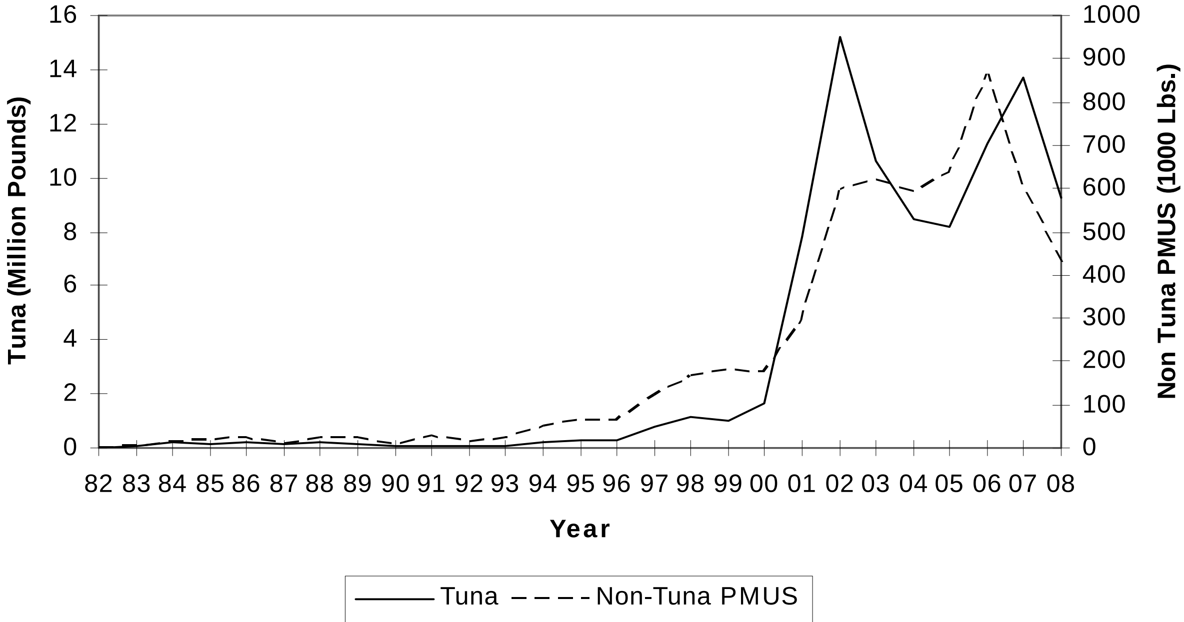
Table 4. American Samoa 2008 Trolling Bycatch

	Bycatch						Interviews		
		Dead					With		
Species	Alive	Inj	Unk	Total	Catch	%BC	BC	All	%BC
All Species (Comparison)					3035	0.000	0	155	0.00

Interpretation: There was no bycatch recorded from 2008 for trolling only; 148 interviews were conducted with 2550 pelagic fish landed; and no fish returned at sea: Using fishermen's reports at the dock may not accurately reflect the number of fish returned at sea.

Calculation: 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 2. American Samoa annual estimated total landings of Tuna and Non-Tuna PMUS

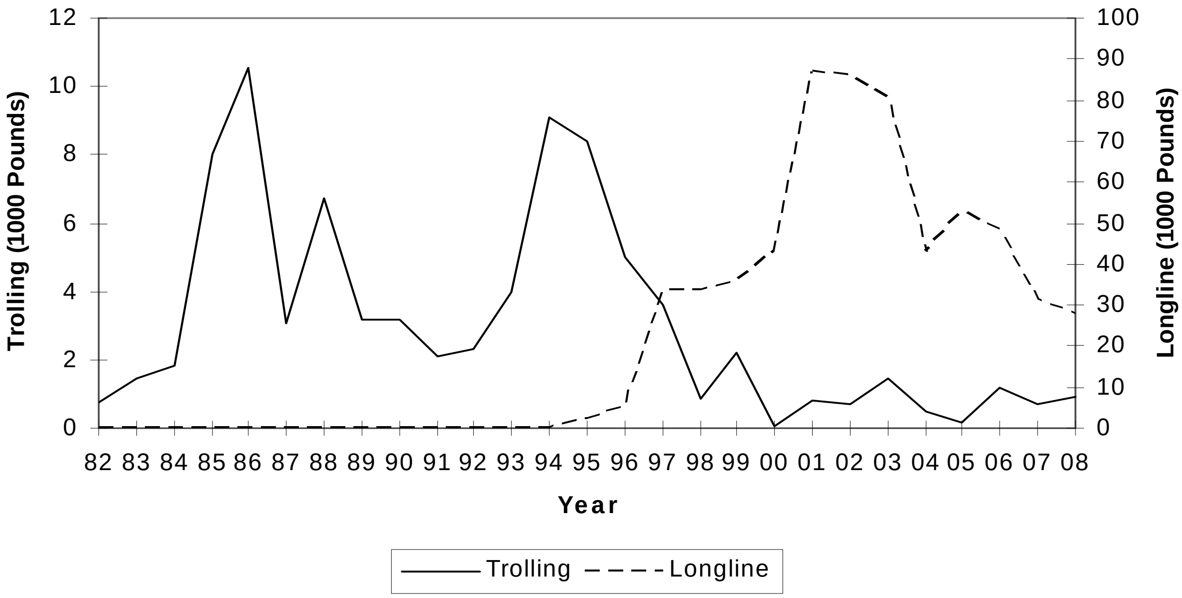


Interpretation: Total landing estimates exceeded 9 million pounds for tuna and 431,000 pounds for non-tuna Pelagic Management Unit Species (PMUS) by American Samoa vessels during 2008. However total landing estimates decreased by 33% down to 9.6 million pounds in 2008 compared to about 14.3 millions in 2007. The estimated tuna landings and non-tuna PMUS landings also decreased in 2008 compared to 2007.

Calculation: Estimated total landings for Tunas and Non-Tuna PMUS were calculated by summing the total landings for the species in these categories as defined by Table 1.

Year	Pounds Landed Tuna	Pounds Landed Non Tuna PMUS
1982	23,042	2,106
1983	90,057	4,806
1984	198,961	15,121
1985	107,659	19,686
1986	190,967	23,899
1987	144,037	10,894
1988	207,097	23,462
1989	171,873	20,539
1990	81,652	10,487
1991	73,116	27,189
1992	94,060	12,328
1993	47,815	21,736
1994	190,262	48,146
1995	288,588	64,329
1996	317,466	64,274
1997	802,077	119,961
1998	1,160,724	163,726
1999	1,004,615	178,648
2000	1,681,978	176,040
2001	7,850,680	295,169
2002	15,185,623	595,982
2003	10,589,782	619,783
2004	8,474,267	590,228
2005	8,201,162	638,586
2006	11,237,679	864,983
2007	13,729,388	601,160
2008	9,214,973	431,739
Average	**3,383,689**	**209,074**
Std. Dev.	**4,869,705**	**259,404**

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

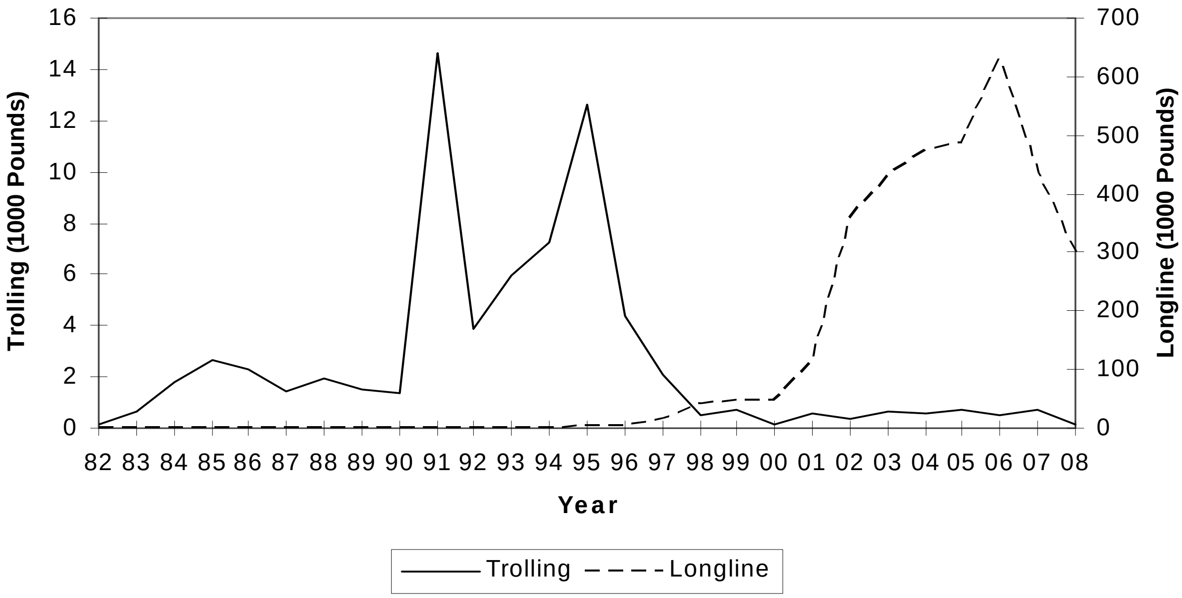


Interpretation: Estimated landings of mahimahi by longline gear decreased by 10% to 27,707 pounds during 2008 while trolling gear shows an increase of 43% from 2007 total pounds of 667. Longline gear dominates the mahimahi estimated landings. Overall estimated mahimahi landings total 28,876 pounds, a decrease of 8% from the previous year. Mahi landings peaked during 2001 at 87,187 pounds.

Calculation: The estimated total annual landings of mahimahi is listed for longline and trolling fishing methods as explained for Table 1 and Table 2.

	Pounds Landed	
Year	Longline	Trolling
1982	0	777
1983	0	1,443
1984	0	1,844
1985	0	8,011
1986	0	10,542
1987	0	3,049
1988	0	6,736
1989	0	3,171
1990	0	3,166
1991	60	2,094
1992	0	2,325
1993	212	4,000
1994	101	9,086
1995	2,373	8,393
1996	5,395	5,022
1997	33,412	3,623
1998	33,484	843
1999	35,779	2,193
2000	43,239	66
2001	87,187	786
2002	86,086	680
2003	80,405	1,434
2004	43,093	458
2005	52,999	155
2006	48,642	1,165
2007	31,415	690
2008	27,798	888
Average	**33,982**	**3,061**
Std. Dev.	**28,776**	**2,930**

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



Interpretation: Estimated landings of wahoo decreased by 138,702 lbs (32%) between 2007 and 2008. Longline gear dominates the wahoo landings in 2008 but compared to 2007, 2008 landing decreased by 138,172lbs Estimated wahoo troll landings also decreased by 69% to 241 pounds.in 2008

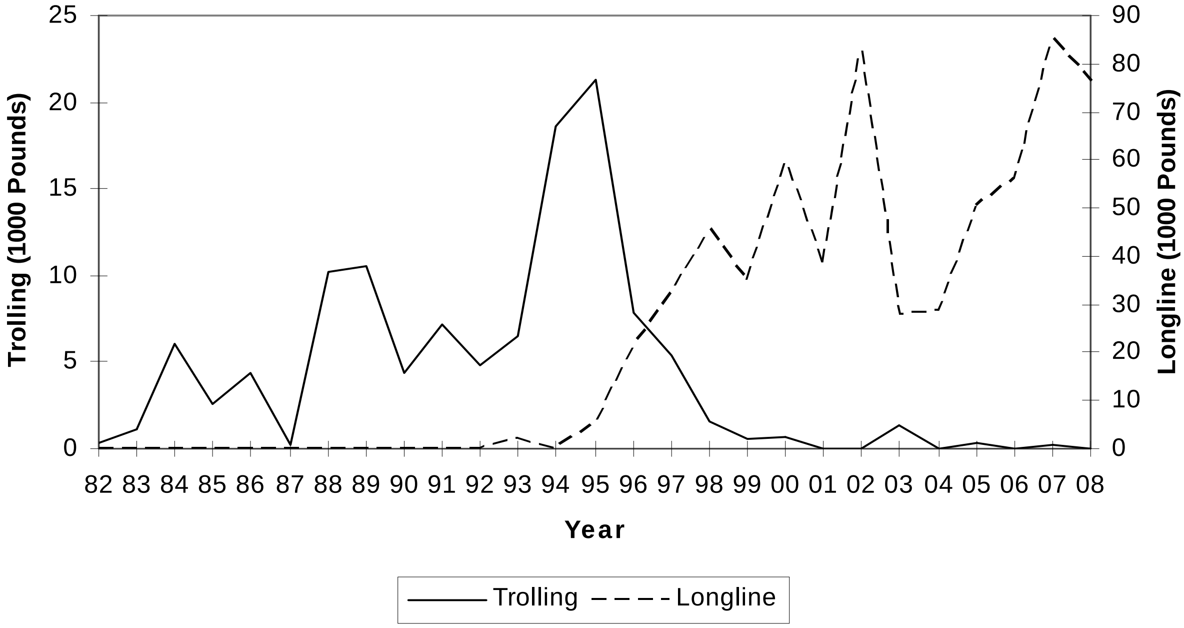
The 2006 estimated wahoo longline landings is highest ever in the 27 year record.

Estimated troll landings of wahoo peaked in 1991 at 14,600 pounds. Nothing is recorded from longline fishing during 1991

Calculation*:* The estimated total annual landings of wahoo is listed for longline and trolling fishing methods as explained for Table 1 and Table 2.

	Pounds Landed	
Year	**Longline**	**Trolling**
1982	0	114
1983	0	632
1984	0	1,777
1985	0	2,678
1986	0	2,282
1987	0	1,395
1988	84	1,962
1989	0	1,476
1990	0	1,332
1991	0	14,629
1992	0	3,904
1993	1,227	5,977
1994	0	7,261
1995	1,642	12,625
1996	3,570	4,398
1997	15,807	2,074
1998	40,439	487
1999	48,181	685
2000	47,562	140
2001	114,553	588
2002	358,380	351
2003	428,664	612
2004	473,512	535
2005	487,253	709
2006	630,394	517
2007	436,921	729
2008	298,246	164
Average	**161,259**	**2,594**
Std. Dev.	**209,828**	**3,590**

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

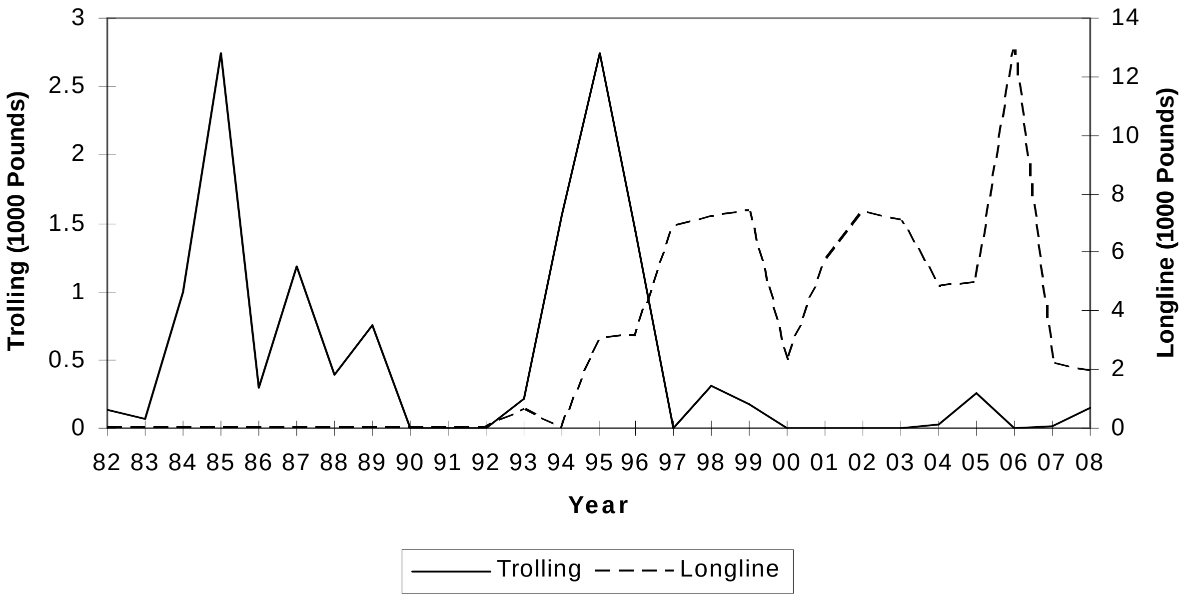


Interpretation: Estimated blue marlin landings for both longline and trolling gears total 76,116 pounds. The 2008 landing shows a drop of 10% from the 2007 landings. There was no recorded landing from trolling fishing method in 2008. The 2007 landing estimates is the highest ever for blue marlin fish.

Calculation: The estimated total annual landings of blue marlin is listed for longline and trolling fishing methods as explained for Table 1 and Table 2. 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	4,327
1987	0	265
1988	0	10,217
1989	0	10,592
1990	0	4,336
1991	0	7,202
1992	0	4,807
1993	2,168	6,545
1994	0	18,661
1995	5,338	21,272
1996	21,576	7,866
1997	32,434	5,379
1998	45,475	1,592
1999	34,883	590
2000	59,766	623
2001	37,793	0
2002	82,794	0
2003	27,823	1,344
2004	28,480	0
2005	50,564	300
2006	56,047	0
2007	84,970	207
2008	76,286	0
Average	**40,400**	**4,303**
Std. Dev.	**26,100**	**5,490**

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

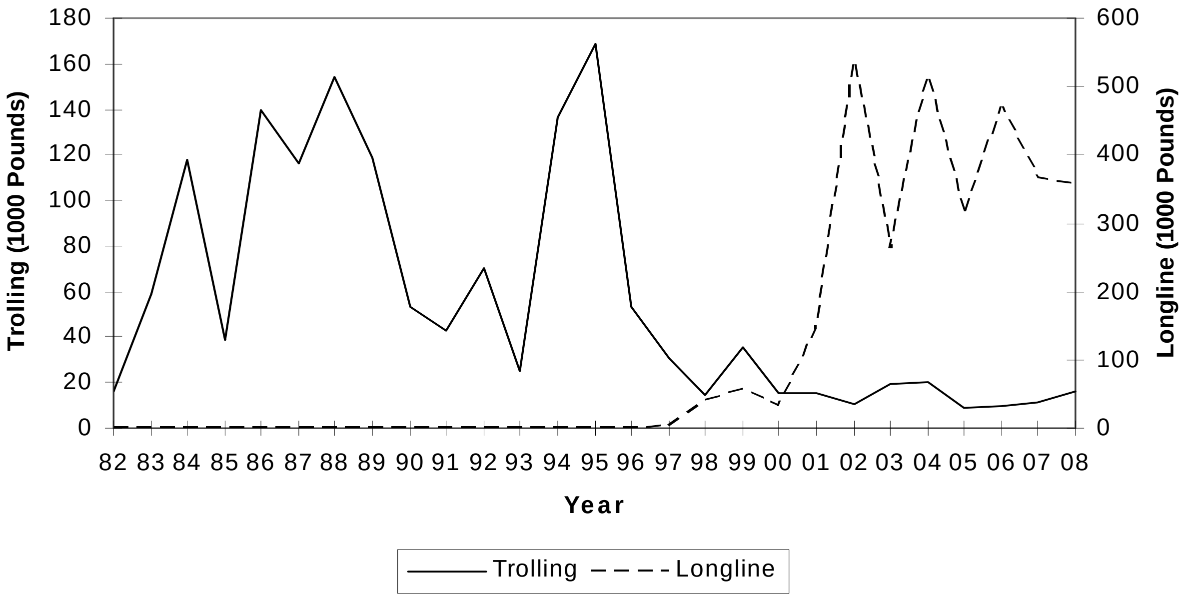


Interpretation: Estimated landings of sailfish by both gears in 2008 shows a slight increase by 3 fishes. However longline landings between 2007 and 2008 decreased by 169 pounds (8%), and trolling shows an increase of 172 fishes from nothing recorded for 2007. 2006 landing is recorded as the highest ever in 27 years caught only by the longline gear.

Calculation: The estimated total annual landings of sailfish is listed for longline and trolling fishing methods as explained for Table 1 and Table 2.

	Pounds Landed	
Year	**Longline**	**Trolling**
1982	0	127
1983	0	74
1984	0	989
1985	0	2,744
1986	0	294
1987	0	1,187
1988	0	394
1989	0	758
1990	0	0
1991	0	0
1992	0	0
1993	618	218
1994	0	1,561
1995	3,078	2,751
1996	3,130	1,444
1997	6,921	0
1998	7,191	314
1999	7,391	184
2000	2,280	0
2001	5,710	0
2002	7,402	0
2003	7,110	0
2004	4,847	31
2005	4,947	253
2006	12,933	0
2007	2,167	17
2008	1,919	151
Average	**4,853**	**500**
Std. Dev.	**3,200**	**779**

Figure 7. American Samoa annual estimated total landings of Skipjack Tuna by gear.



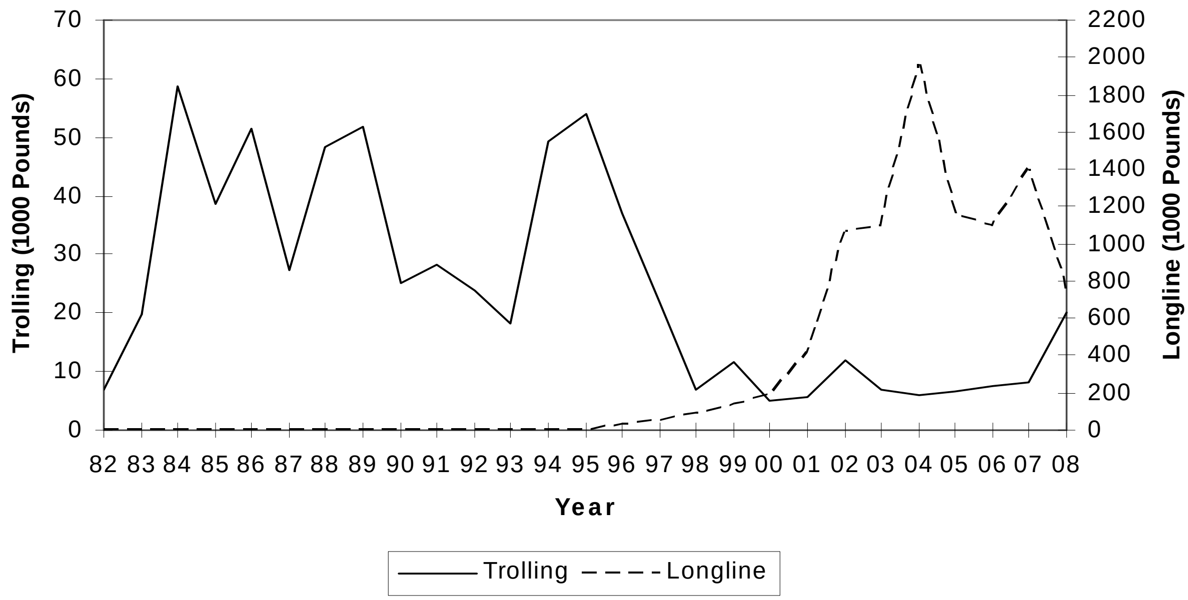
Interpretation: Estimated 2008 total landings of skipjack tuna for both gears increased by 6,038 pounds (2%) from 375,241 lbs in 2007. Estimated longline landings of skipjack tuna decreased by 2%, to 358,751 lbs. Estimated skipjack trolling landings have increased by more than 50% to 22,528 lbs during 2008.

This species is characterized by a large stock size, fast growth, early maturity and high fecundity.

Calculation: The estimated total annual landings of skipjack tuna is listed for longline and trolling fishing methods as explained for Table 1 and Table 2.

	Pounds Landed	
Year	**Longline**	**Trolling**
1982	0	15,877
1983	0	58,997
1984	0	117,693
1985	0	38,902
1986	0	139,421
1987	0	116,436
1988	0	153,905
1989	0	118,997
1990	0	53,376
1991	345	42,462
1992	0	69,901
1993	533	25,356
1994	103	136,762
1995	160	168,389
1996	438	53,092
1997	2,546	30,430
1998	40,625	14,822
1999	56,014	35,171
2000	32,247	15,660
2001	145,820	15,169
2002	538,526	10,839
2003	263,726	19,464
2004	517,277	20,469
2005	312,042	9,041
2006	470,123	9,963
2007	365,220	11,373
2008	358,700	16,303
Average	**172,469**	**56,232**
Std. Dev.	**197,097**	**50,542**

Figure 8. American Samoa annual estimated total landings of Yellowfin Tuna by gear.



Interpretation: Estimated total landings of yellowfin tuna decreased 46%, to 641,740 lbs in 2008 Longline gear dominates the estimated yellowfin tuna landings for American Samoa vessels. However, it is decreased to 740,682lbs from about 1.4 million pounds in 2007.Estimated trolling landings of yellowfin tuna increased more than three times the 2007 landing of 7,323lbs.

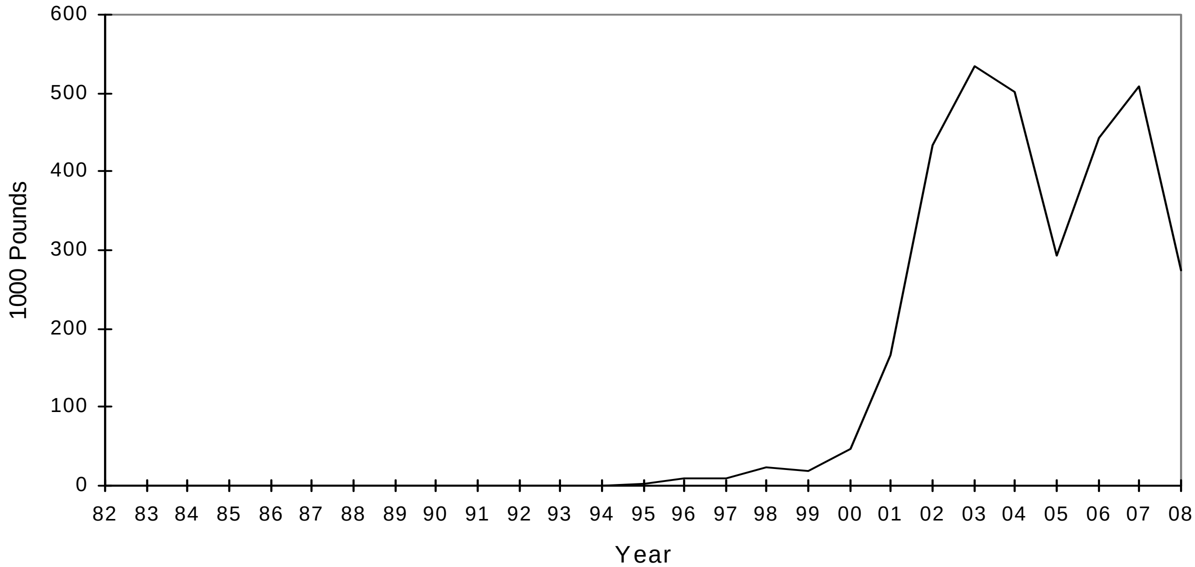
Estimated yellowfin tuna longline landings peaked during 2004 at 1,960,000 pounds; yellowfin longline landings in 2007 is the second highest in the 26 year history.

Estimated troll landings of yellowfin tuna peaked between 51,600 and 59,000 four times between 1984 and 1995. The 2007 estimated yellowfin tuna troll landings is more than three times below the estimated running average.

Calculation: The estimated total annual landings of yellowfin tuna is listed for longline and trolling fishing methods as explained for Table 1 and Table 2.

	Pounds Landed	
Year	Longline	Trolling
1982	0	7,038
1983	0	19,789
1984	0	58,704
1985	0	38,586
1986	0	51,439
1987	0	27,451
1988	1,775	48,319
1989	127	51,890
1990	0	25,172
1991	262	28,192
1992	0	23,916
1993	2,632	18,180
1994	1,716	49,415
1995	4,052	54,139
1996	25,662	37,049
1997	48,589	21,679
1998	92,528	6,762
1999	139,496	11,566
2000	190,618	4,892
2001	414,262	5,572
2002	1,070,139	11,793
2003	1,095,369	6,953
2004	1,961,763	5,827
2005	1,151,000	6,597
2006	1,095,656	7,535
2007	1,396,331	8,209
2008	741,123	19,983
Average	**449,195**	**24,320**
Std. Dev.	**586,333**	**17,641**

Figure 9. American Samoa annual estimated total landings of Bigeye Tuna By longlining



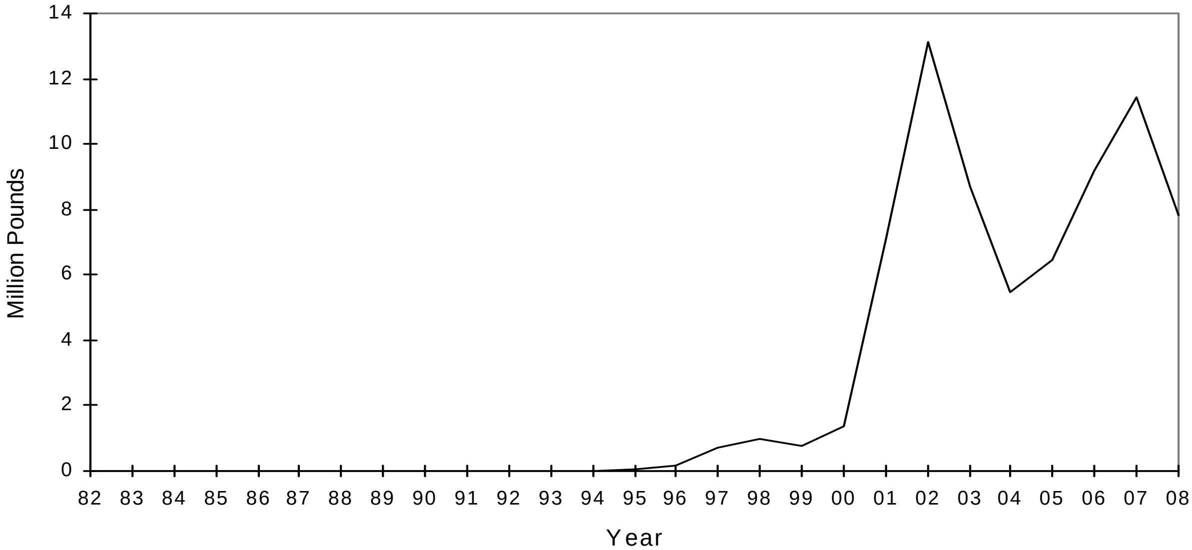
Interpretation: Estimated total longline landings of bigeye tuna in 2008 is more than 274,000 pounds. Estimated longline landings of bigeye tuna decreased by 46% to 274,0212, about half of the 2007 landings.

Estimated bigeye tuna longline landings peaked during 2003 at 534,300 pounds.

Calculation: The estimated total annual landings of bigeye tuna is listed for longline fishing method as explained for Table 1 and Table 2. The average and standard deviation for the Pounds caught is calculated from 1991 onward.

Year	Pounds
1982	0
1983	0
1984	0
1985	0
1986	0
1987	0
1988	0
1989	0
1990	0
1991	0
1992	0
1993	708
1994	0
1995	2,191
1996	8,701
1997	8,808
1998	22,291
1999	19,211
2000	47,551
2001	165,440
2002	432,500
2003	534,359
2004	501,276
2005	293,525
2006	443,127
2007	509,385
2008	273,901
Average	**181,276**
Std. Dev.	**208,172**

Figure 10. American Samoa annual estimated total landings of Albacore by longlining.

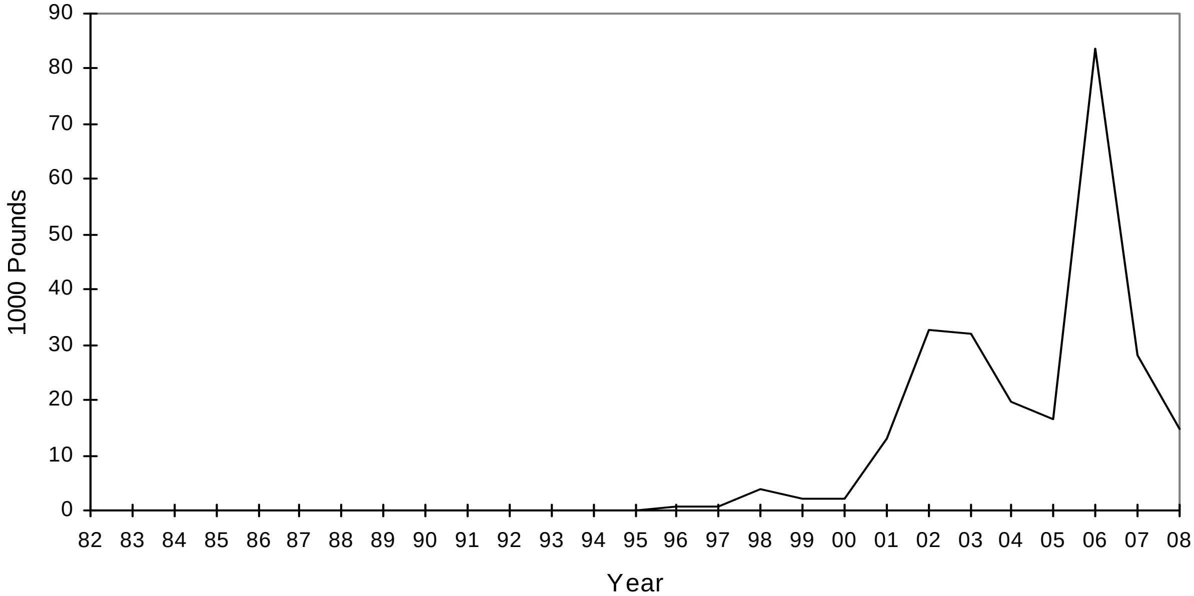


Interpretation: Estimated total albacore longline landings in 2008 is more than 7.8 million pounds. It is a drop of about 32% from the 2007 estimated albacore landings of 11.4 millions.The 2002 albacore landings estimate of 13.3 million pounds is the highest ever recorded in the27 year history of the fishery. Since the longline fishery initially began, it has been the most commonly used method of fishing for pelagic species especially for albacore tuna.

Calculation: The estimated total annual landings of albacore tuna is listed for the longline fishing 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	241
1990	0
1991	1,730
1992	0
1993	315
1994	1,609
1995	58,949
1996	190,269
1997	689,397
1998	983,560
1999	743,038
2000	1,390,874
2001	7,104,257
2002	13,121,302
2003	8,667,555
2004	5,466,939
2005	6,428,385
2006	9,210,657
2007	11,438,307
2008	7,804,550
Average	**3,490,658**
Std. Dev.	**4,329,575**

Figure 11. American Samoa annual estimated total landings of Swordfish by longlining.

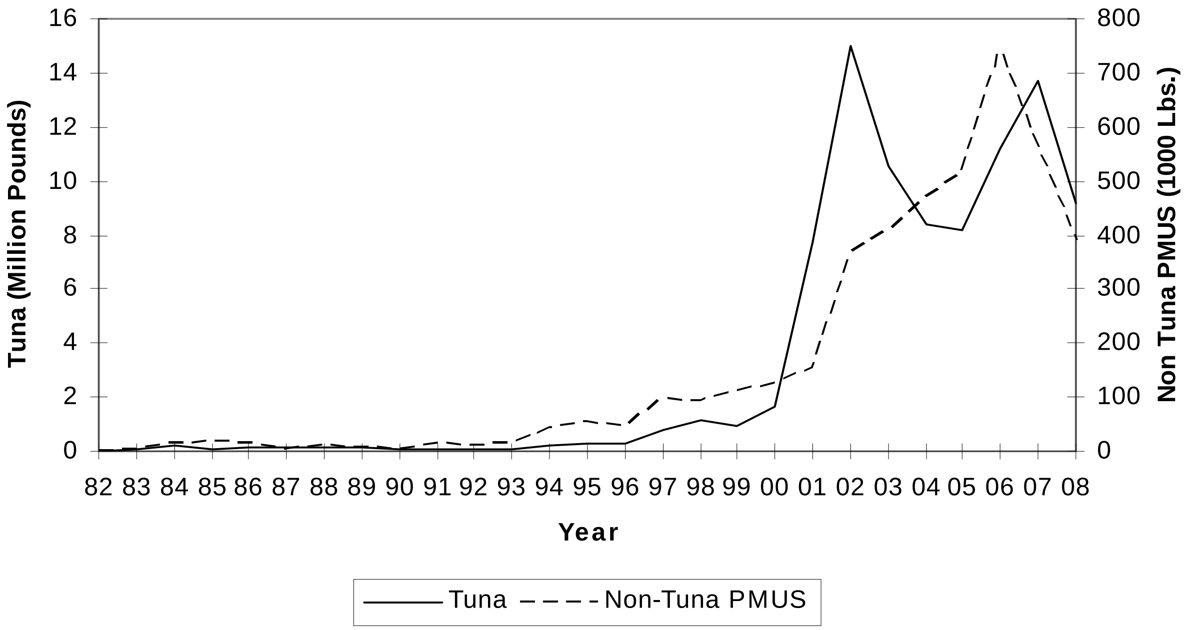


Interpretation: More than 14,800 pounds of swordfish is estimated to have landed in Am. Samoa in 2008 a drop of 13,000lbs from 2007 landing. This estimate is from longline only since there was zero landing from trolling gear in 2007 and the past nine years. The 2008 estimate is about 47% less than the pounds landed in 2007.

Calculation: The estimated total annual landings of swordfish is listed for longline and trolling fishing methods as explained for Table 1 and Table 2.

Year	Pounds
1982	0
1983	0
1984	0
1985	0
1986	0
1987	0
1988	0
1989	0
1990	0
1991	0
1992	0
1993	0
1994	0
1995	0
1996	793
1997	701
1998	3,716
1999	2,259
2000	2,056
2001	13,147
2002	32,762
2003	32,153
2004	19,864
2005	16,480
2006	83,615
2007	28,287
2008	14,889
Average	**19,286**
Std. Dev.	**21,747**

Figure 12. American Samoa annual commercial landings of Tunas and Non Tuna PMUS.

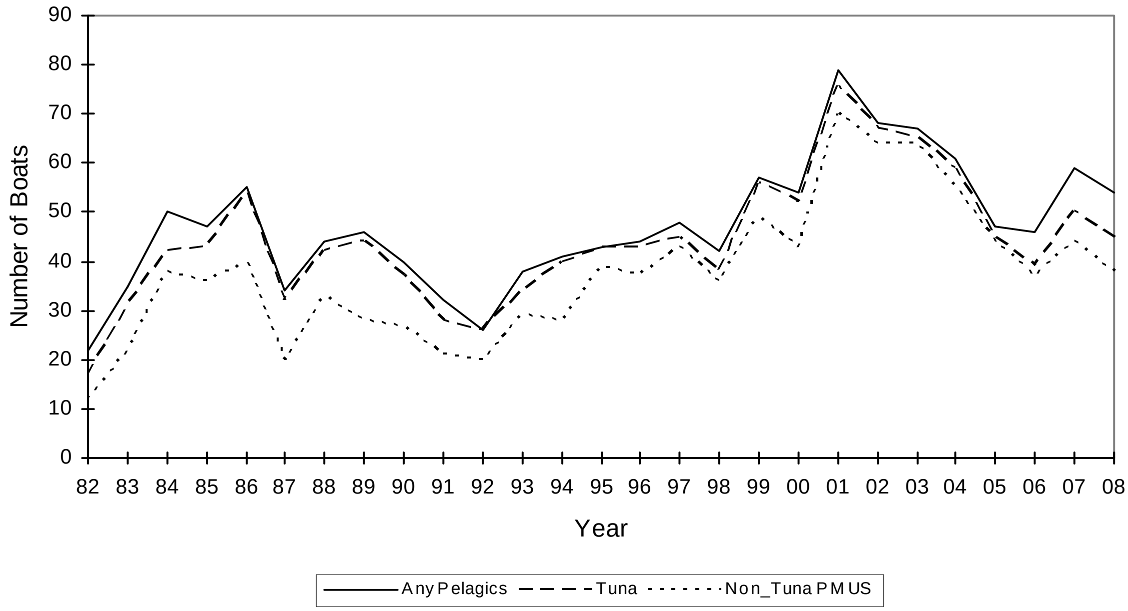


Interpretation: Estimated total commercial landings by American Samoa vessels in 2008 is more than 9.6 million pounds. Commercial landings for tuna dropped by 4.5 million pounds, 33%, in 2008. Estimated 2008 Commercial landings of non-tuna Pelagic Management Unit Species (PMUS) by American Samoa's vessels also decreased by 166,000 pounds, a 30%.drop. Commercial landings for tuna and for all species peaked in 2002 while non-tuna landings peaked in 2006.

Calculation: Estimated commercial landings for Tunas and Non-Tuna PMUS were calculated by summing the commercial landings for the species these categories as defined by Table 2.

Year	Pounds Landed	
	Tuna	Non Tuna PMUS
1982	22,065	1,515
1983	85,069	4,441
1984	196,100	13,458
1985	99,987	17,515
1986	170,150	15,291
1987	132,238	4,841
1988	172,806	12,111
1989	113,590	8,166
1990	56,573	3,623
1991	58,297	15,515
1992	90,575	11,088
1993	44,407	14,479
1994	188,980	41,330
1995	281,726	55,056
1996	311,213	46,153
1997	799,911	97,956
1998	1,115,310	95,011
1999	946,855	109,638
2000	1,643,679	125,551
2001	7,782,350	152,823
2002	15,006,655	364,830
2003	10,525,291	409,349
2004	8,434,924	471,560
2005	8,156,890	518,326
2006	11,224,192	743,406
2007	13,725,575	558,496
2008	9,211,239	390,030
Average	**3,355,431**	**159,317**
Std. Dev.	**4,850,793**	**210,931**

Figure 13. Number of American Samoa boats 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) increased by 10 and by 5 respectively in 2007. The number of boat landing any pelagics also increased by 10 in 2007. and it continues an increasing trend since 2005.

The highest number of boats landing any pelagic, tuna and non-tuna PMUS was 79, 76, and 70 respectively during 2001. Since the peak in 2001,the number of American Samoan vessels landing any pelagic in 2007 has decreased by 20;for tuna it is decreased by 23 and for non-tuna PMUS, it is decreased by 22.

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

	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	44
2006	46	39	37
2007	59	50	44
2008	54	45	38
Average	**47**	**44**	**38**
Std. Dev	**13**	**13**	**14**

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 14. **Number of American Samoa boats landing any pelagic species by longlining, trolling and all Methods.**

Interpretation: The number of American Samoan vessels landing pelagic species using longline gear decreased slightly to 29 in 2007 from 31 boats in 2006. The slight decrease shows a declining trend to the number of boat participating in longline fishing.

The number of American Samoan longline vessels has decreased by 33 (53%) since the peak count of 62 in 2001. The trolling vessels increased by 10 (53%) to 19 vessels which is same as the number of boats during the peak year.

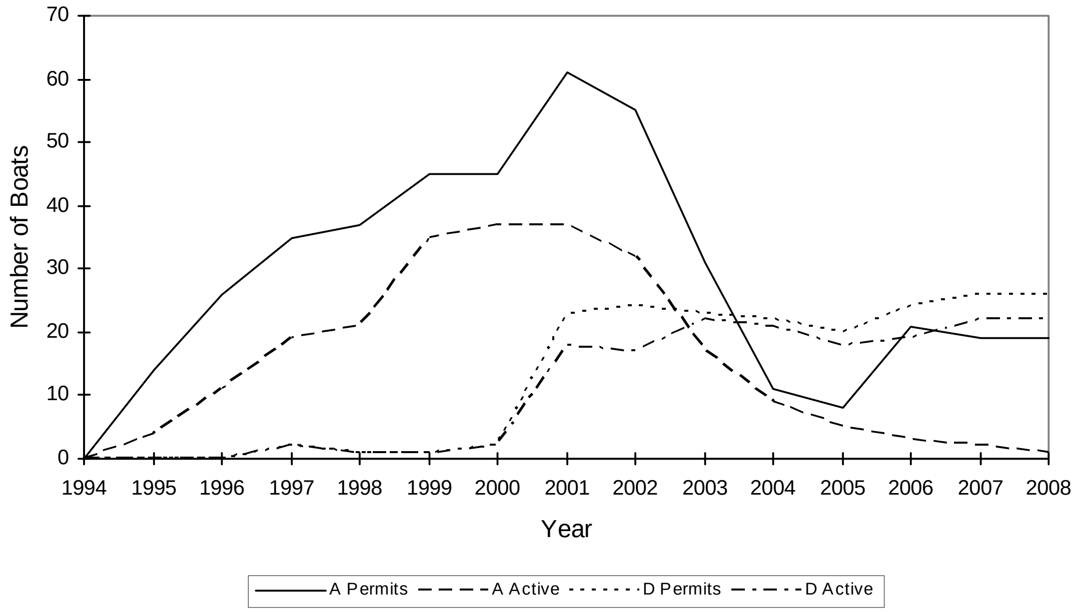
The number of American Samoan vessels landing pelagic-species caught by any method also increased by 10 from the 49 boats in 2006. But since 2001, the number of boats using any method decreased to 59 in 2007.

Calculation: Prior to 1997, each boat counted in the Any Method column made at least one landing in an offshore creel survey

	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	46	31	9
2007	59	29	19
2008	54	28	17
Average	**47**	**23**	**30**
Std. Dev.	**13**	**19**	**12**

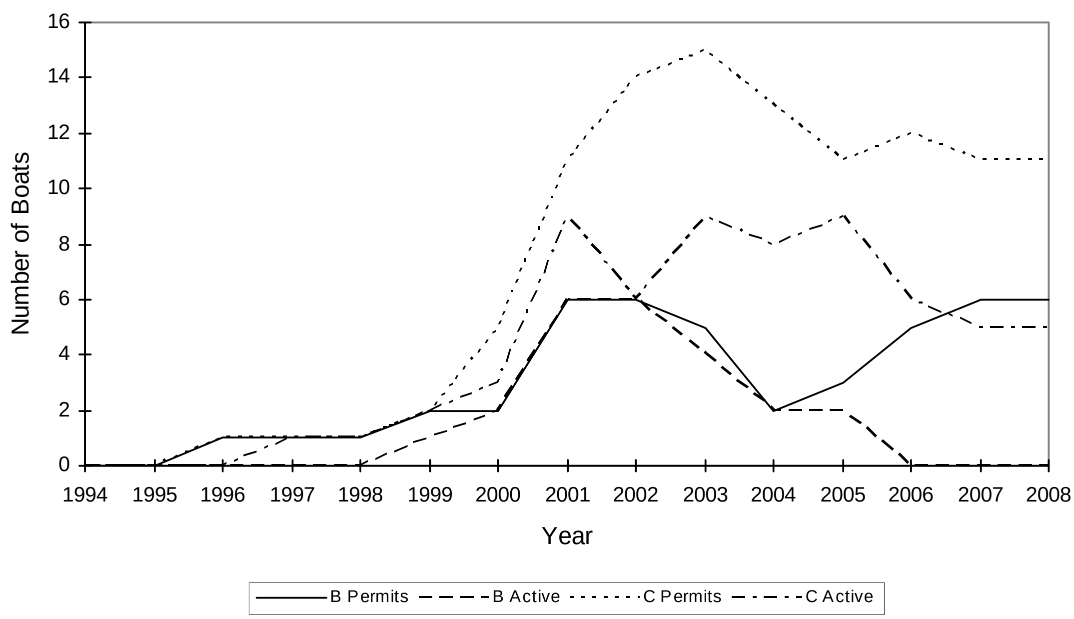
interview of at least one species in Table 2 in the given year. Each boat counted in the Longlining and Trolling columns made at least one landing in an offshore creel survey interview of at least one species in Table 2, using the longline or troll or combined troll/bottom fishing methods in the given 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 15A. Number of permitted and active longline fishing vessels in the A (< 40 foot) and D (> 70.1 foot) size classes



Fi

gure 15B. Number of permitted and active longline fishing vessels in the B (40.1 to 50 foot) and C (50.1 to 70 foot) size classes



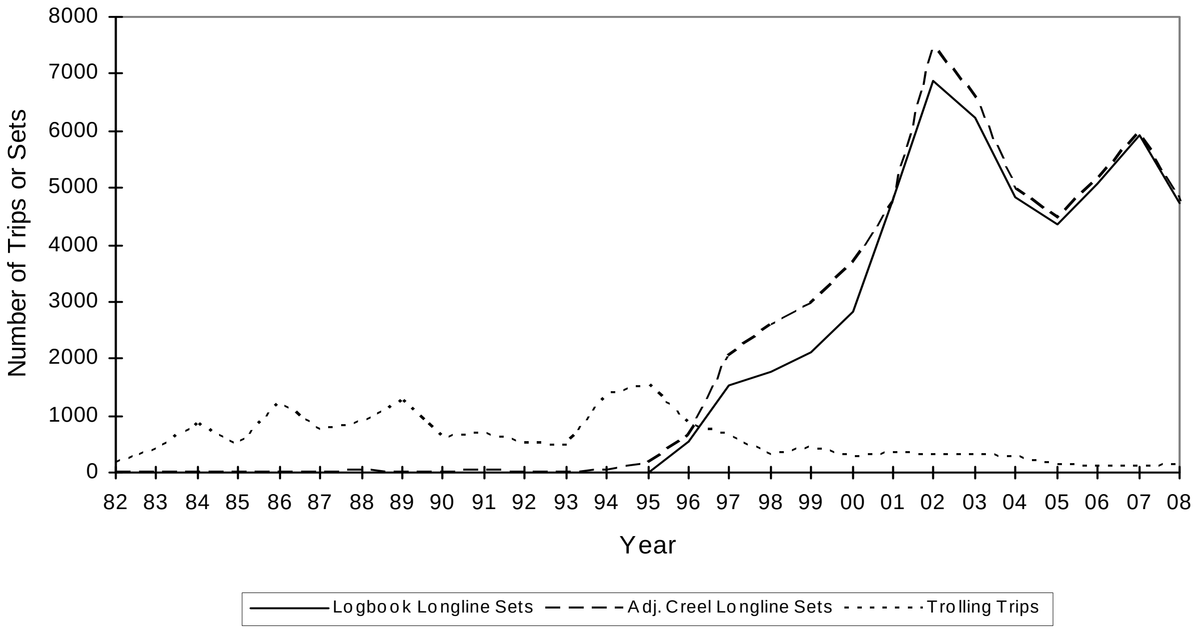
Interpretation: 2007 shows only two, from 17 permitted, Class A (<40ft) boats were active in longline fishing. Local longline alias fall in this Class. The 2007 count shows a continuous declining trend since the 38 peak count in 2001. No boat in the Class B was active in 2007. From 9 boats permitted in the Class C, 5 were active. The number of Class C boats decreased to 5 in 2007 from the 9 in 2006. Class D >70ft boats dominated longline fishing in 2007 with 22 active from 26 permitted. Number of Class D boats increased to 22 in 2007 from 16 in 2006 Longer boats (Class C and D) seem to dominate longline fishing

Calculation: For 2006 the number of permits are the actual number of Limited Entry Longline Permits issued for each size class late in 2005. For earlier years the number of permits are the number of federal general longline permits issued for each vessel size category. For the C and D size classes the number of permits may include those for Hawaiian permitted boats landing their fish in American Samoa. The number of active boats are those that have submitted longline logs or have been interviewed in the boat-based creel survey after a longline fishing trip during the year. Boats in the boat-based creel survey are not counted as active if they are interviewed using only fishing methods other than longlining such as bottomfishing or trolling.

The range of dates that constitutes a year of activity is skewed to be in line with when the longline permits are issued and expire which is around Feb. 25th. The active year of 1996 is from February 25, 1996 to February 24th 1997. This applies through 2004. The active year 2005 is from February 25, 2005 to December 31, 2005. The active year of 2006 is the calendar year and the active year of 1995 is from January 1, 1995 to February 24th 1996. This causes the number of active vessels to be slightly different from other counts of longline vessel activity based on the calendar year.

	Class A < 40 Feet		Class B 40.1 - 50 Feet		Class C 50.1 - 70 Feet		Class D > 70 Feet	
Year	Permits	Active	Permits	Active	Permits	Active	Permits	Active
1994	0	0	0	0	0	0	0	0
1995	14	4	0	0	0	0	0	0
1996	26	11	1	0	1	0	0	0
1997	35	19	1	0	1	1	2	2
1998	37	21	1	0	1	1	1	1
1999	45	35	2	1	2	2	1	1
2000	45	37	2	2	5	3	2	2
2001	61	37	6	6	11	9	23	18
2002	55	32	6	6	14	6	24	17
2003	31	17	5	4	15	9	23	22
2004	11	9	2	2	13	8	22	21
2005	8	5	3	2	11	9	20	18
2006	21	3	5	0	12	6	24	19
2007	19	2	6	0	11	5	26	22
2008	19	1	6	0	11	5	26	22

Figure 16. Number of American Samoa fishing trips or sets for all pelagic species by method.



Interpretation: Longline sets increased by 850 (14%) in 2007 to 5919 as per logbook. The creel survey also reported an increase of 800 sets. 2007 longline sets are the third highest on record for both the logbook and creel counts.

The estimated number of troll trips decreased by 49 (25%) in 2007 to 146 trips. The 2007 decrease in troll trips is the fifth consecutive decline since 2001

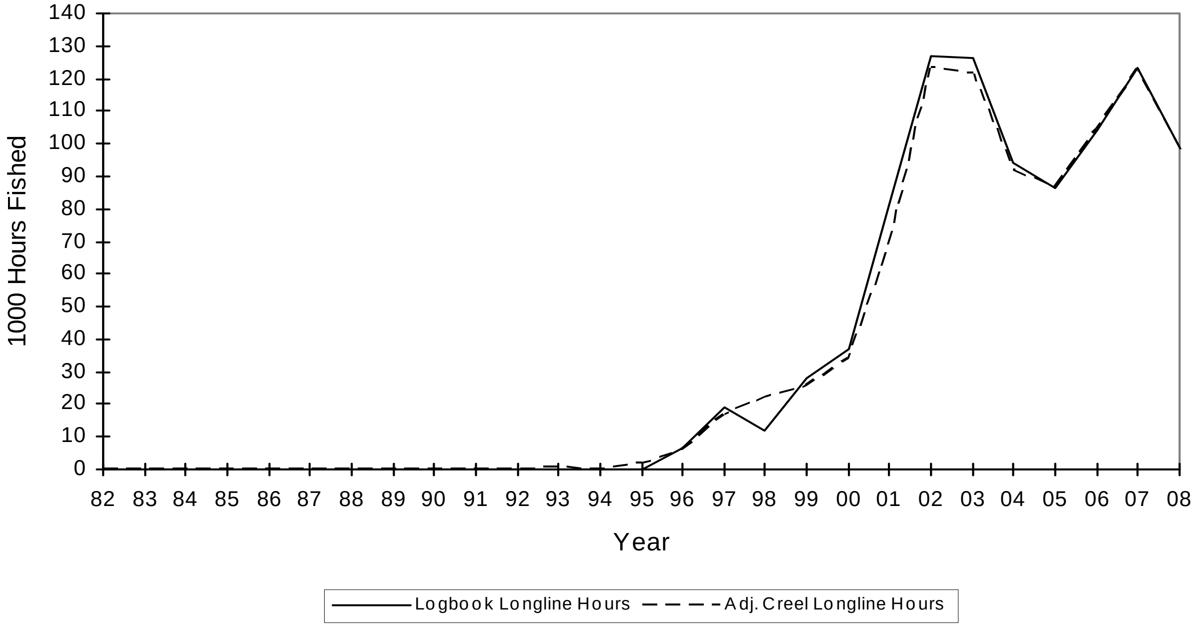
		Longline Sets	
Year	**Troll Trips**	**Logbook**	**Creel (Adj)**
1982	177	0	0
1983	406	0	0
1984	853	0	0
1985	464	0	0
1986	1,234	0	0
1987	751	0	0
1988	875	0	31
1989	1,266	0	3
1990	612	0	0
1991	686	0	21
1992	513	0	0
1993	481	0	16
1994	1,355	0	20
1995	1,547	0	187
1996	846	528	653
1997	656	1,528	2,037
1998	316	1,754	2,584
1999	429	2,108	2,967
2000	287	2,814	3,666
2001	331	4,801	4,725
2002	292	6,872	7,441
2003	310	6,220	6,560
2004	276	4,850	4,985
2005	151	4,359	4,469
2006	88	5,069	5,149
2007	110	5,919	5,967
2008	142	4,741	4,765
Average	**572**	**3,966**	**4,305**
Std. Dev.	**397**	**1,926**	**1,817**

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



Interpretation: : Longline hours-fished increased for both Logbook and Creel in 2007. Longline hours-fished from the logbook increased 18,900 hrs (15%) to 123,260 in 2007. Creel hours-fished shows similar increase of 18,470; a 15% increae.2007 hours-fished is third highest record.

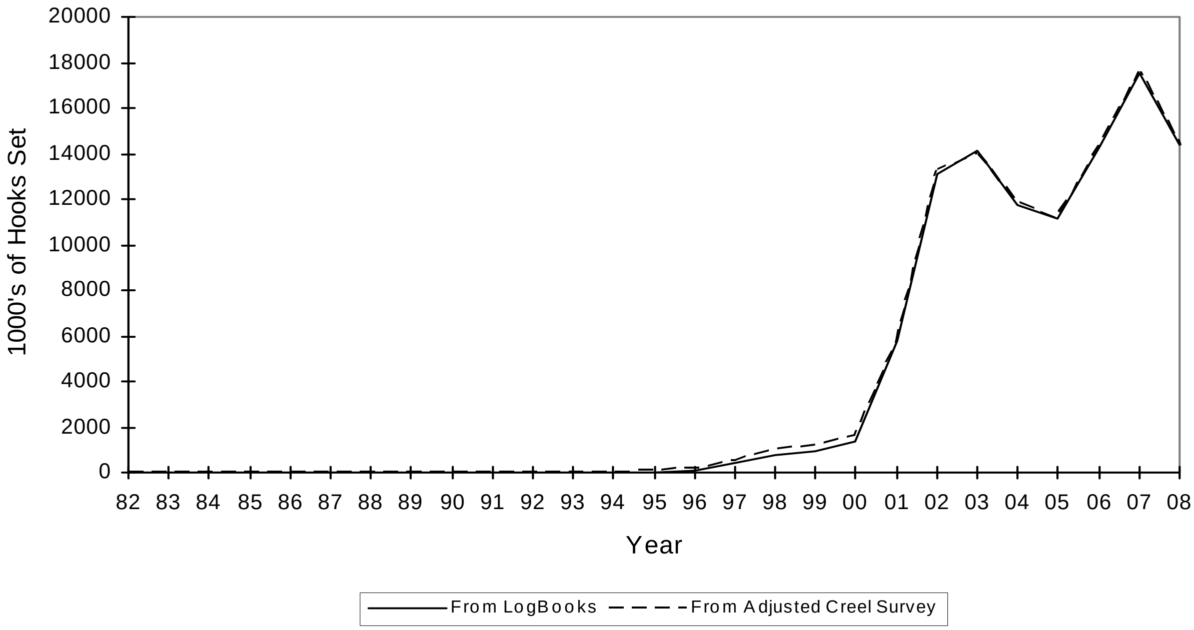
Calculation: The number of longline trip-hours using logbook data is obtained by summing the duration all of the sets entered in the longline logbook system for the given year for interviewed and non-interviewed boats. The duration of a set is defined as from beginning of set time to the end of haul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

	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	296
1994	0	161
1995	0	1,860
1996	6,366	5,906
1997	19,065	16,956
1998	11,984	22,012
1999	27,708	25,721
2000	36,973	33,834
2001	81,291	67,755
2002	127,023	123,194
2003	126,265	121,647
2004	93,996	91,807
2005	86,332	86,108
2006	104,324	104,129
2007	123,267	122,610
2008	98,892	98,371
Average	**72,576**	**70,773**
Std. Dev.	**43,888**	**42,481**

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”

Figure 18. **Thousands of American Samoa longline hooks set from logbook and creel survey data.**



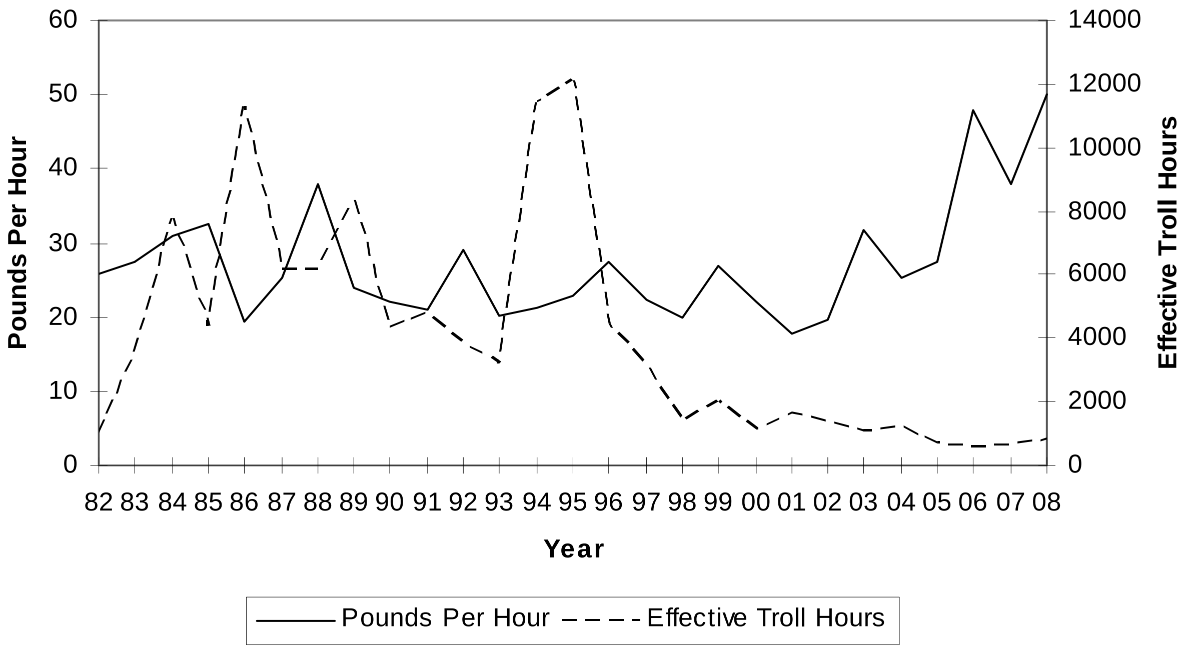
Interpretation: The number of hooks set by American Samoan longline vessels decreased 18% to 14.4 million hooks from the record high of 17.5 million hooks in 2007. The 2007 estimate is the highest in the 26- year history. The creel count is about the same as the logbook count for 2008.

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 calculated from 1996 onward for comparison.

	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	157
1997	419	518
1998	771	1,042
1999	915	1,226
2000	1,335	1,588
2001	5,795	5,808
2002	13,096	13,245
2003	14,165	13,991
2004	11,736	11,800
2005	11,129	11,174
2006	14,263	14,319
2007	17,552	17,586
2008	14,406	14,425
Average	**8,129**	**8,221**
Std. Dev.	**6,389**	**6,313**

Figure 19. American Samoa pelagic catch per hour of trolling and number of trolling hours.



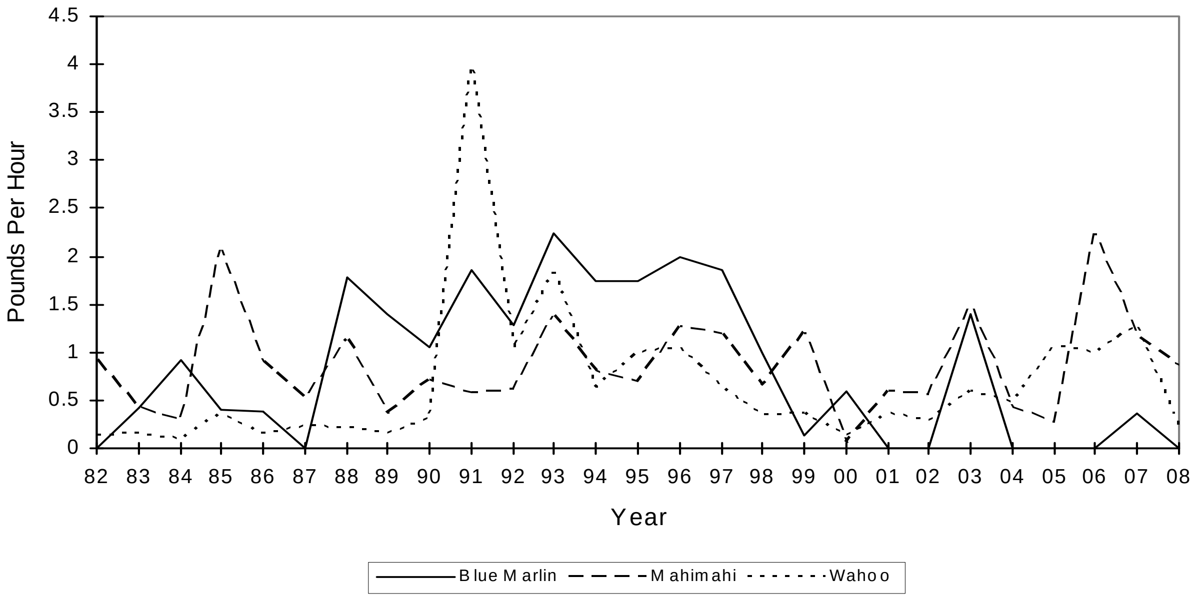
Interpretation: Trolling pounds-per-hour (PPH) increased 42% to 62.38 PPH in 2008 from 36.10 PPH in 2007. The 2008 PPH figure is the highest ever in the 27-year record. Pounds-per-troll hour has generally been increased since 2001. Effective troll hours increased by 30% to 1025 in 2008 from 724 hours in 2007.

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

Year	CPUE	Hours
1982	25.91	1,019
1983	27.41	3,513
1984	30.97	7,785
1985	32.59	4,394
1986	19.36	11,294
1987	25.34	6,179
1988	38.01	6,126
1989	23.86	8,348
1990	21.98	4,335
1991	20.97	4,793
1992	28.97	3,809
1993	20.09	3,216
1994	21.23	11,448
1995	22.94	12,138
1996	27.36	4,434
1997	22.31	3,144
1998	19.93	1,405
1999	26.81	1,981
2000	22.01	1,128
2001	17.72	1,663
2002	19.58	1,380
2003	31.78	1,044
2004	25.30	1,200
2005	27.47	674
2006	47.85	542
2007	38.06	611
2008	50.17	810
Average	**27.26**	**4,015**
Std. Dev.	**8.07**	**3,451**

Figure 20. American Samoa trolling catch rates for Blue Marlin, Mahimahi, and Wahoo.

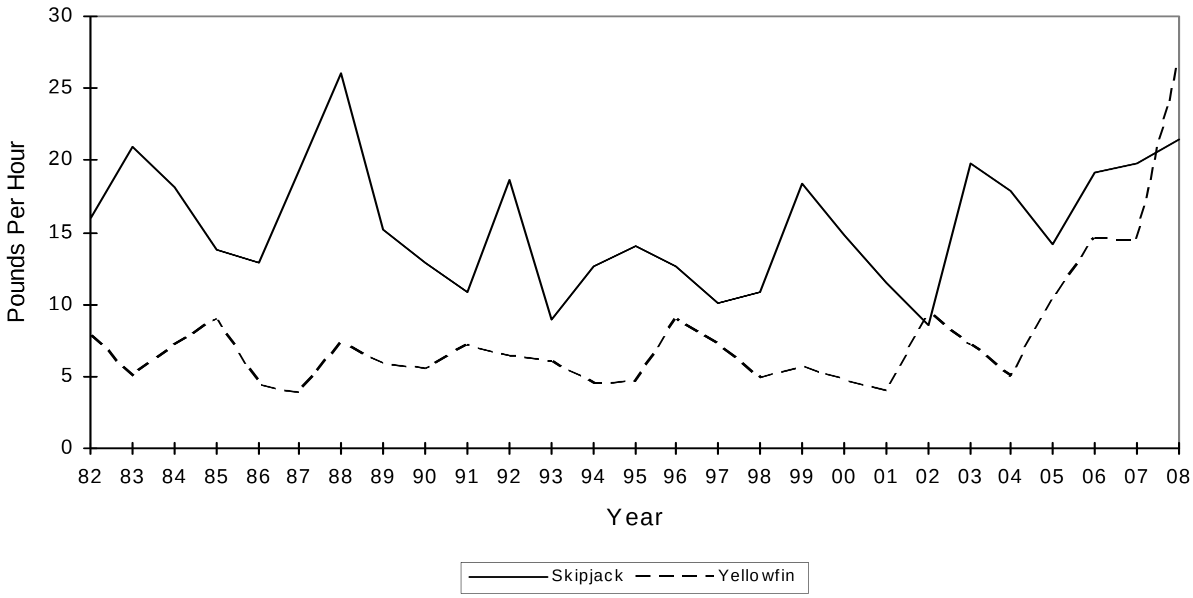


Interpretation: Blue marlin pounds-per-hour (PPH) trolling increased 0.28 PPH(after remaining at zero for three consecutive years; Mahimahi PPH decreased by 0.14 (-12%), to 1.07 pph in 2007 from 1.21 pph in 2006. Wahoo PPH shows an increase (36%)from 0.76 PPH in 2006 to 1.19pph in 2007.

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.

	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	1.85	0.57	3.99
1992	1.29	0.62	1.04
1993	2.25	1.38	1.84
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	0.26	1.07
2006	0.00	2.24	1.00
2007	0.36	1.17	1.28
2008	0.00	0.87	0.22
Average	**0.84**	**0.86**	**0.67**
Std. Dev.	**0.76**	**0.51**	**0.78**

Figure 21. American Samoa trolling catch rates for Skipjack and Yellowfin Tuna



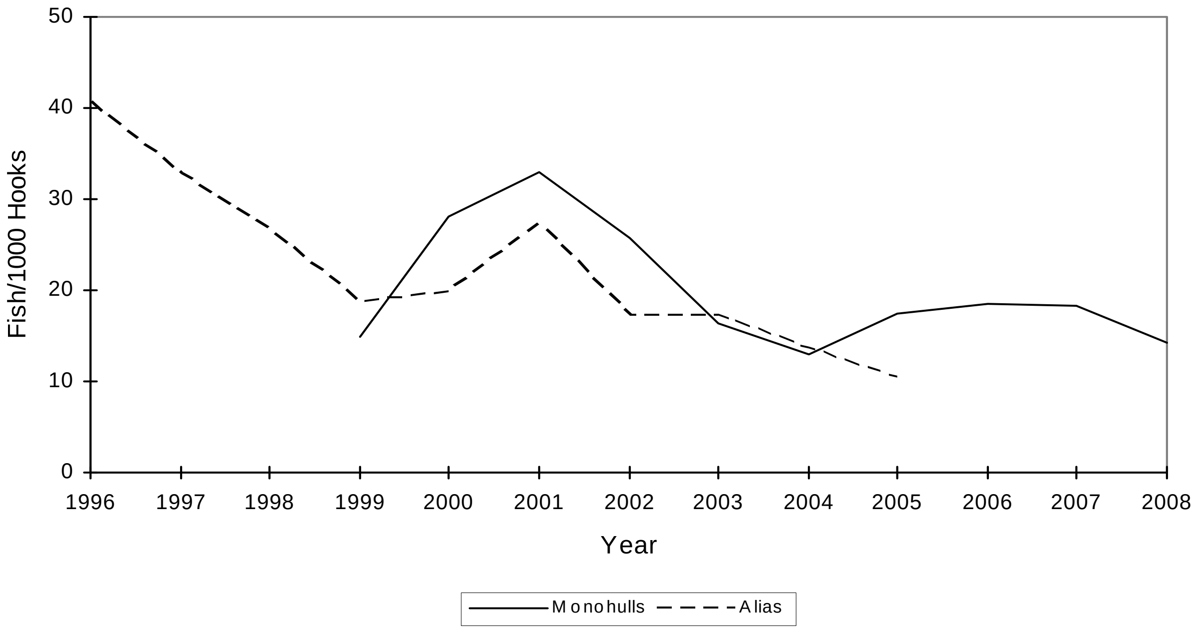
Interpretation: Estimated 2007 troll landings of skipjack and yellowfin tunas were 10,395 lbs and 7,356 pounds, respectively (Table 1). The pounds-per-troll-hour (PPTH) for skipjack in American Samoa increased 0.5 (31%) to 14.90 in 2007. Highest PPTH recorded is 26.00 in 1988.
The yellowfin tuna PPTH in American Samoa increased by 0.70 (6%) to a record high in 26 year of 10.90 The yellowfin tuna PPTH of 2007 continues an increasing trend from 2005.

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

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.

	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	15.20	5.92
1990	12.90	5.53
1991	10.80	7.10
1992	18.70	6.40
1993	8.89	6.06
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	14.20	10.40
2006	19.20	14.50
2007	19.80	14.40
2008	21.50	26.90
Average	**15.54**	**7.69**
Std. Dev.	**4.26**	**4.64**

Figure 22. American Samoa catch per 1000 hooks of Albacore by Alias and Monohull Vessels from Longline Logbook Data,



Interpretation: Due to fishery data confidential, albacore information of Alias longline vessel for 2006, 2007 and 2008 are omitted. Monohulls landed 14.2 albacore tuna in 2008; a decrease of 4.1, from 18.3 albacore landed in 2007.

Calculation: These values are sums of the Longline Logbook albacore catch (number of fish kept+released) from the longline logs for the two types of longline vessels in Samoa, alias and monohulls, divided by the total number of hooks set by each type of vessel. The 2006 monohull value is the value for all vessels for confidentiality reasons.

	Number of Fish Per 1000 Hooks	
Year	**Alias**	**Monohulls**
1996	40.6	--
1997	32.8	--
1998	26.6	--
1999	18.8	14.8
2000	19.8	28.0
2001	27.3	32.9
2002	17.2	25.8
2003	17.3	16.4
2004	13.7	12.9
2005	10.3	17.4
2006	--	18.4
2007	--	18.3
2008	--	14.2

Table 5A. American Samoa Catch/1000 Hooks
for two types of longline vessels from 1996 to 1999

	1996	1997	1998	1999	
Species	**Alias**	**Alias**	**Alias**	**Alias**	**Monohulls**
Skipjack tuna	0.1	1.2	3.7	5.0	4.5
Albacore tuna	40.6	32.8	26.6	18.8	14.8
Yellowfin tuna	6.5	2.7	2.2	6.7	2.1
Bigeye tuna	1.3	0.3	0.3	0.7	0.5
TUNAS SUBTOTALS	48.5	37.0	32.7	31.2	21.9
Mahimahi	2.3	2.2	1.7	2.2	0.3
Black marlin	0.0	0.1	0.0	0.2	0.0
Blue marlin	0.9	0.7	0.5	0.5	0.1
Wahoo	0.8	0.9	2.2	2.1	1.2
Sharks (all)	0.7	0.1	0.1	0.1	1.2
Sailfish	0.2	0.2	0.1	0.0	0.1
Moonfish	0.0	0.1	0.1	0.1	0.0
NON-TUNA PMUS SUBTOTALS	4.9	4.3	4.7	5.1	2.9
Pelagic fishes (unknown)	0.0	0.0	0.2	0.3	0.2
OTHER PELAGICS SUBTOTALS	0.0	0.0	0.2	0.3	0.2
TOTAL PELAGICS	**53.4**	**41.3**	**37.7**	**36.6**	**25.0**

Table 5B. American Samoa Catch/1000 Hooks for two types of longline vessels from 2000 to 2002

	2000		2001		2002	
Species	**Alias**	**Monohulls**	**Alias**	**Monohulls**	**Alias**	**Monohulls**
Skipjack tuna	2.0	1.7	3.1	2.1	6.0	4.9
Albacore tuna	19.8	28.0	27.3	32.9	17.2	25.8
Yellowfin tuna	6.2	3.1	3.3	1.4	7.1	1.3
Bigeye tuna	0.4	1.0	0.6	1.0	0.6	0.9
TUNAS SUBTOTALS	28.4	33.8	34.3	37.4	30.9	32.8
Mahimahi	1.7	0.4	3.4	0.5	4.0	0.6
Black marlin	0.1	0.1	0.1	0.0	0.0	0.0
Blue marlin	0.5	0.2	0.4	0.2	0.2	0.3
Striped marlin	0.1	0.3	0.0	0.1	0.1	0.0
Wahoo	1.2	1.0	1.5	0.6	2.7	1.0
Sharks (all)	0.0	0.7	0.0	0.7	0.0	0.8
Swordfish	0.0	0.0	0.1	0.0	0.1	0.0
Spearfish	0.0	0.1	0.0	0.0	0.0	0.0
Moonfish	0.1	0.2	0.1	0.1	0.1	0.1
Oilfish	0.0	0.1	0.0	0.2	0.0	0.5
Pomfret	0.0	0.1	0.0	0.1	0.0	0.1
NON-TUNA PMUS SUBTOTALS	3.6	3.2	5.6	2.6	7.2	3.5
Barracudas	0.0	0.0	0.0	0.0	0.0	0.1
Pelagic fishes (unknown)	0.0	0.0	0.0	0.0	0.0	0.3
OTHER PELAGICS SUBTOTALS	0.0	0.0	0.1	0.1	0.0	0.3
TOTAL PELAGICS	**32.0**	**37.0**	**40.0**	**40.1**	**38.1**	**36.6**

Table 5C. American Samoa Catch/1000 Hooks for two types of longline vessels from 2003 to 2005

	2003		2004		2005	
Species	**Alias**	**Monohulls**	**Alias**	**Monohulls**	**Alias**	**Monohulls**
Skipjack tuna	4.7	2.9	3.0	3.9	1.0	2.7
Albacore tuna	17.3	16.4	13.7	12.9	10.3	17.4
Yellowfin tuna	5.9	2.0	8.8	3.2	7.0	2.6
Bigeye tuna	1.6	1.1	0.8	1.3	1.0	0.9
TUNAS SUBTOTALS	29.5	22.4	26.2	21.2	19.3	23.7
Mahimahi	2.2	0.4	2.1	0.2	2.0	0.3
Blue marlin	0.2	0.2	0.1	0.2	0.2	0.2
Striped marlin	0.0	0.0	0.1	0.0	0.1	0.0
Wahoo	1.8	1.1	3.0	1.6	2.3	1.4
Sharks (all)	0.3	0.8	0.1	0.9	0.0	0.7
Swordfish	0.1	0.0	0.1	0.0	0.1	0.0
Sailfish	0.1	0.0	0.0	0.1	0.1	0.1
Spearfish	0.1	0.0	0.0	0.1	0.0	0.0
Moonfish	0.1	0.1	0.1	0.1	0.1	0.1
Oilfish	0.3	0.5	0.0	0.7	0.0	0.3
Pomfret	0.1	0.1	0.0	0.1	0.0	0.1
NON-TUNA PMUS SUBTOTALS	5.2	3.3	5.7	3.8	4.8	3.1
Pelagic fishes (unknown)	0.2	0.2	0.0	0.1	0.0	0.1
OTHER PELAGICS SUBTOTALS	0.2	0.2	0.0	0.1	0.0	0.1
TOTAL PELAGICS	**34.8**	**25.8**	**32.0**	**25.2**	**24.2**	**26.8**

Table 5D. American Samoa catch/1000 Hooks for all longline vessels from 2006 to 2008

Species	2006 All Vessels	2007 All Vessels	2008 All Vessels
Skipjack tuna	3.2	2.3	2.4
Albacore tuna	18.4	18.3	14.2
Yellowfin tuna	1.6	1.9	1.0
Bigeye tuna	0.9	0.9	0.5
TUNAS SUBTOTALS	24.2	23.5	18.2
Mahimahi	0.4	0.1	0.1
Blue marlin	0.2	0.2	0.2
Wahoo	1.5	1.0	0.7
Sharks (all)	0.5	0.4	0.4
Swordfish	0.1	0.0	0.0
Spearfish	0.1	0.0	0.1
Oilfish	0.5	0.5	0.4
Pomfret	0.0	0.1	0.1
NON-TUNA PMUS SUBTOTALS	3.3	2.4	2.0
Pelagic fishes (unknown)	0.0	0.2	0.1
OTHER PELAGICS SUBTOTALS	0.0	0.2	0.1
TOTAL PELAGICS	**27.5**	**26.0**	**20.3**

Interpretation: Total pelagics catch by all longline vessels in 2008 decreased by 22% to 20.3 fish from 26.0 fish in 2007.Total catch for tunas also decrease by 5.3 (23%) to 18.2 in 2008. Albacore tuna dominates the total tuna catch although albacore catch decreased by 4.1 to 14.2 in 2008. Skipjack tuna catch increased by 0.1 to 2.4 in 2008; Yellowfin decreased by 0.9 to 1.0; and bigeye also decreased by 0.4. Non-tuna PMUS total catch also decreased by 0.4 to 2.0 in 2008. Wahoo dominates the non-tuna landings at 0.7 but a 0.3 decrease from 2007.

.

Calculation: These values are sums of the Longline Logbook catch (number of fish kept+released) from the longline logs for the two types of longline vessels in Samoa, alias and monohulls, divided by the total number of hooks set by each type of vessel. All species of sharks entered in the Longline Logs are combined in the All Sharks species category. Rays and Sunfish are included in the Misc Pelagic Fish category.

Figure 23A. Average Albacore Weight-per-fish

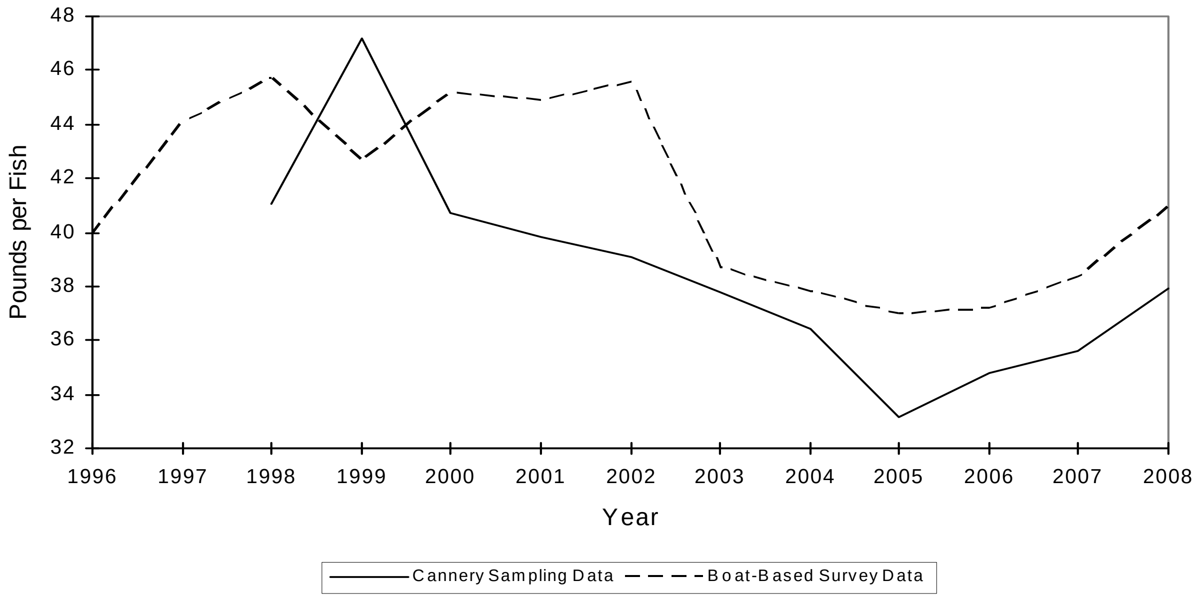
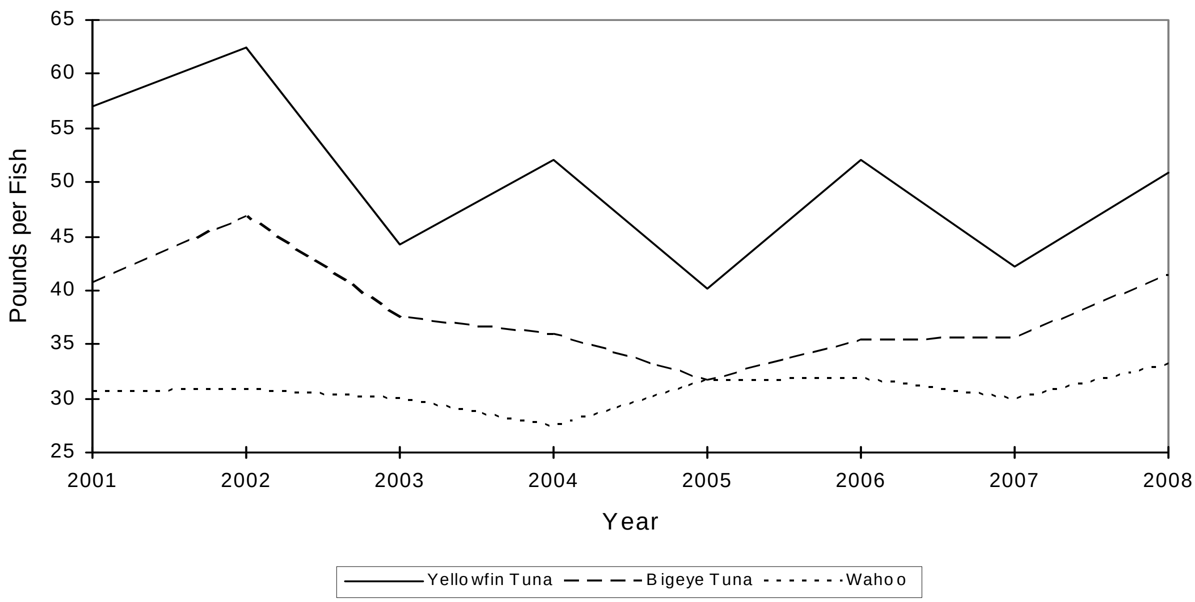


Figure 23B. Average Cannery Sampled Weight-per-fish for other Cannery Species



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.

Albacore weight-per-fish increased 1.4 (4%) to 38.4 lbs in creel interviews between 2006 and 2007. Albacore weight per fish in 2008 increased by 2.7 lbs to 41.1 pounds in creel samples. Cannery sampled weight-per-albacore also increased 2.3lbs in 2008.Skipjack average weight per fish in cannery samples increased slightly by 0.1 to 12.2 lbs in 2008, and in creel samples it increased by 7.8lbs.Yellowfin shows a decrease of 1.8lb in creel samples and an increase of 8.3lbs in cannery samples. Bigeye average weight also decreased by 6.2lbs in cannery samples while decreased 22.6lbs in creel to 39.0lbs in 2008. From the 2008 creel samples, Wahoo average weight increased by 0.6 pounds to 33.2 lbs; and increased by 2.9lbs from the cannery samples.Mahi increased 2.1lbs from creel and also increased 5.7lbs from the cannery samples

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

Table 6A. Creel Survey Average Weight-per-fish (1996-2001)

Species	Creel Survey Annual Average Pounds per Fish					
	1996	1997	1998	1999	2000	2001
Skipjack tuna	9.6	8.4	12.5	9.7	11.6	14.8
Albacore tuna	39.9	44.0	45.7	42.6	45.1	44.8
Yellowfin tuna	37.9	44.2	45.9	33.1	38.1	31.3
Bigeye tuna	52.3	82.8	79.2	57.1	61.1	69.2
Mahimahi	26.2	25.6	23.3	22.3	24.8	19.7
Black marlin		148.3		101.9		67.2
Blue marlin	151.8	117.7	119.9	101.9	135.7	70.9
Wahoo	44.3	38.4	26.3	27.3	31.9	29.7
Sharks (all)	112.3	96.8	69.3	38.0	39.5	68.8
Swordfish	150.0	100.0	212.6	12.0		59.4
Sailfish	88.4	70.7	67.0	61.8	39.1	42.0
Spearfish				46.0		
Moonfish		70.3	33.5	57.7	30.9	102.5
Oilfish			12.7	10.0		23.9
Pomfret					16.5	
Barracudas	13.5	14.6	15.3	11.0	13.1	7.6
Rainbow runner		14.0	17.5	6.5		
Dogtooth tuna			10.0			15.6
Pelagic fishes (unknown)	61.8	8.0	45.3			

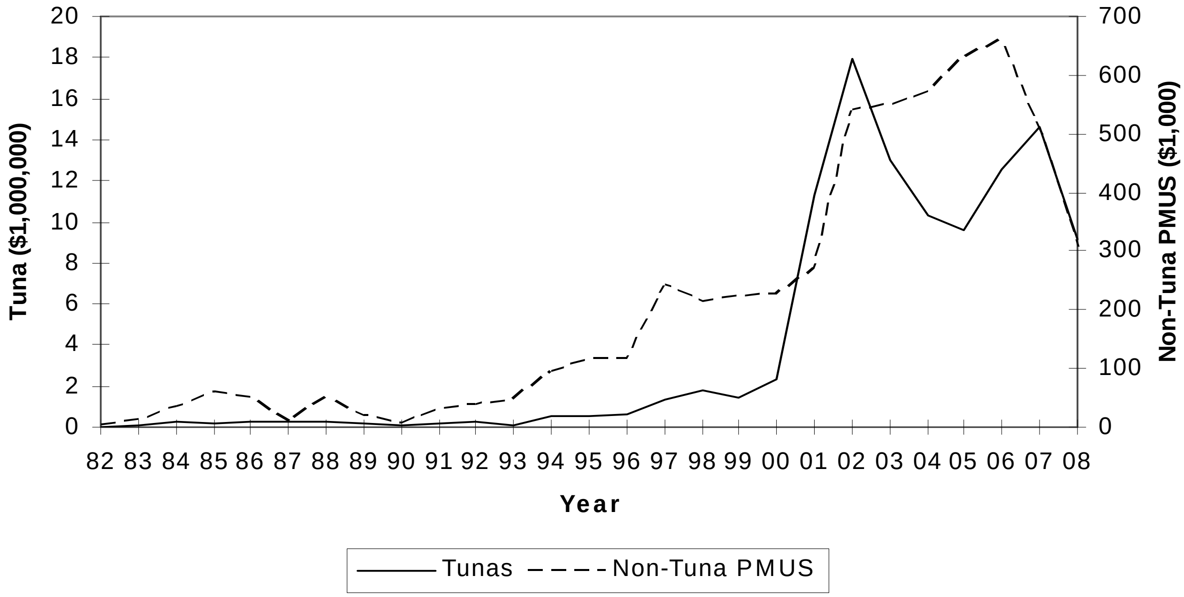
Table 6B. Creel Survey Average Weight-per-fish (2002-2008)

Species	Creel Survey Annual Average Pounds per Fish						
	2002	2003	2004	2005	2006	2007	2008
Skipjack tuna	11.1	8.6	8.1	8.0	12.5	7.4	13.5
Albacore tuna	45.5	38.7	37.8	37.0	37.2	38.3	40.9
Yellowfin tuna	28.0	17.7	34.7	32.9	19.0	37.5	35.4
Bigeye tuna	67.6	37.2	45.3	42.7	37.1	62.2	39.0
Mahimahi	19.3	20.4	21.7	18.5	17.6	21.5	22.8
Black marlin	31.9	90.0	103.0	78.1	91.5	105.9	
Blue marlin	190.4	98.8	62.9	117.9	175.7	136.2	84.1
Wahoo	28.2	30.8	28.1	29.7	29.5	33.6	31.8
Sharks (all)	68.5	62.4	71.7		47.5	65.0	
Swordfish	23.4	117.4	37.7	25.6	28.3	115.9	
Sailfish	33.8	57.6	44.9	54.2	42.0	65.1	56.5
Spearfish			46.0				
Moonfish	78.3	107.1	59.7	101.5	117.4	97.3	
Oilfish		11.1	7.8	1.9		5.9	12.9
Pomfret	8.2		8.2	2.3	1.3	8.8	
Barracudas	9.2	8.8	10.4	10.5	8.2	9.6	10.5
Rainbow runner	16.1		6.9	8.8		10.1	
Dogtooth tuna	40.8		16.2				

Table 6C. Cannery Sampled Average Weight-per-fish (1998-2008)

	Cannery Sampled Average Lbs. per Fish										
Species	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Skipjack tuna				16.8	11.3	9.9	13.6	13.1	12.3	12.1	12.0
Albacore tuna	41.0	47.2	40.7	39.8	39.1	37.8	36.5	33.2	34.8	35.6	37.9
Yellowfin tuna				57.0	62.4	44.3	52.1	40.1	52.1	42.2	50.9
Bigeye tuna				40.6	46.7	37.4	35.9	31.6	35.5	35.6	41.4
Mahimahi				16.1	13.5	20.7	13.0	17.2	13.4	13.4	19.1
Black marlin				36.3							
Blue marlin								45.8			
Wahoo				30.6	30.7	30.0	27.4	31.7	31.9	29.9	33.2
Swordfish							72.3		90.3		
Sailfish					34.0			22.9	21.7		
Moonfish				147.6	117.5			95.5	34.7		
Pomfret				5.1	6.2			7.8		5.4	
Rainbow runner					9.4		10.8				

Figure 24. American Samoa annual inflation-adjusted revenue in 2007 dollars for Tuna and non-Tuna PMUS.



Interpretation: Inflation-adjusted revenues for 2008 decreased by more than $4 million (33%) to $9.5 millions for all pelagic landed by American Samoa vessels in 2008; thus the tuna revenues also decreased to $9.2 millions from $13.8 millions in 2007. Inflation-adjusted tuna revenue in 2002 was the highest peak ever at more than $16.6 million. The 2007 adjusted revenue was second highest

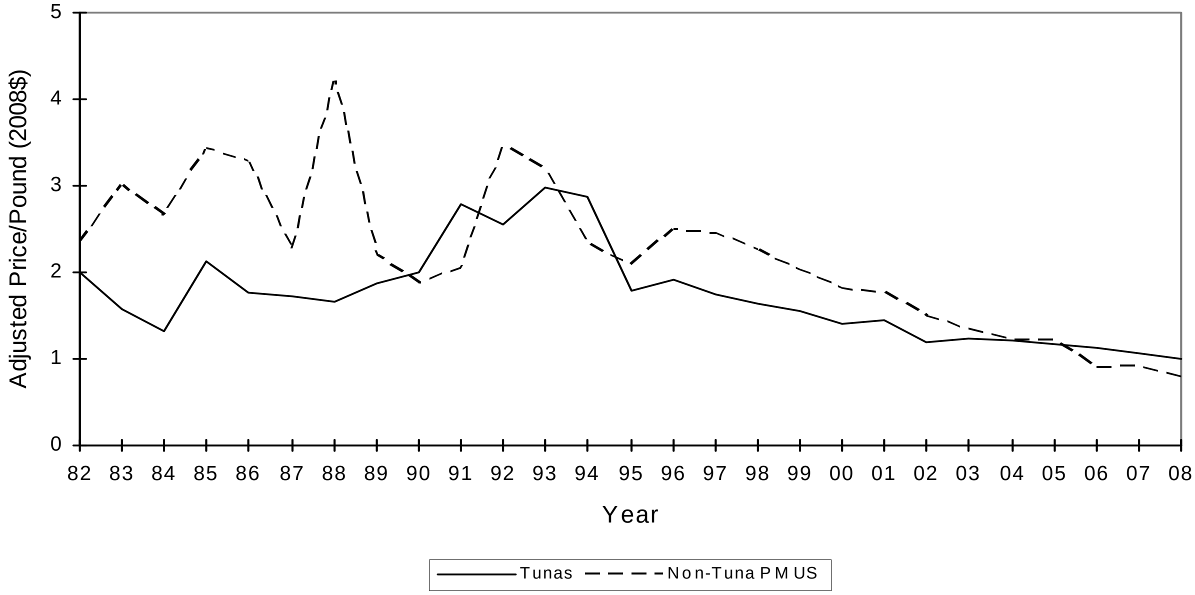
Inflation-adjusted revenues for non-tuna Pelagic Management Unit Species (PMUS) decreased by 36% to $307,574 in 2008. The 2006 non-tuna PMUS revenue of $566,636 is the highest recorded in the 27-year history.

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	$43,962	$1,534	$3,551
1983	100.8	$58,561	$134,456	$5,828	$13,381
1984	102.7	$114,981	$259,167	$15,938	$35,924
1985	103.7	$95,157	$212,390	$26,800	$59,818
1986	107.1	$139,021	$300,424	$23,117	$49,957
1987	111.8	$110,012	$227,725	$5,267	$10,902
1988	115.3	$143,626	$288,400	$25,384	$50,971
1989	120.3	$110,386	$212,382	$9,340	$17,970
1990	129.6	$63,229	$112,928	$3,809	$6,803
1991	135.3	$94,822	$162,241	$18,569	$31,771
1992	140.9	$141,106	$231,837	$23,451	$38,530
1993	141.1	$80,250	$131,689	$28,181	$46,244
1994	143.8	$337,977	$544,143	$59,266	$95,418
1995	147.0	$319,148	$502,659	$73,194	$115,280
1996	152.5	$393,625	$597,522	$75,932	$115,264
1997	156.4	$941,063	$1,392,773	$162,262	$240,148
1998	158.4	$1,241,313	$1,813,558	$146,754	$214,407
1999	159.9	$1,016,156	$1,471,393	$153,286	$221,959
2000	166.7	$1,654,560	$2,298,184	$162,696	$225,985
2001	169.9	$8,294,263	$11,305,081	$198,197	$270,142
2002	172.1	$13,314,347	$17,907,797	$400,285	$538,384
2003	176.0	$9,891,537	$13,007,372	$418,375	$550,164
2004	188.5	$8,369,117	$10,277,275	$466,489	$572,849
2005	198.3	$8,202,805	$9,572,673	$539,547	$629,652
2006	204.3	$11,053,679	$12,523,818	$581,150	$658,443
2007	215.5	$13,580,333	$14,585,277	$471,264	$506,138
2008	231.5	$9,158,809	$9,158,809	$307,154	$307,154
Average	**150.0**	**$3,294,032**	**$4,047,257**	**$163,077**	**$208,415**
Std. Dev.	**36.15**	**$4,656,577**	**$5,578,499**	**$186,178**	**$215,710**

Figure 25. American Samoa average inflation-adjusted price per pound of Tunas and Non-Tuna PMUS.



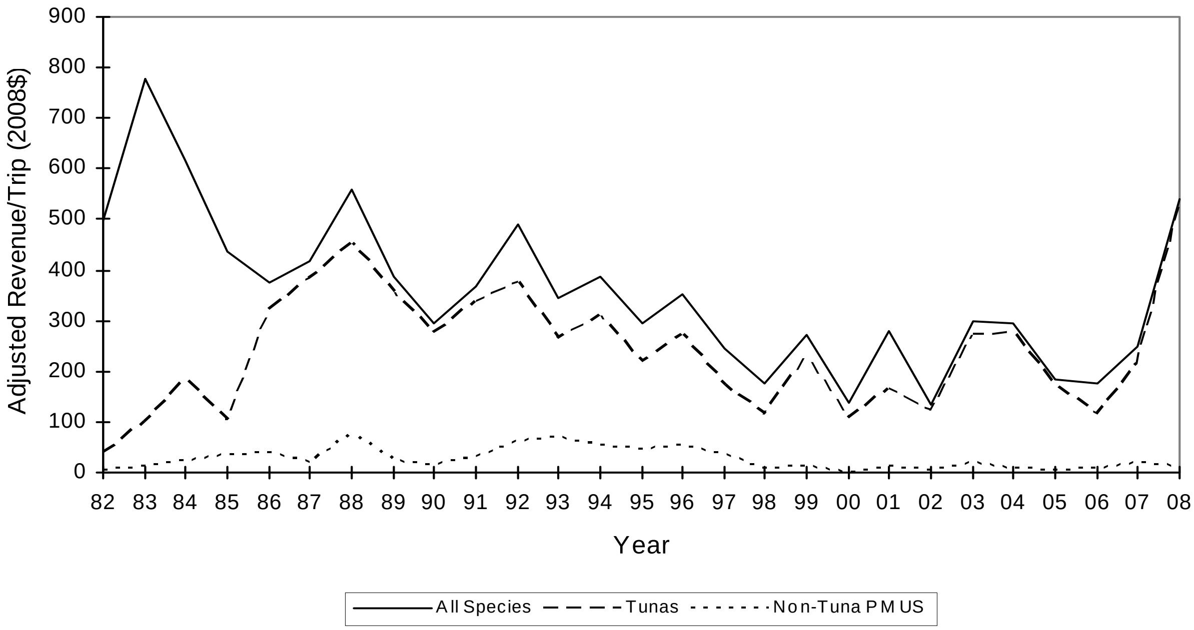
Interpretation: The average inflation-adjusted price-per-pound for tunas and non-tuna Pelagic Management Unit Species (PMUS) decreased and continued a long-term decline since 2003. The average price-per-pound for tuna in 2008 decreased by 6cents; and non-tuna PMUS average price decreased by 7cents.Tuna price-per-pound peaked at $2.96 in 1993; and for non- tuna PMUS average peaked at $3.92 in 1988. The 2008 inflation-adjusted price-per-pound for tuna and non-tuna PMUS is the lowest ever.

	Average Price/Pound ($)			
	Tunas		Non-Tuna PMUS	
Year	Unadjust.	Adjusted	Unadjust.	Adjusted
1982	$0.86	$1.99	$1.01	$2.34
1983	$0.69	$1.58	$1.31	$3.01
1984	$0.59	$1.32	$1.18	$2.67
1985	$0.95	$2.12	$1.53	$3.42
1986	$0.82	$1.77	$1.51	$3.27
1987	$0.83	$1.72	$1.09	$2.25
1988	$0.83	$1.67	$2.10	$4.21
1989	$0.97	$1.87	$1.14	$2.20
1990	$1.12	$2.00	$1.05	$1.88
1991	$1.63	$2.78	$1.20	$2.05
1992	$1.56	$2.56	$2.12	$3.47
1993	$1.81	$2.97	$1.95	$3.19
1994	$1.79	$2.88	$1.43	$2.31
1995	$1.13	$1.78	$1.33	$2.09
1996	$1.26	$1.92	$1.65	$2.50
1997	$1.18	$1.74	$1.66	$2.45
1998	$1.11	$1.63	$1.54	$2.26
1999	$1.07	$1.55	$1.40	$2.02
2000	$1.01	$1.40	$1.30	$1.80
2001	$1.07	$1.45	$1.30	$1.77
2002	$0.89	$1.19	$1.10	$1.48
2003	$0.94	$1.24	$1.02	$1.34
2004	$0.99	$1.22	$0.99	$1.21
2005	$1.01	$1.17	$1.04	$1.21
2006	$0.98	$1.12	$0.78	$0.89
2007	$0.99	$1.06	$0.84	$0.91
2008	$0.99	$0.99	$0.79	$0.79
Average	**$1.08**	**$1.73**	**$1.31**	**$2.18**
Std. Dev.	**$0.30**	**$0.54**	**$0.36**	**$0.85**

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 2006 consumer price index (CPI) divided by the CPI for that year.

Figure 26. American Samoa average inflation-adjusted revenue per trolling trip landing pelagic species



Interpretation: Tunas continue to dominate the inflation-adjusted revenues per trolling trip. The 2008 average inflation-adjusted revenue-per-troll-trip for tunas amounts to $587; an increase of $400 (68%) from $187 in 2007. Skipjack and Yellowfin are the primary tuna landings by trollers (Table 1). Inflation-adjusted revenue-per-troll-trip for all species increased $317 (51%) to $618 in 2008. Inflation-adjusted revenue-per-troll-trip for non-tuna Pelagic Management Unit Species (PMUS) decreased 30% to $13.2. The highest average per trolling trip estimates for tunas is from last year 2008. The highest average for non-tuna is 1988. Mahimahi and Wahoo are the primary non-tuna PMUS landings for trollers (Table 1).

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	$496	$214	$37	$16	$3.0	$1.3
1983	$776	$338	$99	$43	$11.9	$5.2
1984	$617	$274	$185	$82	$23.7	$10.5
1985	$438	$196	$104	$47	$35.3	$15.8
1986	$375	$173	$324	$150	$37.6	$17.4
1987	$416	$201	$383	$185	$18.8	$9.1
1988	$559	$278	$451	$225	$77.5	$38.6
1989	$389	$202	$356	$185	$24.1	$12.5
1990	$296	$166	$275	$154	$13.9	$7.8
1991	$368	$215	$336	$196	$29.1	$17.0
1992	$489	$298	$375	$228	$60.5	$36.8
1993	$346	$211	$266	$162	$68.4	$41.7
1994	$387	$241	$312	$194	$54.3	$33.7
1995	$295	$187	$219	$139	$46.8	$29.7
1996	$351	$231	$273	$180	$53.7	$35.4
1997	$245	$165	$172	$116	$34.2	$23.1
1998	$174	$119	$114	$78	$8.9	$6.1
1999	$271	$187	$228	$158	$10.7	$7.4
2000	$139	$100	$106	$76	$1.1	$0.8
2001	$280	$205	$165	$121	$12.1	$8.9
2002	$135	$101	$123	$91	$5.1	$3.8
2003	$298	$226	$274	$208	$18.4	$14.0
2004	$293	$239	$274	$223	$7.9	$6.4
2005	$185	$158	$172	$148	$4.9	$4.2
2006	$176	$155	$113	$100	$6.5	$5.7
2007	$250	$233	$216	$201	$19.1	$17.8
2008	$541	$541	$525	$525	$10.3	$10.3
Average	**$355**	**$217**	**$240**	**$157**	**$25.8**	**$15.6**
Std. Dev.	**$151**	**$84**	**$117**	**$93**	**$21.2**	**$12.2**

B. Guam

Introduction

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 27-year time series. The 2008 total pelagic landings were approximately 551,504 pounds, a decrease of 1.5% compared with 2007. 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*), kawakawa (*Euthynnus affinis*), dogtooth tuna (*Gymnosarda unicolor*), double-lined mackerel (*Grammatorcynus bilineatus*), and oilfish (*Ruvettus pretiosus*). Sailfish and sharks were also caught during 2008. 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 385 boats involved in Guam's pelagic fishery in 2008, an increase of 4% from 2007. 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 the five common species showed mixed changes from 2007 levels. 2008 mahimahi catch decreased more than 57% from 2007, while wahoo catch totals increased 123% from 2007, bonita increased by more than 189% and Pacific blue marlin catch decreased 49% from 2007.

Aggregate landings of all pelagics, tuna, and non-tuna Pelagic Management Unit Species (PMUS) decreased slightly in 2008 from 2007 levels. Landings of all pelagics decreased 1.5%, with tuna PMUS increasing 52% and non-tuna PMUS decreasing more than 32%. The number of trolling boats increased by 4%, the number of trolling trips increased by 8% and hours spent trolling increased by 18%. More boats making more and longer trips may be a result of decreasing gas prices during the second half of the year and increasing prices paid for fish, as fish were nearly equally abundant in 2008 as they were in 2007. Trolling catch rates (pounds per hour fished) showed a significant decrease compared with 2007. Total CPUE was down 15%, with bonita, and wahoo showing the greatest increases, while yellowfin, mahimahi, and marlin showed decreases. Bonita CPUE increased by 59% and was the highest in the 27 year data set. Yellowfin CPUE decreased by 64%, and marlin CPUE decreased by 43%. Both were at their lowest levels in the 27 year data set.

Commercial landings and revenues decreased in 2008, with total adjusted revenues decreasing 42%. The adjusted average price for all pelagics increased 5.6%, with tuna PMUS prices increasing 7.6%, and non-tuna PMUS increasing 2.9%. Adjusted revenue per trolling trip decreased 15% for all pelagics, decreased 13% for tuna PMUS, and decreased 9% for non-tuna PMUS. Commercial landings have shown a decreasing trend over the past seven 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. Regular gas peaked at 4.92 per gallon during July of 2007, before settling down to about 2 dollars per gallon less than that at the end of the year. While the adjusted average price of pelagic species increased last year for the first time in the past eight years, this again is based on only partial data for 2008. As the number of boats participating in the fishery increase over last year, it reasonable to assume the amount of catch and sales should be closer to last year's numbers than what is provided. 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.

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. In early 2007, this facility was damaged by heavy surf, and has yet to be repaired. Monitoring of this ramp is currently on hold until the ramp is repaired. The current financial situation in Gov Guam makes it unlikely this ramp will be repaired in the near future.

In July and August, 2008, DAWR deployed 6 FADS. These were the first FADS deployed in over two years. DAWR has received four more line systems, and is awaiting the arrival of more buoys, at which time four more FADS will be deployed. This should bring the number of FADS on station to ten, of the fourteen considered to be a full complement.

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 half 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.

Plan Team Recommendations

2008 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. Streamline the procurement process to facilitate the redeployment of FADS.
3. Streamline the hiring process to facilitate filling biologist positions in the DAWR office.
4. Encourage commercial vendors to participate in the commercial receipts program.
5. Assist with studies to find new areas for FADs to be deployed.

Table 1. Guam 2008 Creel Survey - Pelagic Species Composition

Species	Total Landing (Lbs)	Non-Charter	Charter
Skipjack Tuna	295,250	281,827	13,423
Yellowfin Tuna	19,887	18,900	987
Kawakawa	4,313	3,554	759
Albacore	0	0	0
Bigeye Tuna	0	0	0
Other Tuna PMUS	145	145	0
Tuna PMUS	**319,595**	**304,426**	**15,169**
Mahimahi	111,811	99,331	12,480
Wahoo	98,345	78,274	20,071
Blue Marlin	9,705	6,807	2,898
Black Marlin	0	0	0
Striped Marlin	0	0	0
Sailfish	283	283	0
Shortbill Spearfish	0	0	0
Swordfish	0	0	0
Oceanic Sharks	497	497	0
Pomfrets	2,620	2,620	0
Oilfish	0	0	0
Moonfish	0	0	0
Misc. Longline Fish	0	0	0
Non-tuna PMUS	**223,261**	**187,812**	**35,449**
Dogtooth Tuna	2,602	2,400	202
Rainbow Runner	2,455	2,396	59
Barracudas	2,167	2,101	66
Oceanic Sharks	0	0	0
Misc. Troll Fish	0	0	0
Non-PMUS Pelagics	**7,224**	**6,897**	**327**
Total Pelagics	**550,080**	**499,135**	**50,945**

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 2008 Annual Commercial Average Price of Pelagic Species

Species	Average Price ($/Lb)
Kawakawa	2.00
Yellowfin Tuna	2.09
Bonita/skipjack Tuna	**1.56**
Tunas **Subtotal**	1.70
Monchong	2.54
Swordfish	3.00
Sailfish	1.64
Marlin	1.43
Wahoo	2.00
Mahi / Dolphinfish	**1.87**
Non-tuna **PMUS Subtotal**	1.78
Barracuda	1.98
Rainbow Runner	2.17
Dogtooth Tuna	**1.53**
Non-PMUS **Pelagic Subtotal**	1.94
Pelagic **Total**	**1.77**

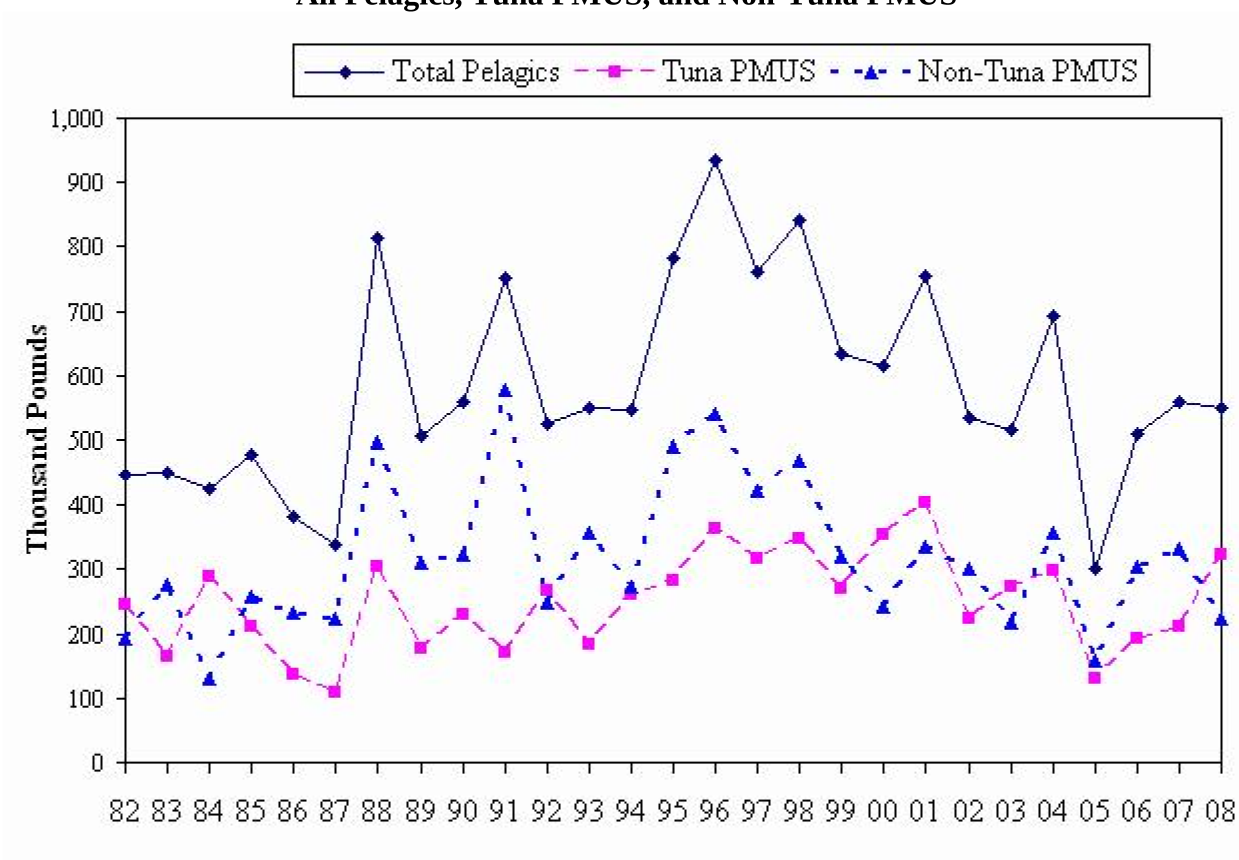
Source: The WPacFIN-sponsored commercial landings system.

Table 3. Annual Consumer Price Indexes and CPI Adjustment Factors

Year	Consumer Price Index	CPI Adjust Factor	Data Adjust Factor
1980	134.0	5.48	75
1981	161.4	4.55	80
1982	169.7	4.32	85
1983	175.6	4.18	90
1984	190.9	3.84	90
1985	198.3	3.70	90
1986	203.7	3.60	90
1987	212.7	3.45	80
1988	223.8	3.28	50
1989	248.2	2.96	55
1990	283.5	2.59	75
1991	312.5	2.35	80
1992	344.2	2.13	80

1993	372.9	1.97	75
1994	436.0	1.68	60
1995	459.2	1.60	60
1996	482.0	1.52	70
1997	491.3	1.49	80
1998	488.2	1.50	80
1999	497.2	1.48	80
2000	507.1	1.45	85
2001	500.0	1.47	85
2002	503.2	1.46	85
2003	517.0	1.42	85
2004	548.5	1.34	85
2005	590.5	1.24	80
2006	658.9	1.11	80
2007	**703.5**	**1.04**	65
2008	**733.7**	**1.00**	**65**

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 2007, total pelagic and non-tuna PMUS decreased 1.5% and 33% respectively, while tuna landings increased 52%. Non-tuna PMUS catch was well below the 27 year average, while the tuna PMUS was well above the 27 year average, and total pelagic catch was slightly below the 27 year average. Generally, tuna species are consistently caught year round, with the other major pelagic species being more seasonal.

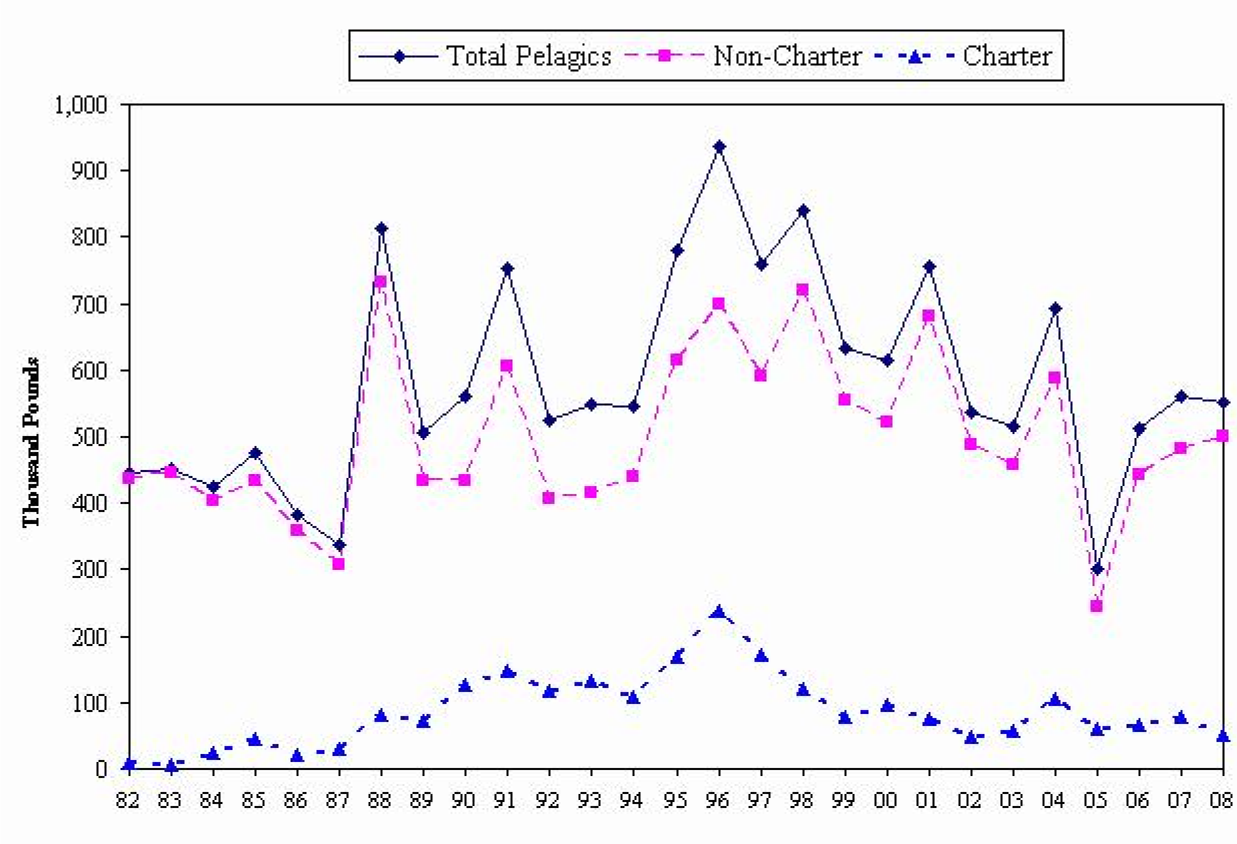
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel survey.

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	446,996	245,077	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	338,450	108,851	222,500
1988	812,961	303,021	495,521
1989	505,797	176,821	311,113
1990	559,365	230,318	321,769
1991	752,718	172,357	577,620
1992	523,359	266,578	248,422
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	841,812	346,611	470,128
1999	632,354	271,395	320,528
2000	614,710	355,374	242,774
2001	755,028	403,720	336,571
2002	534,878	223,805	302,339
2003	514,820	273,029	217,440
2004	693,217	298,709	356,586
2005	301,504	129,500	159,935
2006	510,608	192,247	303,297
2007	559,891	212,487	333,513
2008	**550,081**	**322,053**	**223,406**
	Average	583,484	249,854
319,130			
Standard Deviation	160,210	76,735	115,348

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 2008, total pelagic landings decreased 1.5%, non-charter landings increased 3.9%, while charter landings decreased 35%. Non-charter boats landed 90.7% of all pelagics in 2008.

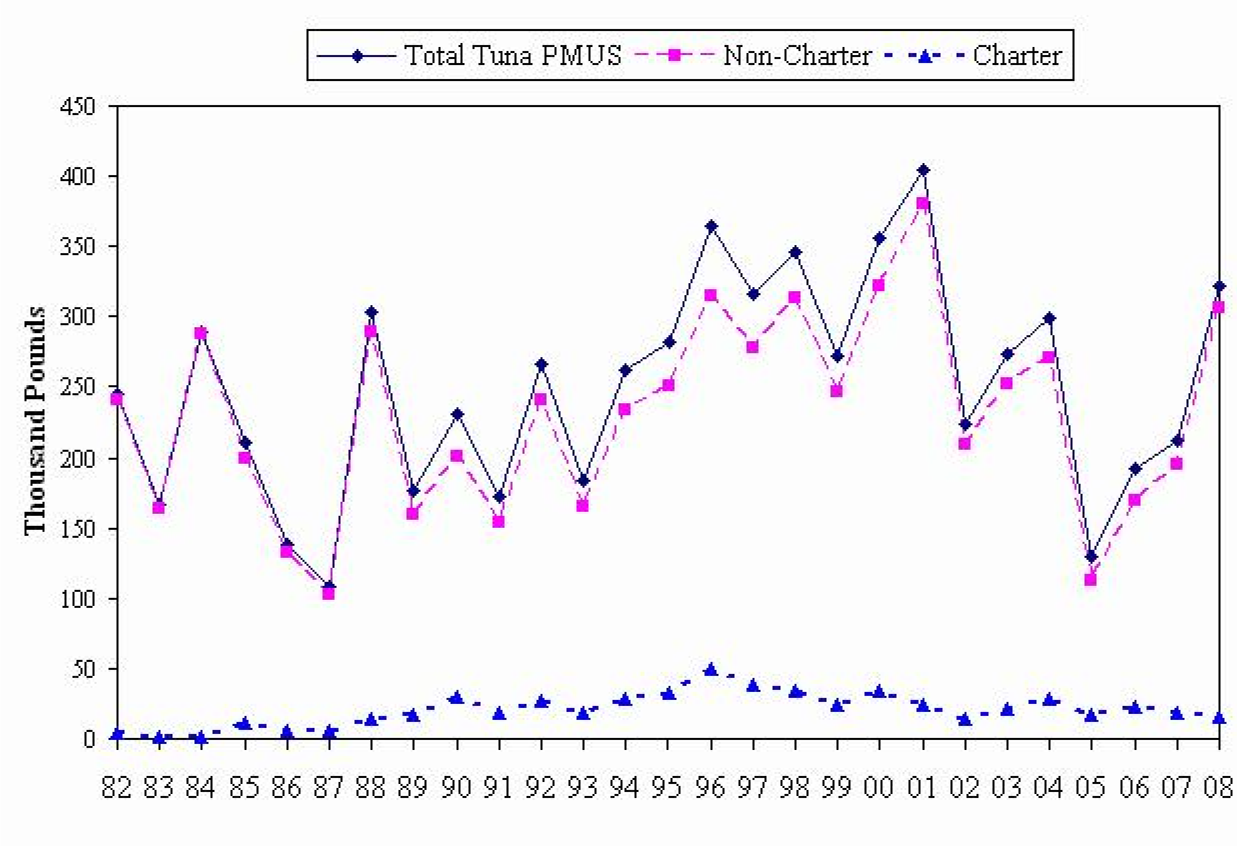
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel survey data.

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	446,996	437,861	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	338,450	307,442	31,007
1988	812,961	730,725	82,235
1989	505,797	434,819	70,978
1990	559,365	433,954	125,411
1991	752,718	606,230	146,488
1992	523,359	407,126	116,232
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	841,812	719,838	121,974
1999	632,354	553,486	78,868
2000	614,710	519,678	95,032
2001	755,028	680,465	74,563
2002	534,878	486,790	48,087
2003	514,820	458,746	56,074
2004	693,217	586,688	106,529
2005	301,504	242,536	58,968
2006	510,608	443,504	67,104
2007	559,891	481,607	78,284
2008	**550,081**	**499,137**	**50,945**
Average	583,484	497,281	86,203
Standard Deviation	160,210	123,136	54,521

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 2008, 95% of tuna were caught by non-charter boats. In 2008, total tuna and non-charter landings increased by 52% and 58% respectively. Charter tuna landings decreased by 18% from 2007 totals. The 2008 estimated tuna PMUS landings were 29% higher than the 27 year average.

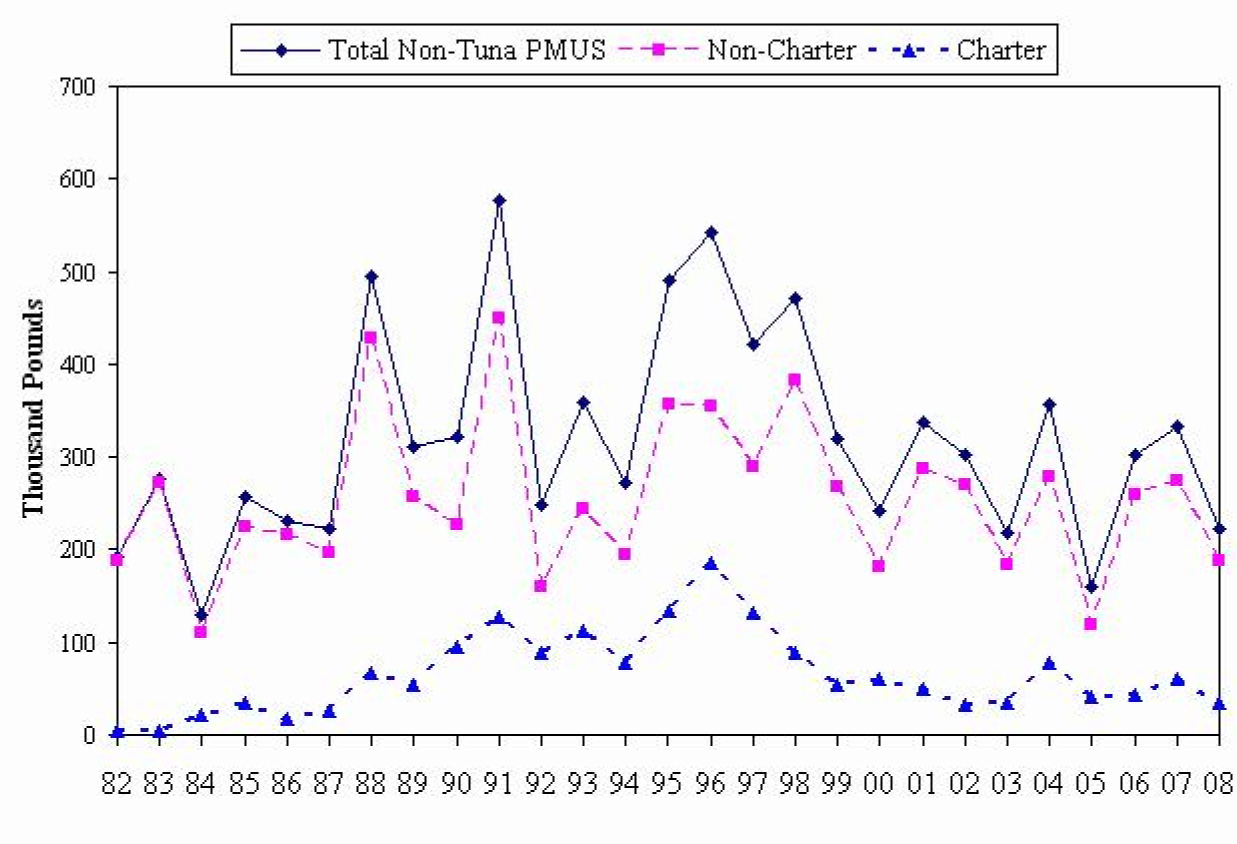
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program, expanded with the assistance of NMFS.

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	245,077	241,087	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	108,851	103,065	5,787
1988	303,021	288,402	14,620
1989	176,821	159,151	17,671
1990	230,318	200,780	29,538
1991	172,357	153,874	18,483
1992	266,578	239,968	26,610
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	346,611	313,078	33,533
1999	271,395	246,792	24,603
2000	355,374	321,546	33,828
2001	403,720	380,019	23,701
2002	223,805	208,925	14,880
2003	273,029	251,484	21,545
2004	298,709	269,861	28,848
2005	129,500	113,050	16,450
2006	192,247	168,788	23,459
2007	212,487	194,528	17,958
2008	**322,053**	**306,682**	**15,371**
Average	249,854	229,139	20,715
Standard Deviation	76,735	70,366	11,729

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 2008, total non-tuna PMUS and non-charter non-tuna PMUS decreased 33% and 31% respectively, compared with 2007. Charter non-tuna PMUS decreased 40%. Non-charter boats accounted for 84% of non-tuna PMUS catch in 2008.

.

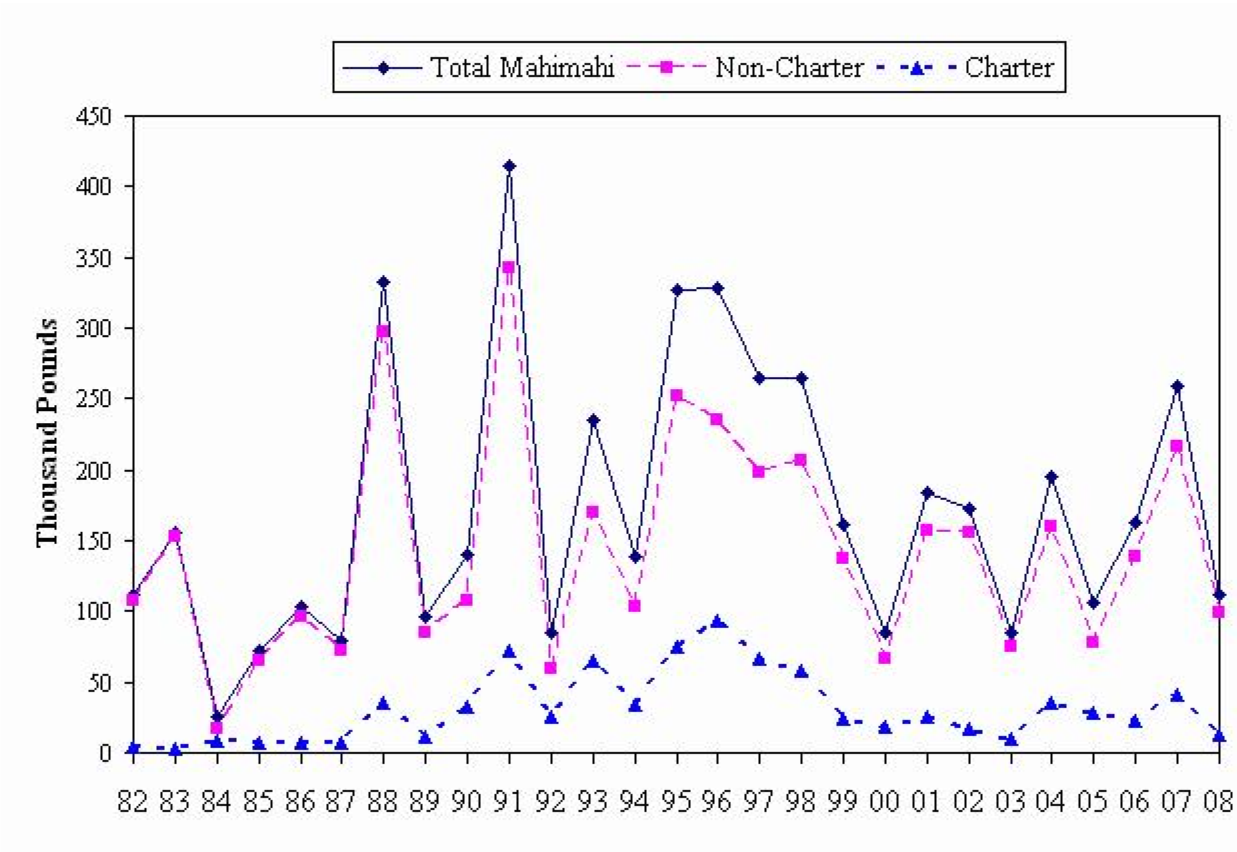
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program, expanded with the assistance of NMFS.

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	222,500	197,560	24,940
1988	495,521	428,109	67,412
1989	311,113	258,152	52,961
1990	321,769	226,418	95,350
1991	577,620	449,835	127,785
1992	248,422	159,900	88,522
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	470,128	382,199	87,929
1999	320,528	267,112	53,416
2000	242,774	181,972	60,802
2001	336,571	286,816	49,756
2002	302,339	269,555	32,784
2003	217,440	183,667	33,773
2004	356,586	279,289	77,297
2005	159,935	118,434	41,500
2006	303,297	259,979	43,318
2007	333,513	273,589	59,924
2008	**223,406**	**187,958**	**35,449**
Average	319,130	254,099	65,031
Standard Deviation	115,348	84,775	44,406

**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 2008, mahimahi landings decreased, with total and non-charter landings decreasing 57% and 54%, respectively. Charter landings decreased by 69%.

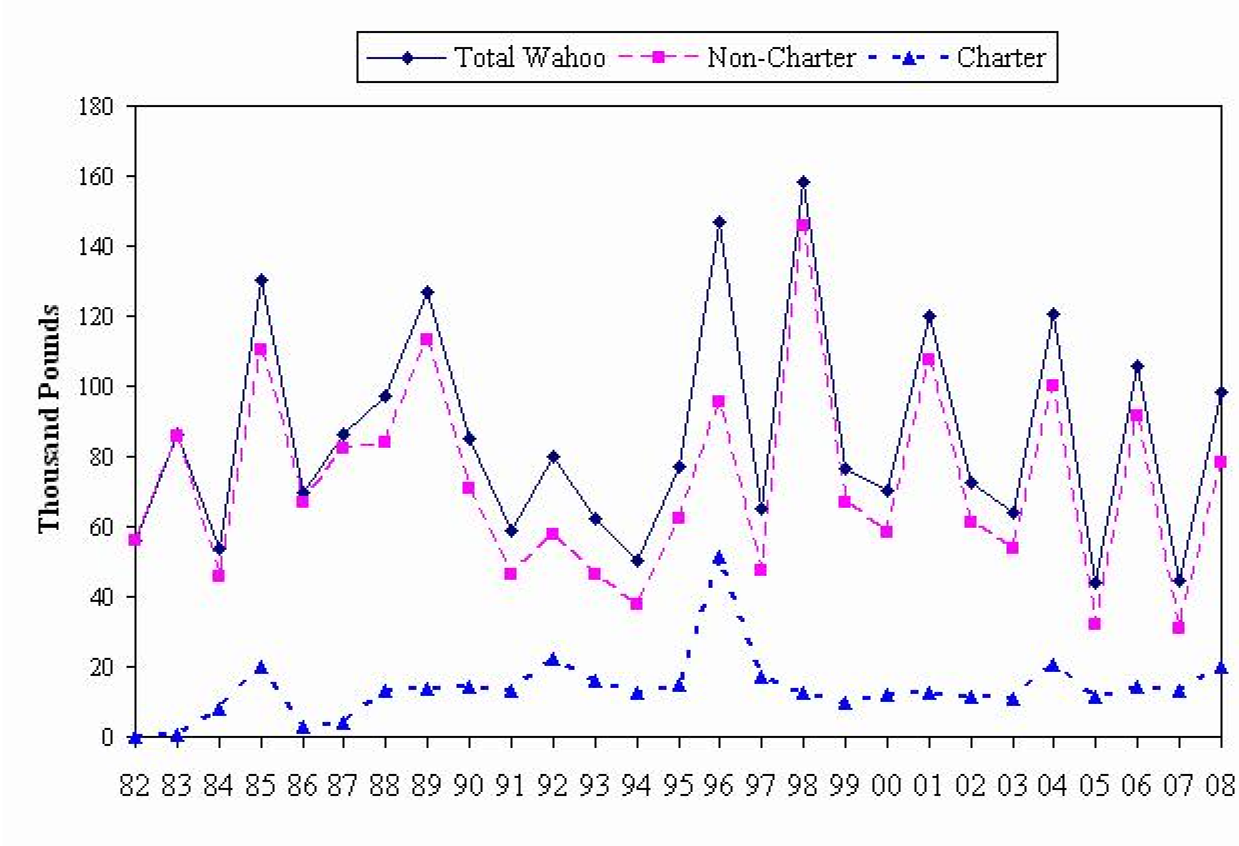
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files, expanded with the assistance of NMFS.

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	79,601	72,355	7,247
1988	332,874	296,990	35,884
1989	95,975	84,499	11,476
1990	140,293	107,740	32,553
1991	415,007	342,140	72,867
1992	85,017	59,818	25,200
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	264,695	206,546	58,149
1999	161,935	137,811	24,125
2000	85,585	66,499	19,086
2001	183,278	157,293	25,986
2002	173,130	156,172	16,958
2003	84,739	74,766	9,973
2004	195,340	159,948	35,392
2005	105,715	77,931	27,784
2006	162,512	139,365	23,147
2007	258,260	216,953	41,307
2008	**111,811**	**99,331**	**12,480**
Average	174,043	142,735	31,308
Standard Deviation	97,982	77,872	25,057

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 2008, total, non-charter, and charter harvest of wahoo increased 122%, 153%, and 50% respectively from 2007. Non-charter boats harvested 80% of the total wahoo harvest. A lack of deployed FADs during wahoo season may have contributed to the low catch in 2007.

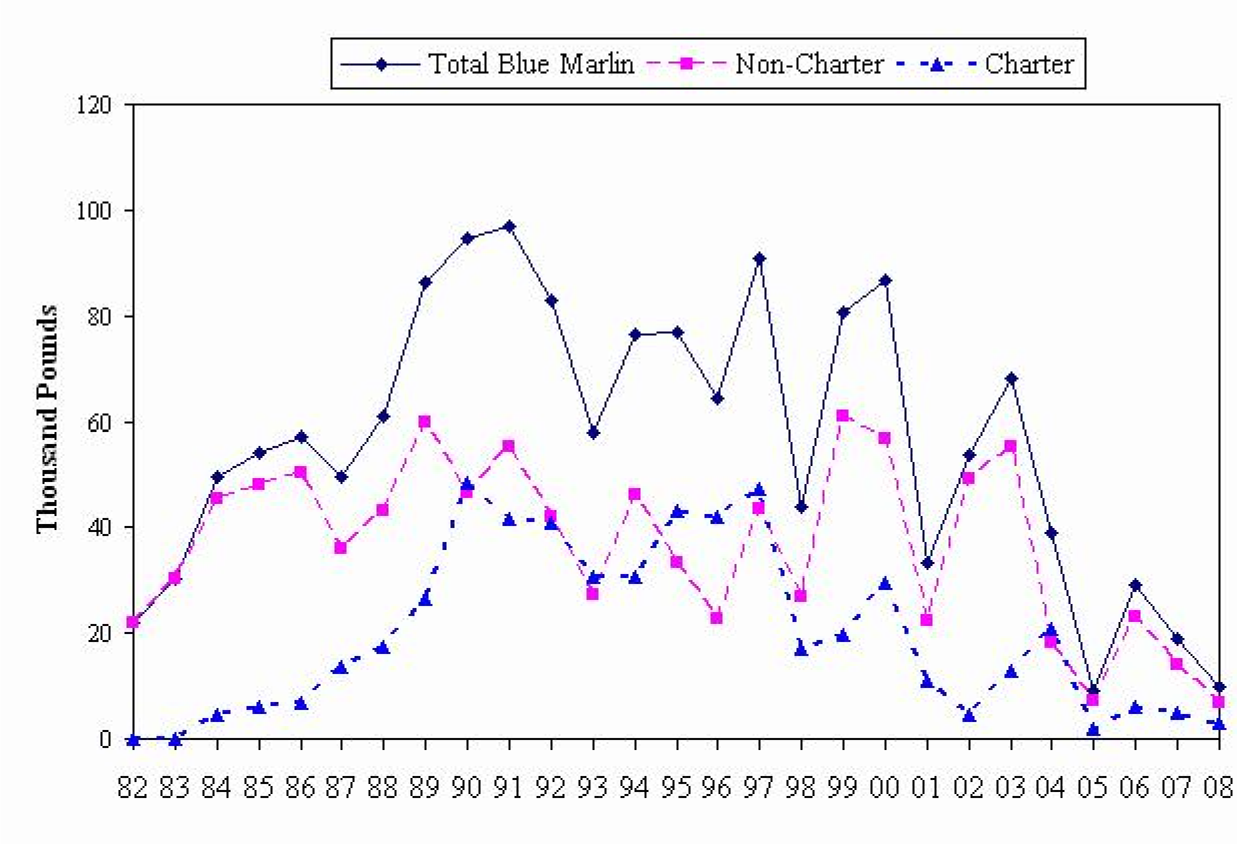
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files, expanded with the assistance of NMFS.

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

Estimated Total Landings (Pounds)

Year	Total 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	86,203	82,138	4,065
1988	96,996	83,972	13,025
1989	127,096	113,163	13,933
1990	85,280	71,131	14,149
1991	59,132	46,235	12,897
1992	79,894	57,874	22,020
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	158,230	145,620	12,610
1999	76,338	66,673	9,665
2000	70,484	58,429	12,056
2001	119,765	107,150	12,616
2002	72,643	61,386	11,257
2003	64,266	53,505	10,761
2004	120,288	99,963	20,325
2005	43,906	32,201	11,704
2006	105,878	91,713	14,166
2007	44,354	30,992	13,362
2008	**98,345**	**78,274**	**20,071**
Average	85,467	71,651	13,816
Standard Deviation	31,222	27,917	9,359

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 2008, the overall, and non-charter blue marlin landings decreased 49%, and 52% respectively. Charter blue marlin catch decreased by 40%, and accounted for 30% of the total blue marlin harvest. Blue marlin landings were below the 27 year average in all categories, and non-charter catch was the lowest in the 27 year time set.

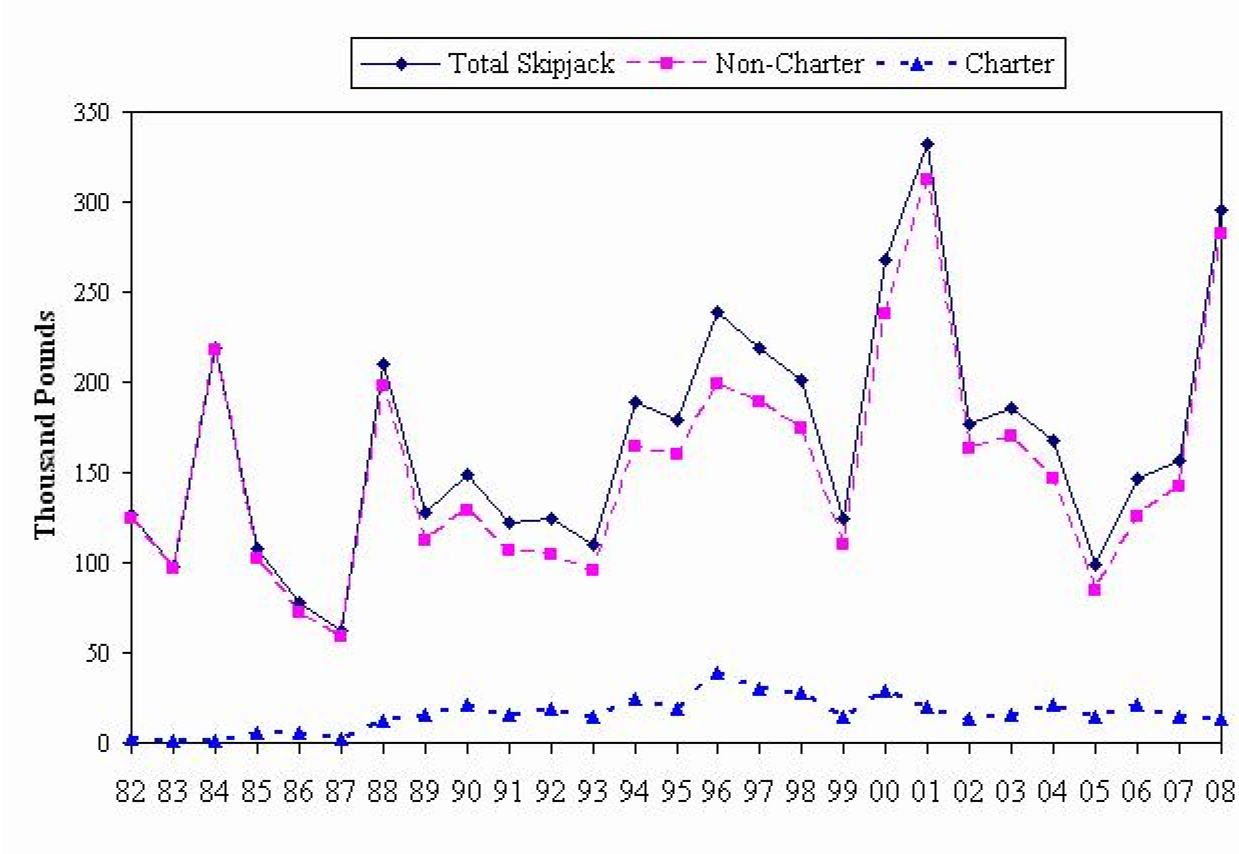
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files, expanded with the assistance of NMFS.

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	49,508	35,879	13,629
1988	60,863	43,308	17,555
1989	86,163	59,811	26,352
1990	94,796	46,411	48,385
1991	96,962	55,284	41,678
1992	82,965	42,198	40,767
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	43,872	27,012	16,860
1999	80,537	61,032	19,504
2000	86,565	56,905	29,660
2001	33,302	22,148	11,154
2002	53,761	49,191	4,569
2003	68,204	55,165	13,039
2004	38,845	18,036	20,809
2005	9,270	7,258	2,012
2006	29,222	23,217	6,005
2007	18,994	14,148	4,846
2008	**9,704**	**6,807**	**2,898**
Average	56,426	36,761	21,237
Standard Deviation	26,276	16,091	15,626

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 was 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 2008 by 88% and 98% respectively, while charter landings decreased by 7%. Total landings and non-charter landings are well above the 27-year average. Charter landings are slightly below the 27-year averages.

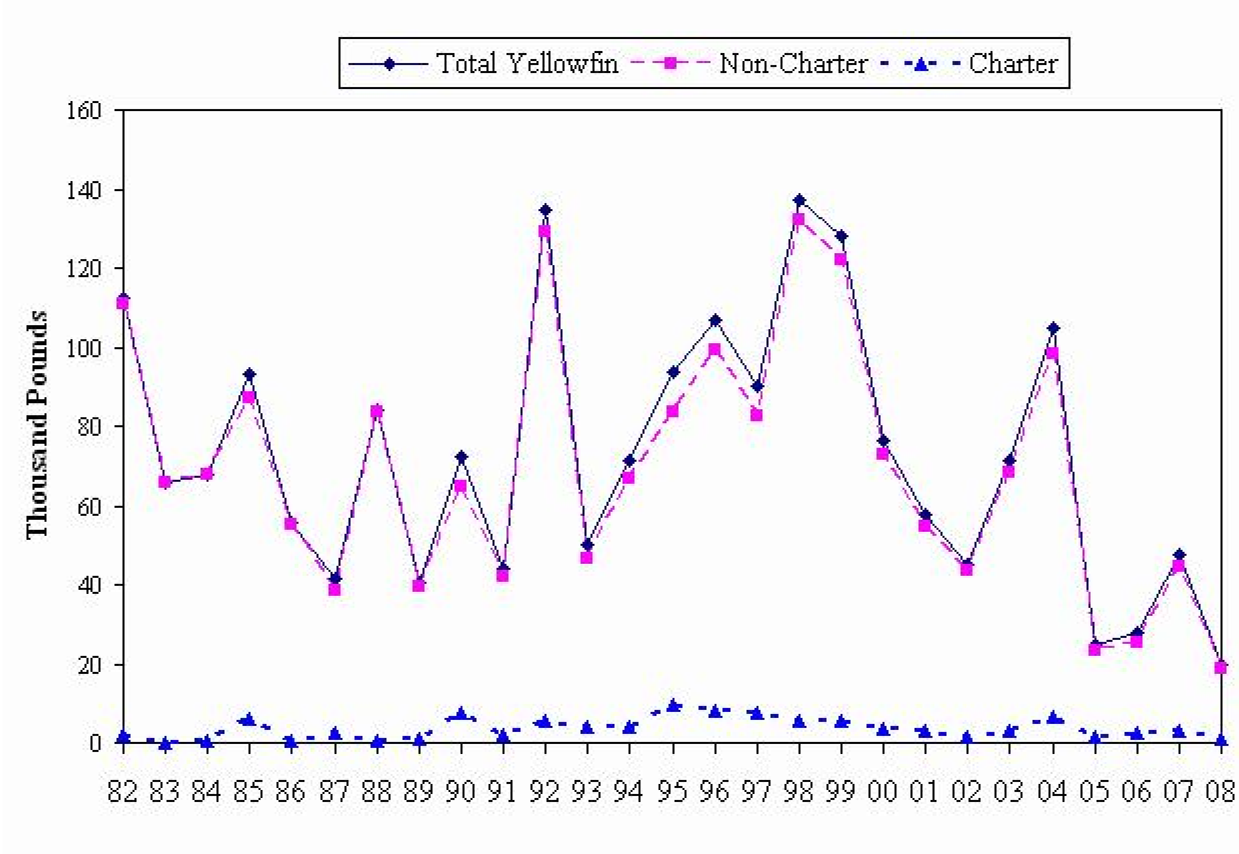
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files, expanded with the assistance of NMFS.

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	61,767	59,071	2,696
1988	210,185	197,415	12,770
1989	128,015	111,918	16,097
1990	149,312	128,747	20,566
1991	122,378	107,051	15,327
1992	123,903	104,981	18,922
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	201,666	173,948	27,718
1999	124,452	109,696	14,755
2000	267,541	238,304	29,237
2001	331,768	312,001	19,767
2002	176,356	163,504	12,852
2003	185,575	170,352	15,223
2004	168,232	146,841	21,391
2005	99,391	84,762	14,629
2006	146,658	126,042	20,616
2007	156,651	142,122	14,529
2008	**295,250**	**281,827**	**13,423**
Average	167,120	151,116	16,004
Standard Deviation	65,965	61,707	9,349

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



Interpretations: The overall yellowfin landings show wide fluctuations during the 27-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 down significantly in 2008, with total catch, non-charter catch, and charter catch up 58%, 58%, and 69%, respectively. Non-charter boats harvested 95% of the total yearly catch of yellowfin. All three categories are well below their 27-year averages.

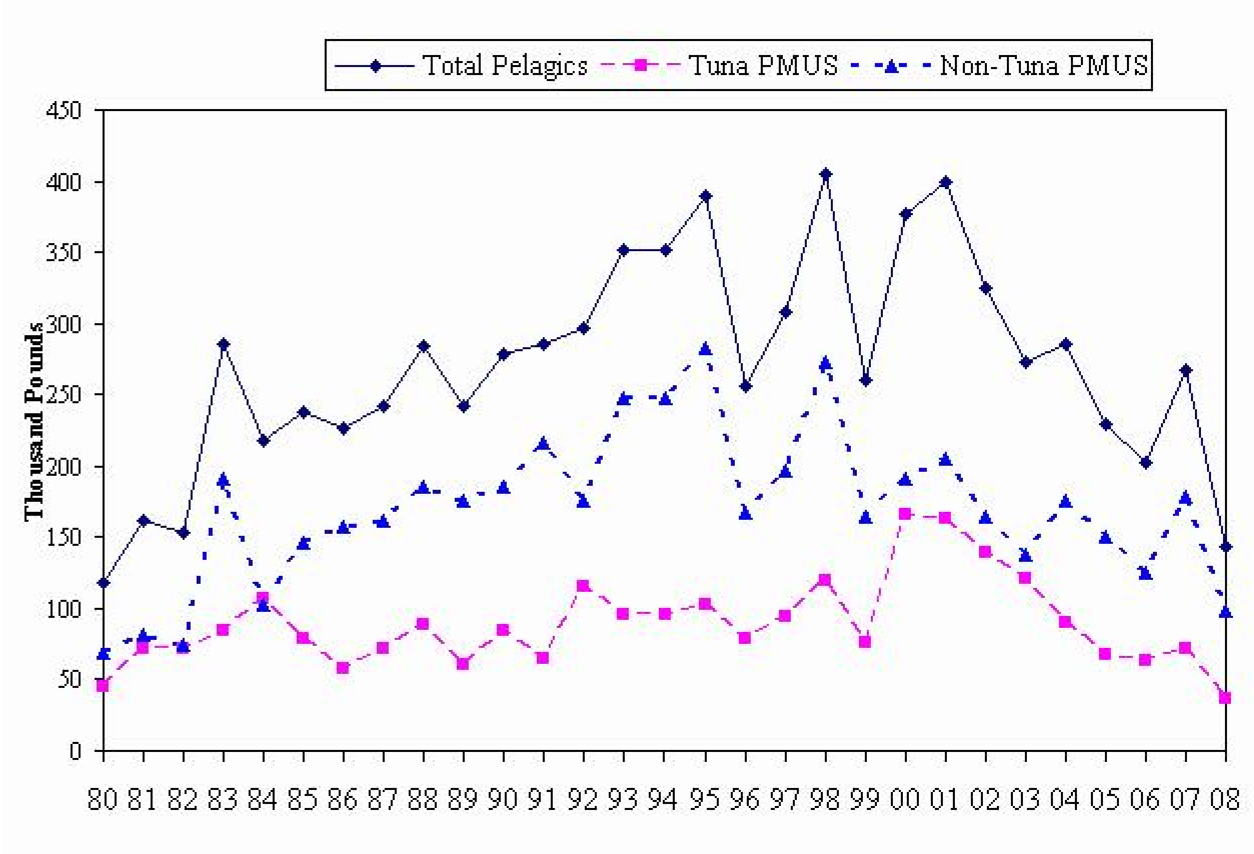
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files, expanded with the assistance of NMFS.

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	41,475	38,717	2,758
1988	84,102	83,537	565
1989	40,355	39,326	1,028
1990	72,314	64,782	7,532
1991	44,068	41,918	2,150
1992	134,653	128,941	5,712
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	137,392	132,039	5,354
1999	128,026	122,204	5,822
2000	76,606	72,905	3,702
2001	57,929	54,668	3,261
2002	45,089	43,336	1,753
2003	71,626	68,573	3,053
2004	104,845	98,145	6,700
2005	24,884	23,130	1,754
2006	28,049	25,419	2,630
2007	47,833	44,649	3,184
2008	**19,888**	**18,900**	**987**
Average	72,839	69,140	3,841
Standard Deviation	33,140	31,681	2,617

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 2007. Early in 2008, a vendor who provides a large part of DAWR’s commercial data opted to not share the data with DAWR. Thus, numbers are much lower, primarily due to a lack of data for the entire year. Percent changes were not calculated due to lack of data.

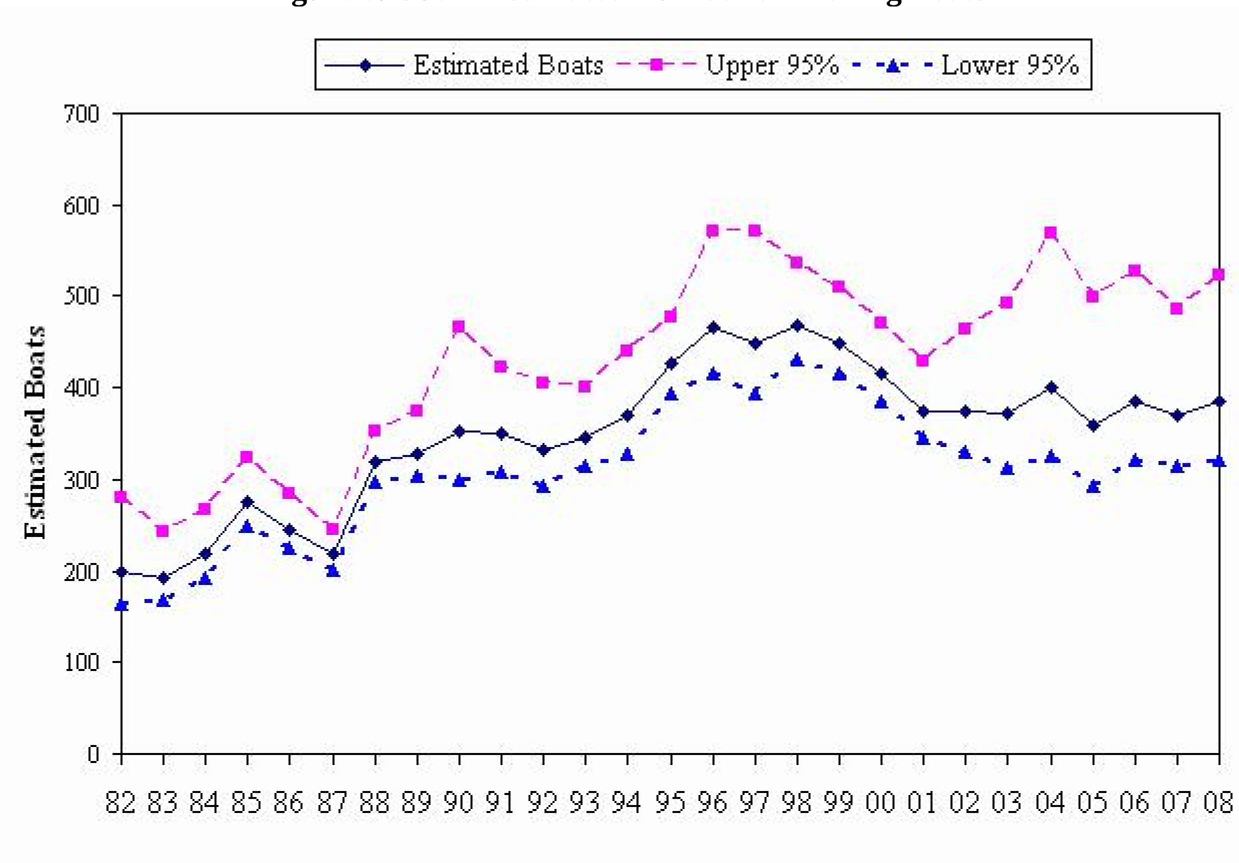
Source: The WPACFIN-sponsored commercial landings system.

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	255,281	78,636	166,702
1997	307,764	93,825	196,335
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	203,139	63,579	125,847
2007	266,964	72,271	178,660
2008	**144,110**	**36,009**	**98,207**
Average	270,894	88,993	170,027
Standard Deviation	75,093	31,131	54,075

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 2008, the number of boats was 385, an increase of 4% from 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.

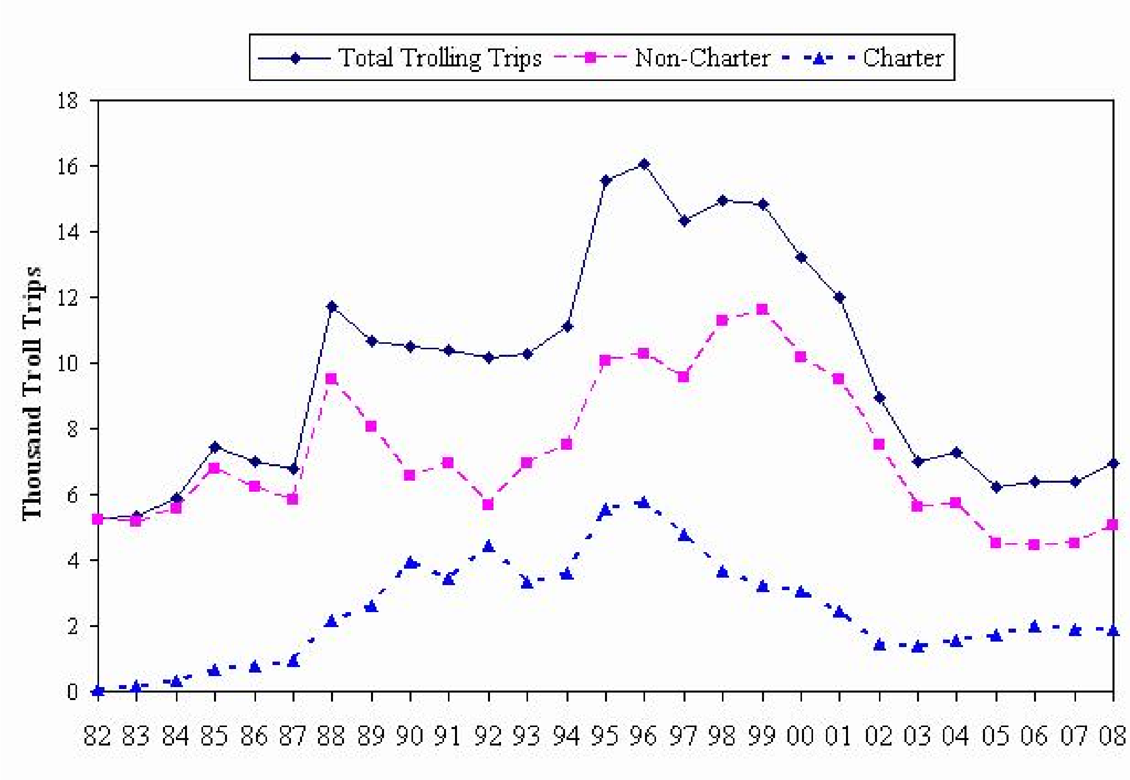
Calculation: Since only a fraction of the days of the year are sampled, it is not possible to know the exact number of boats participating in the fishery. The 2008 trolling boat log was converted and processed through a boat estimator model 1,000 times.

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
2007	370	485	315
2008	**385**	**523**	**322**

Year	Survey Days	Trips in Boat Log	Interviews
1982	46	393	363
1983	47	363	351
1984	54	486	365
1985	66	737	503
1986	49	629	382
1987	48	614	431
1988	51	1,032	698
1989	60	1,053	642
1990	60	1,097	804
1991	60	1,096	773
1992	60	1,170	843
1993	61	1,149	844
1994	69	1,224	878
1995	96	1,540	1,110
1996	96	1,542	1,147
1997	96	1,378	949
1998	96	1,477	1,051
1999	96	1,436	917
2000	96	1,338	854
2001	96	1,076	620
2002	84	730	396
2003	79	531	289
2004	96	714	367
2005	97	698	377
2006	96	763	413
2007	96	754	392
2008	**96**	**788**	**405**

**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 27-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 2008, the total number of troll trips increased by 8.8%, and the number of charter trips increased by .8%. The number of non-charter trips increased, by 12%. The increase in charter trips could be due to a decrease in the cost of fuel. All three categories are below the 27-year averages.

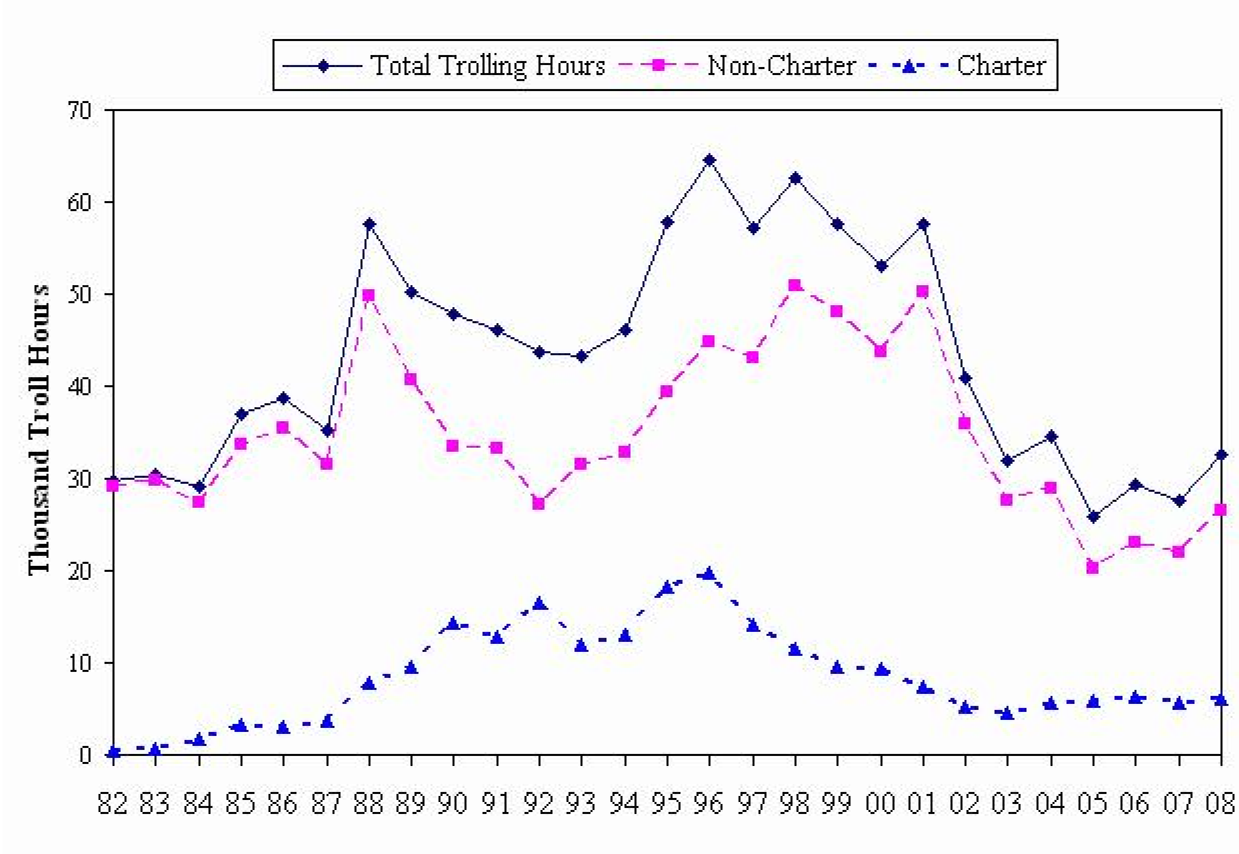
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files.

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	11,696	9,506	2,190
1989	10,660	8,049	2,612
1990	10,523	6,563	3,960
1991	10,408	6,950	3,459
1992	10,147	5,691	4,456
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	6,238	4,495	1,743
2006	6,414	4,440	1,973
2007	6,383	4,508	1,875
2008	**6,947**	**5,057**	**1,891**
Average	9,731	7,254	2,476
Standard Deviation	3,425	2,215	1,590

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 2008, total, non-charter, and charter totals increased by 18%, 21%, and 7%, respectively. The increase in hours trolling may be attributed to an decrease in the price of fuel. All three totals are below the 27-year average.

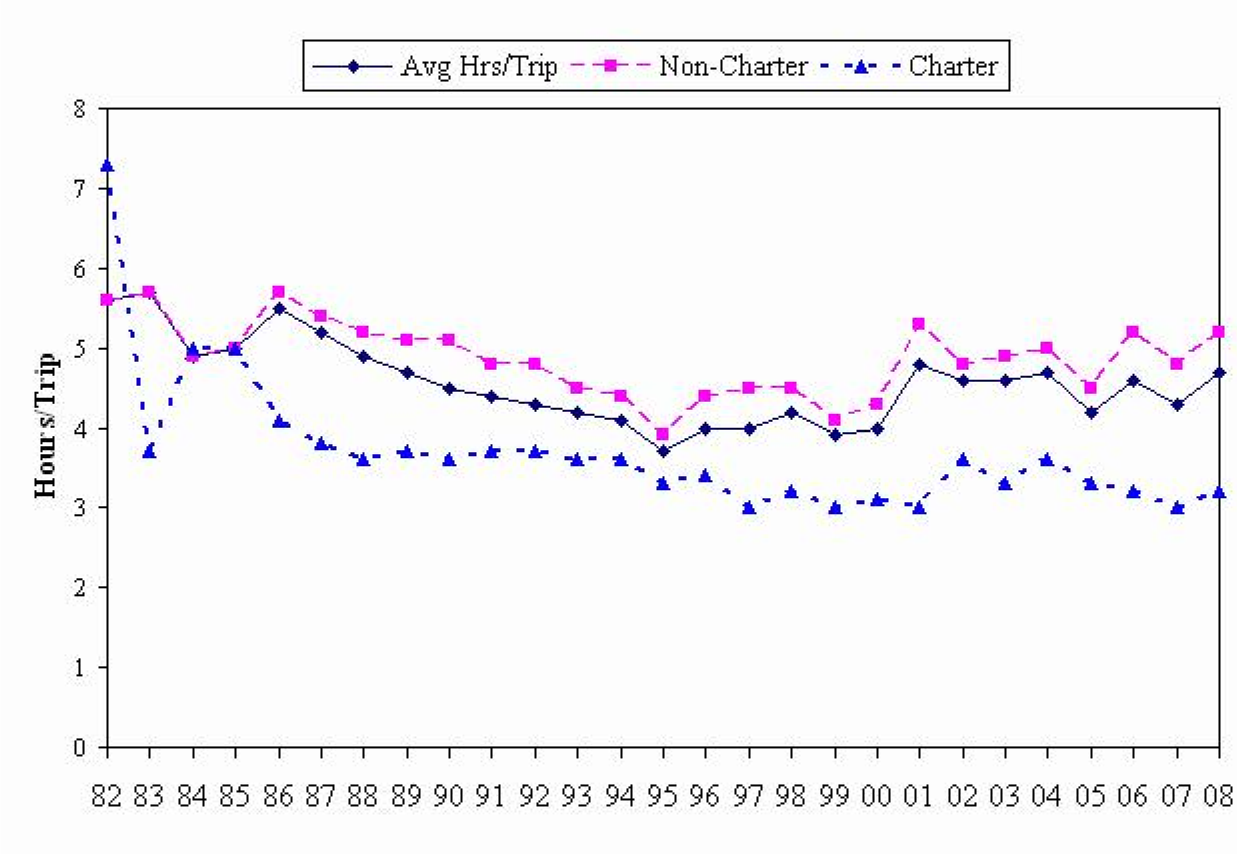
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files.

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	57,666	49,828	7,837
1989	50,220	40,685	9,535
1990	47,824	33,527	14,298
1991	46,166	33,368	12,798
1992	43,640	27,198	16,441
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	25,903	20,116	5,786
2006	29,250	22,987	6,263
2007	27,544	21,855	5,689
2008	**32,624**	**26,538**	**6,087**
Average	43,245	34,803	8,442
Standard Deviation	12,040	8,949	5,298

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



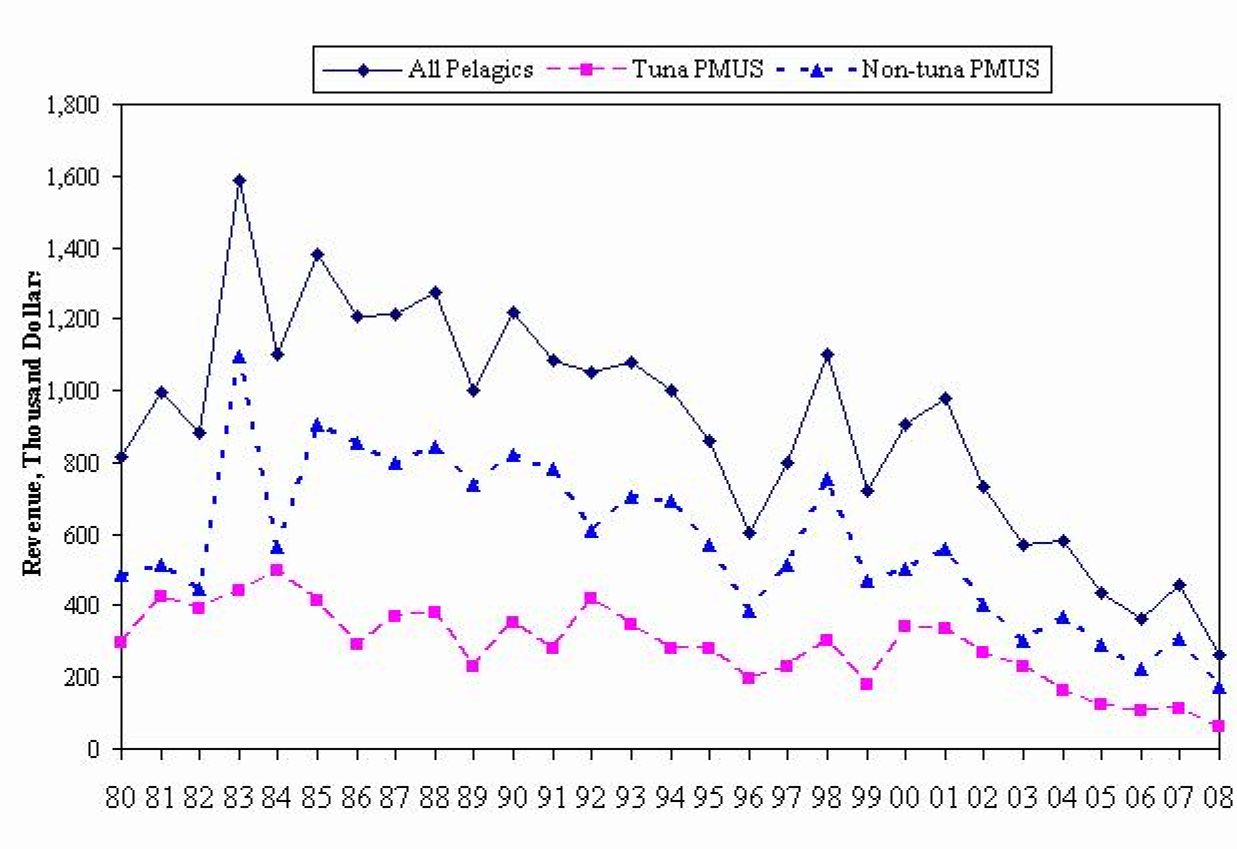
Interpretations: The overall average trolling trip increased slightly from 2007. The redeployment of fish aggregating devices (FADs) still provide charter boats and non-charter fishermen with a prescribed route for trolling activity, although many boats have been observed to be making longer trips to the banks located north and south of Guam. Overall trolling trip length appears to have remained fairly constant throughout the 27-year time series. In 2008, non-charter vessels showed a slight increase in average trip length, up 8%, while charter vessels also show a slight increase in the number of hours per trip, up 6%. This increase in trip length may be due to the redeployment of FADs, along with a decrease in the cost of fuel.
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	4.4	4.8	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	4.2	4.5	3.3
2006	4.6	5.2	3.2
2007	4.3	4.8	3.0
2008	**4.7**	**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 2008 decreased 46% for tuna PMUS, decreased 41% for total, and 43% 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 2008, with all three adjusted revenue categories well below the 29-year averages. The loss of the primary source of commercial data to DAWR precluded analysis of commercial landing data. The numbers shown are for a partial year.

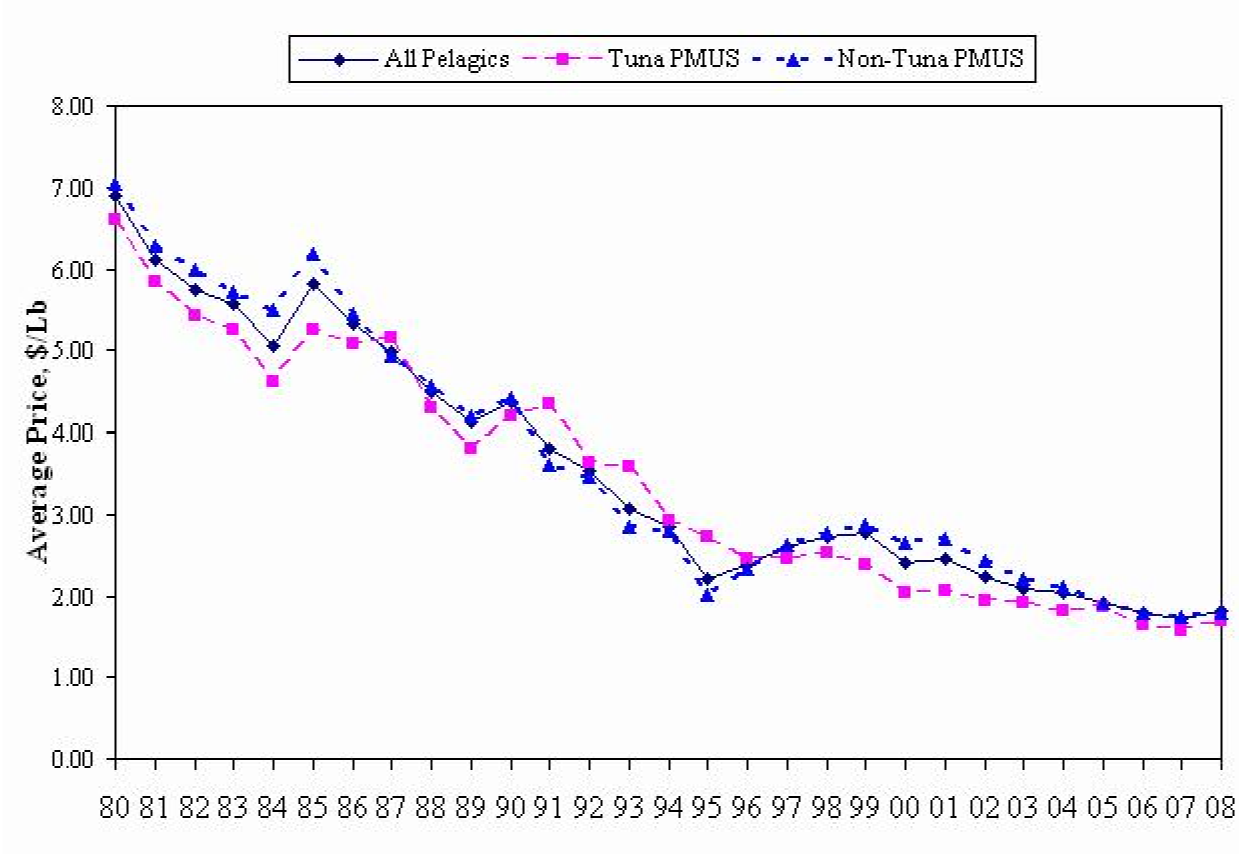
Source: The WPACFIN-sponsored commercial landings system.

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	816,453	54,353	297,580	88,775	486,045
1981	218,384	992,775	92,914	422,389	113,212	514,663
1982	203,847	881,436	90,719	392,269	103,459	447,356
1983	380,231	1,588,603	105,308	439,977	262,817	1,098,049
1984	286,490	1,100,981	129,389	497,243	146,339	562,383
1985	373,796	1,383,044	112,286	415,456	244,423	904,366
1986	334,955	1,206,508	81,299	292,840	237,826	856,650
1987	350,828	1,210,356	107,642	371,365	231,451	798,505
1988	388,630	1,273,928	115,243	377,768	258,203	846,391
1989	337,586	997,904	76,865	227,214	249,421	737,287
1990	471,241	1,219,573	136,321	352,798	316,491	819,078
1991	462,191	1,085,223	119,640	280,915	333,096	782,109
1992	492,707	1,050,452	195,547	416,905	284,546	606,653
1993	547,835	1,078,140	175,360	345,109	358,592	705,709
1994	593,838	999,430	165,296	278,193	411,832	693,113
1995	537,889	859,547	173,629	277,460	356,256	569,297
1996	398,375	606,327	127,375	193,865	254,063	386,684
1997	534,352	797,788	154,819	231,145	344,972	515,043
1998	733,101	1,101,851	201,639	303,063	502,801	755,711
1999	489,605	722,657	122,023	180,107	319,342	471,349
2000	626,803	906,983	234,735	339,662	349,312	505,455
2001	667,648	979,439	228,652	335,432	379,174	556,248
2002	500,777	730,132	184,705	269,300	274,929	400,847
2003	399,989	567,584	163,423	231,897	214,143	303,869
2004	432,735	578,999	122,098	163,367	277,544	371,354
2005	353,131	438,588	100,720	125,095	232,336	288,561
2006	324,686	361,700	94,040	104,761	202,560	225,652
2007	437,861	456,689	109,201	113,897	296,385	309,129
2008	**260,474**	**260,474**	**61,360**	**61,360**	**174,973**	**174,973**
Average	423,762	905,295	132,297	287,532	269,630	575,604
Standard Deviation	138,712	317,965	47,420	110,987	93,657	226,907

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 2008, the adjusted price for all pelagics increased 6%, 7.5% for tuna PMUS, and 2.8% for non-tuna PMUS species. All three prices are near 50% of their 29 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.

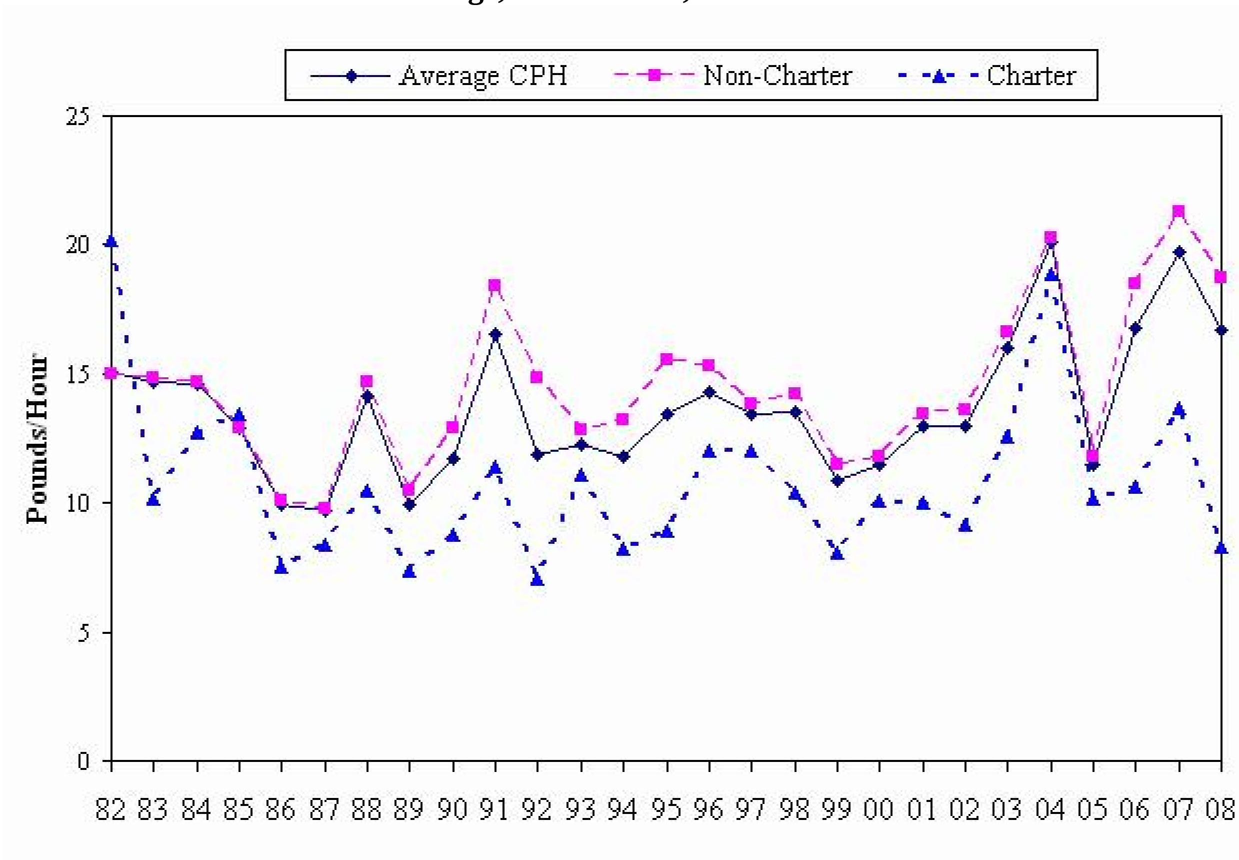
Source: The WPACFIN-sponsored commercial landings system.

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	6.90	1.21	6.61	1.29	7.04
1981	1.35	6.12	1.29	5.85	1.38	6.29
1982	1.33	5.74	1.25	5.42	1.38	5.98
1983	1.33	5.57	1.26	5.25	1.37	5.73
1984	1.31	5.05	1.20	4.62	1.43	5.49
1985	1.57	5.82	1.42	5.26	1.67	6.17
1986	1.48	5.34	1.41	5.08	1.51	5.44
1987	1.45	4.99	1.49	5.16	1.43	4.94
1988	1.37	4.48	1.31	4.29	1.39	4.56
1989	1.39	4.11	1.28	3.80	1.42	4.20
1990	1.69	4.37	1.62	4.19	1.70	4.41
1991	1.62	3.80	1.85	4.34	1.54	3.61
1992	1.66	3.54	1.70	3.63	1.62	3.45
1993	1.56	3.07	1.82	3.58	1.45	2.84
1994	1.69	2.85	1.73	2.92	1.67	2.81
1995	1.38	2.20	1.70	2.71	1.26	2.02
1996	1.56	2.38	1.62	2.47	1.52	2.32
1997	1.74	2.59	1.65	2.46	1.76	2.62
1998	1.81	2.72	1.68	2.52	1.84	2.77
1999	1.88	2.77	1.62	2.39	1.95	2.87
2000	1.67	2.41	1.41	2.05	1.83	2.65
2001	1.67	2.45	1.40	2.05	1.84	2.70
2002	1.54	2.24	1.33	1.94	1.67	2.43
2003	1.47	2.08	1.35	1.91	1.55	2.20
2004	1.52	2.03	1.36	1.83	1.58	2.11
2005	1.54	1.92	1.51	1.87	1.54	1.91
2006	1.60	1.78	1.48	1.65	1.61	1.79
2007	1.64	1.71	1.51	1.58	1.66	1.73
2008	**1.81**	**1.81**	**1.70**	**1.70**	**1.78**	**1.78**
Average	1.55	3.55	1.49	3.42	1.57	3.62
Standard Deviation	0.16	1.56	0.19	1.51	0.18	1.63

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 2008, total overall, non-charter, and charter trolling catch rate decreased 15%, 12%, and 39%, 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.

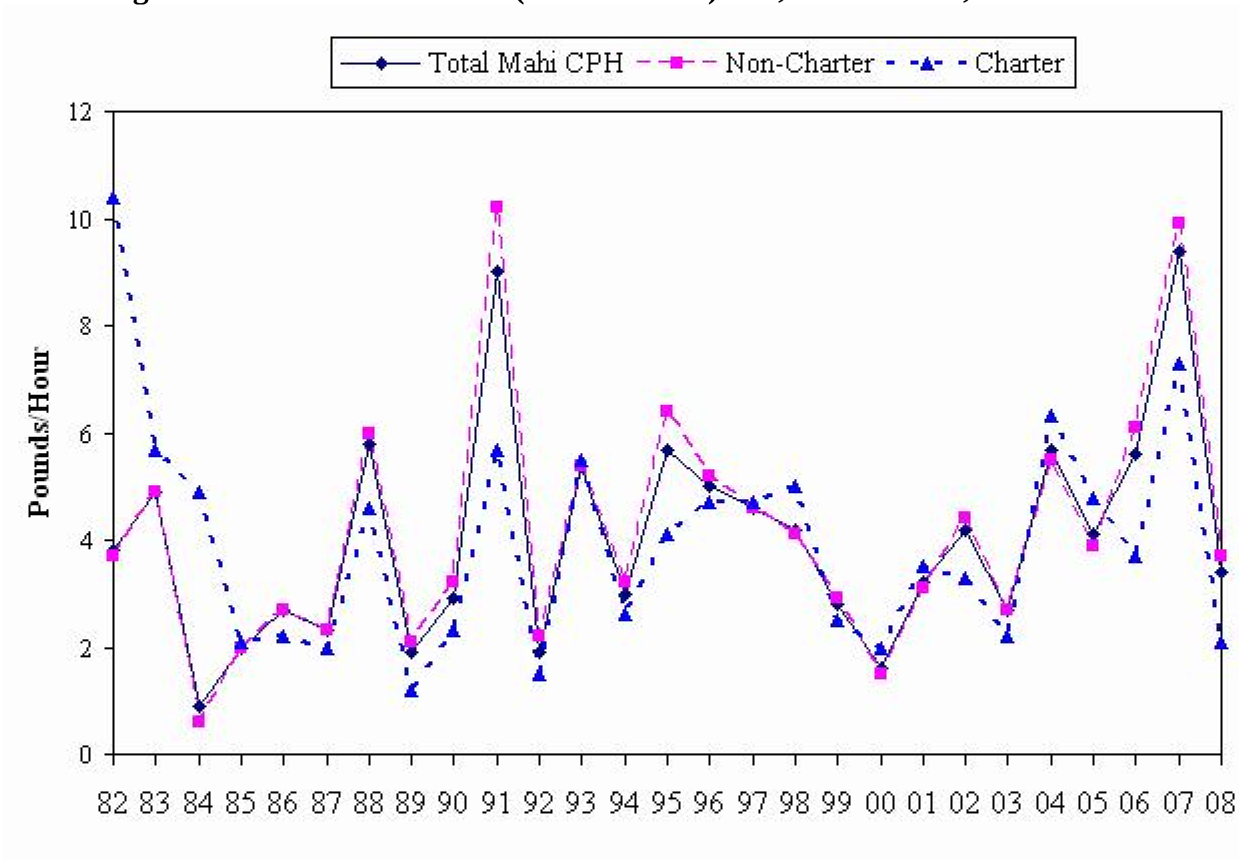
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files.

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	9.7	9.8	8.4
1988	14.1	14.7	10.5
1989	9.9	10.5	7.4
1990	11.7	12.9	8.8
1991	16.5	18.4	11.4
1992	11.9	14.8	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	10.0
2002	13.0	13.6	9.2
2003	16.0	16.6	12.6
2004	20.1	20.3	18.9
2005	11.5	11.8	10.2
2006	16.8	18.5	10.6
2007	19.7	21.3	13.7
2008	**16.7**	**18.7**	**8.3**
Average	13.7	14.5	10.8
Standard Deviation	2.7	3.0	3.1

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 2008, the catch rate for total and non-charter mahimahi decreased 64%, and 63%, while charter CPUE decreased by 71%. All three categories were well below their 27 year averages.

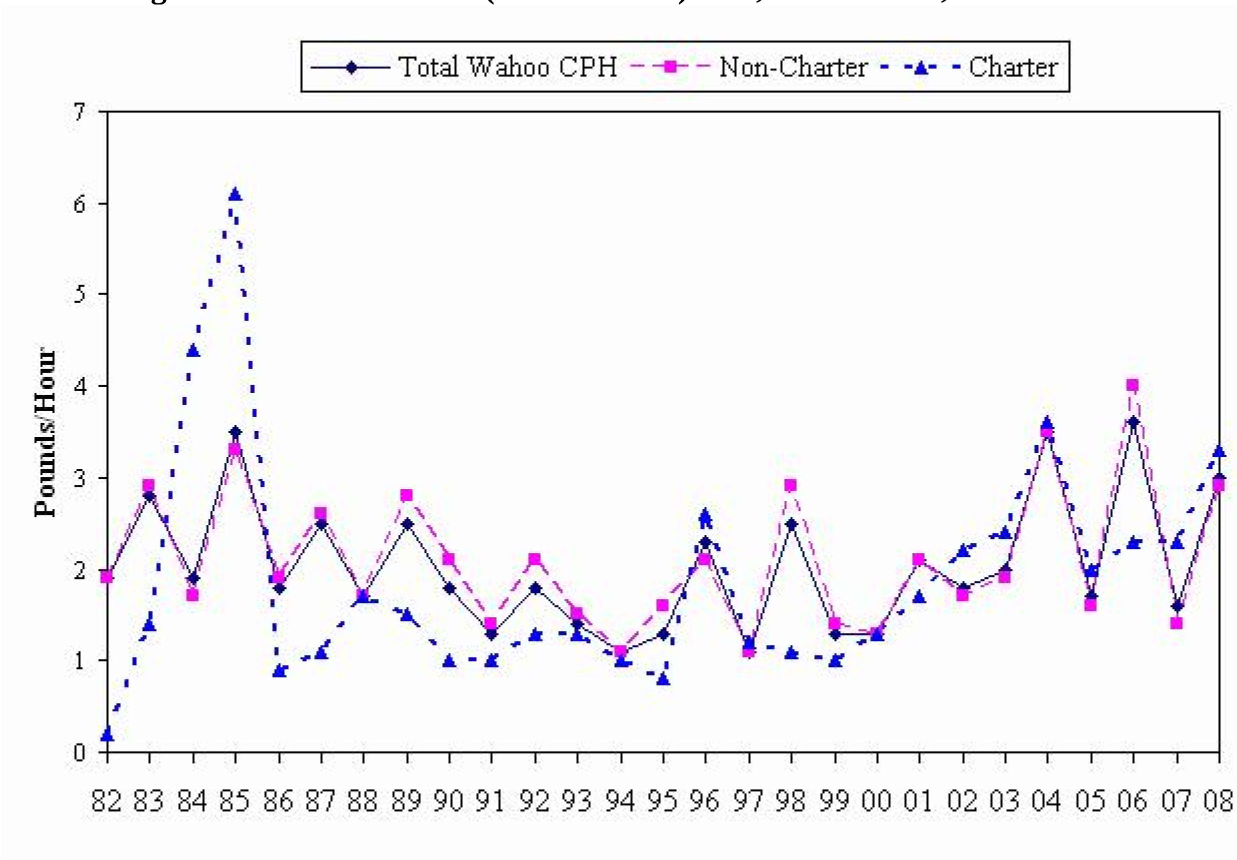
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files.

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 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	5.8	6.0	4.6
1989	1.9	2.1	1.2
1990	2.9	3.2	2.3
1991	9.0	10.2	5.7
1992	1.9	2.2	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	4.4	3.3
2003	2.7	2.7	2.2
2004	5.7	5.5	6.3
2005	4.1	3.9	4.8
2006	5.6	6.1	3.7
2007	9.4	9.9	7.3
2008	**3.4**	**3.7**	**2.1**
Average	4.0	4.2	4.0
Standard Deviation	2.0	2.3	2.1

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. Total wahoo CPUE increased by 87.5%, with non-charter CPUE increasing by 107%. Charter CPUE increased by 43%.

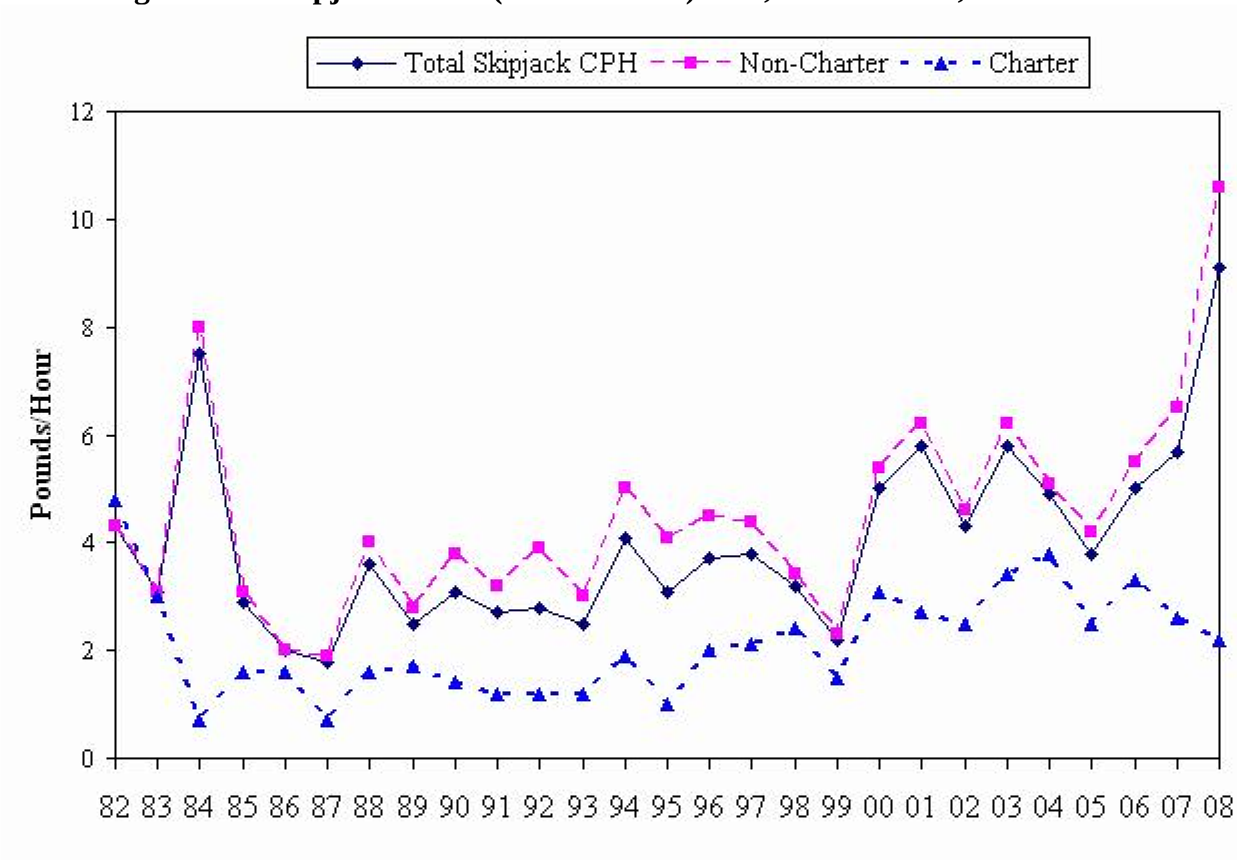
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files.

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	1.8	2.1	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	1.8	1.7	2.2
2003	2.0	1.9	2.4
2004	3.5	3.5	3.6
2005	1.7	1.6	2.0
2006	3.6	4.0	2.3
2007	1.6	1.4	2.3
2008	**3.0**	**2.9**	**3.3**
Average	2.0	2.1	1.9
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 2008, the catch rates for total and non-charter increased by 60% and 63%, respectively. Charter rates decreased 15% in 2008. All three categories were above their 27-year averages.

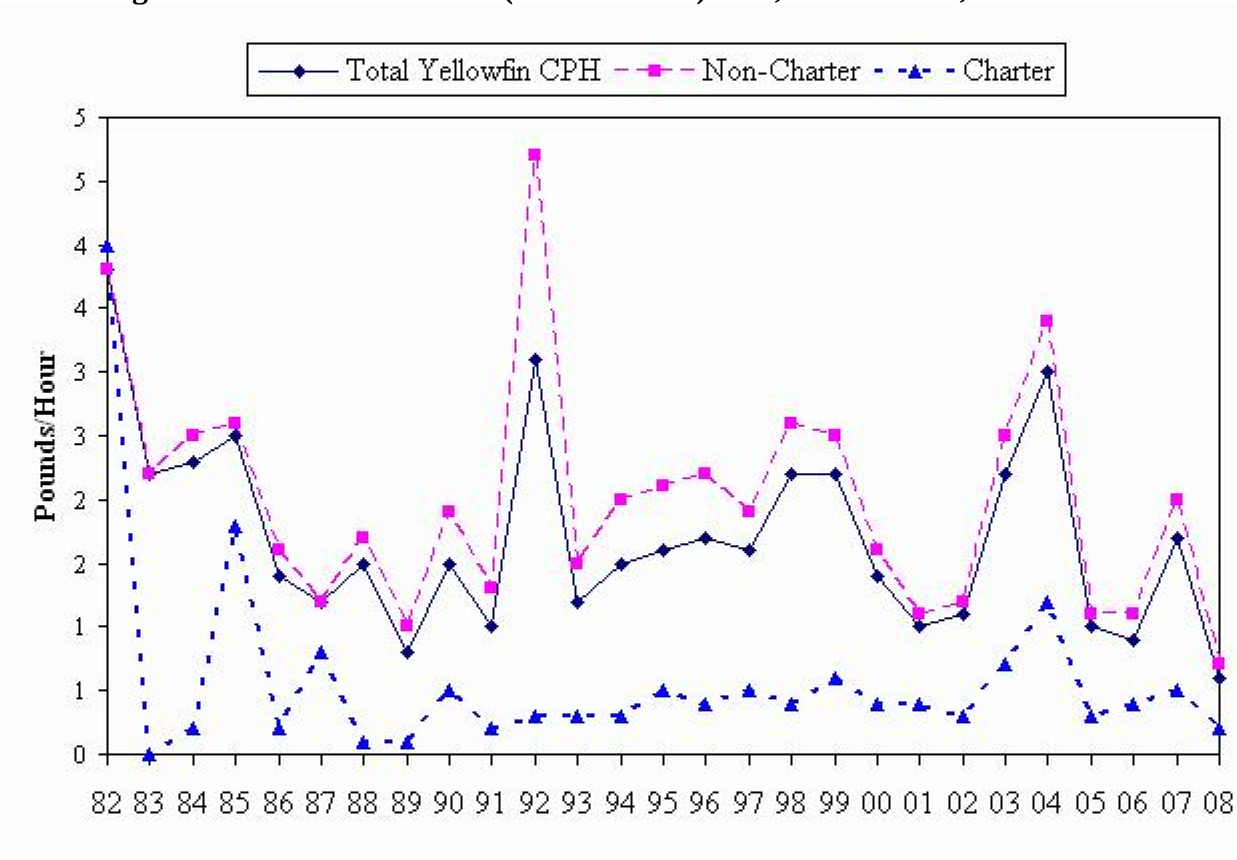
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files, expanded with the assistance of NMFS.

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	4.0	1.6
1989	2.5	2.8	1.7
1990	3.1	3.8	1.4
1991	2.7	3.2	1.2
1992	2.8	3.9	1.2
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	2.2	2.3	1.5
2000	5.0	5.4	3.1
2001	5.8	6.2	2.7
2002	4.3	4.6	2.5
2003	5.8	6.2	3.4
2004	4.9	5.1	3.8
2005	3.8	4.2	2.5
2006	5.0	5.5	3.3
2007	5.7	6.5	2.6
2008	**9.1**	**10.6**	**2.2**
Average	4.0	4.5	2.1
Standard Deviation	1.7	1.9	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 2008, the yellowfin catch rates for total, non-charter, and charter catch decreased by 64%, 65%, and 60%, respectively. All three categories are well below their 27-year averages.

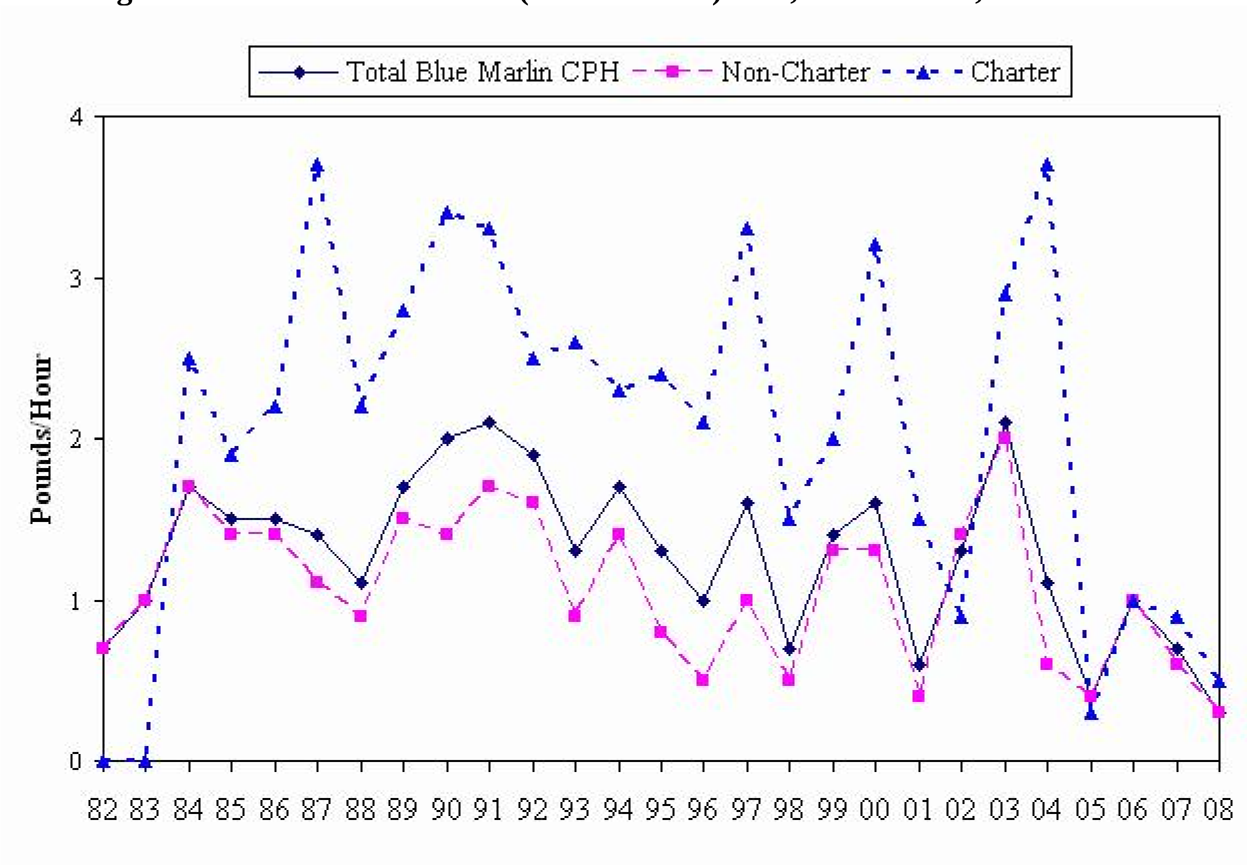
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files, expanded with the assistance of NMFS.

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	3.1	4.7	0.3
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	2.5	0.7
2004	3.0	3.4	1.2
2005	1.0	1.1	0.3
2006	0.9	1.1	0.4
2007	1.7	2.0	0.5
2008	**0.6**	**0.7**	**0.2**
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 2008 blue marlin catch rates decreased for total and non-charter by 43% and 50%, respectively. Charter blue marlin catch rate decreased by 44%. All three levels are below the 27 year averages.

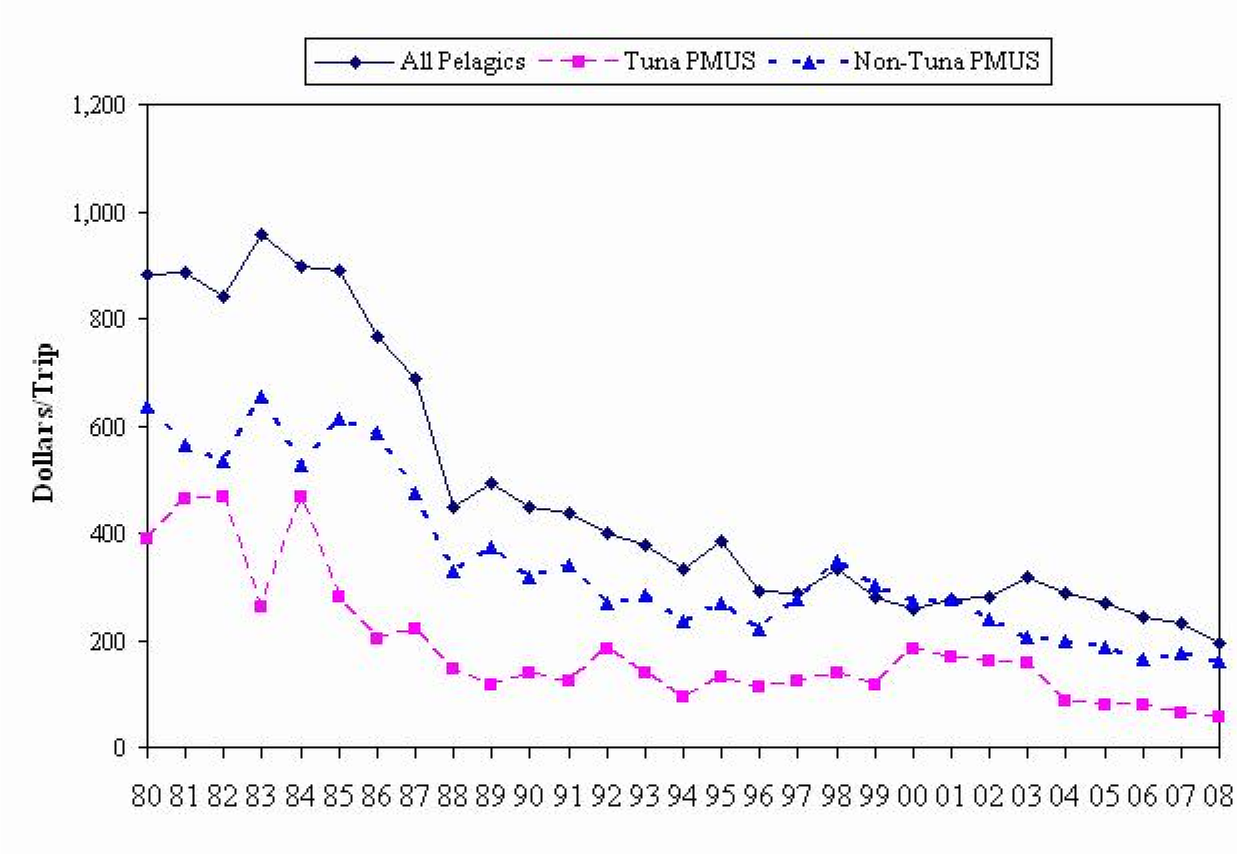
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files, expanded with the assistance of NMFS.

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 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	1.1	3.7
1988	1.1	0.9	2.2
1989	1.7	1.5	2.8
1990	2.0	1.4	3.4
1991	2.1	1.7	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	2.0
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
2007	0.7	0.6	0.9
2008	**0.3**	**0.3**	**0.5**
Average	1.3	1.1	2.2
Standard Deviation	0.5	0.5	1.0

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 rate of decline has lessened over the past 10 years. In 2008, the adjusted revenue per trip decreased for all pelagics by 15%. Tuna PMUS revenues decreased by 13%, and non-tuna PMUS decreased by 8.6%. Despite continued 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. The commercial data is given with the warning that this only a partial year worth of data. The loss of the primary vendor providing commercial data reduces the reliability of this data

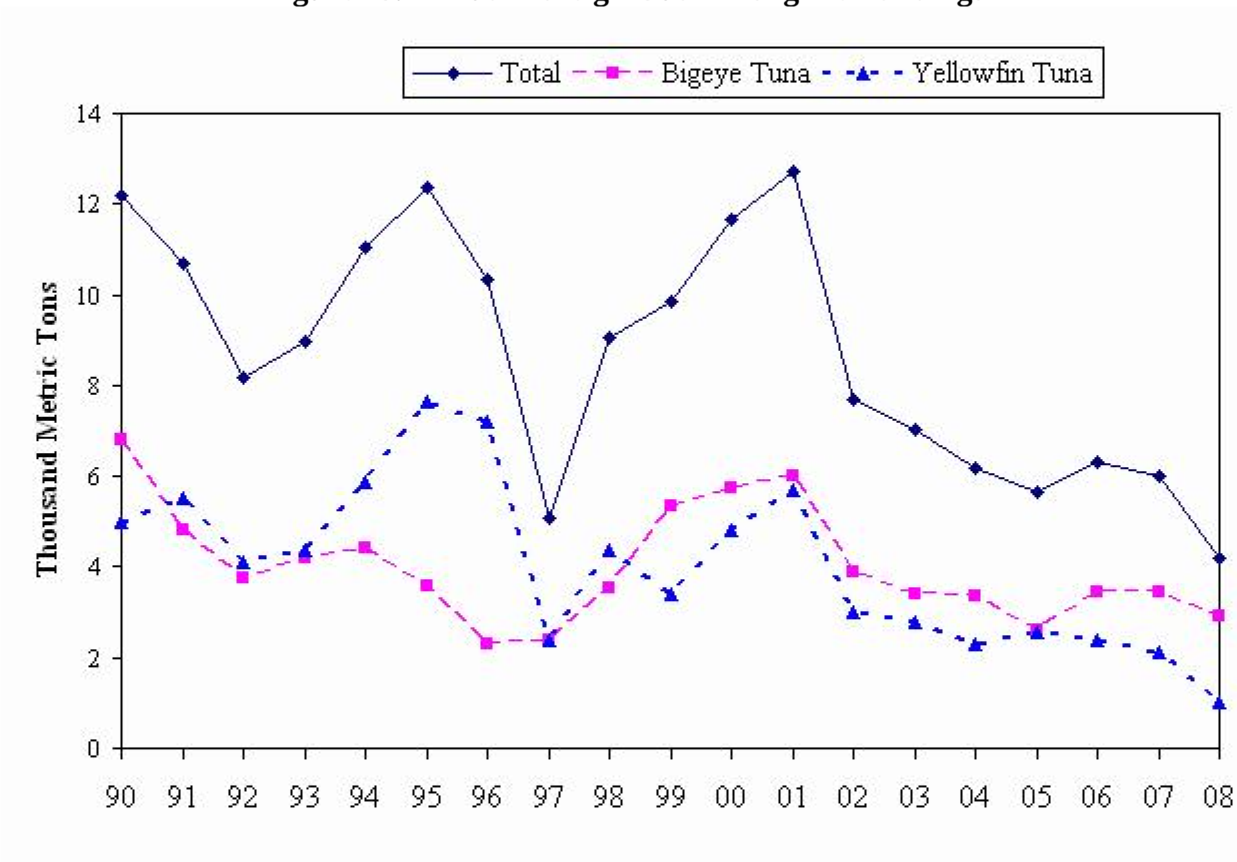
Source: The WPacFIN-sponsored commercial landings system.

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	883.17	71.14	389.49	116.20	636.20
1981	195.29	887.79	102.24	464.78	124.58	566.34
1982	194.29	840.11	108.45	468.94	123.68	534.79
1983	229.26	957.85	62.81	262.42	156.75	654.90
1984	233.01	895.46	121.56	467.16	137.48	528.34
1985	240.34	889.26	76.21	281.98	165.90	613.83
1986	212.25	764.52	55.68	200.56	162.89	586.73
1987	199.18	687.17	64.07	221.04	137.77	475.31
1988	137.30	450.07	44.98	147.44	100.78	330.36
1989	166.79	493.03	38.89	114.96	126.20	373.05
1990	172.68	446.90	53.19	137.66	123.50	319.62
1991	185.96	436.63	51.79	121.60	144.20	338.58
1992	188.33	401.52	86.72	184.89	126.18	269.02
1993	191.92	377.70	70.60	138.94	144.36	284.10
1994	197.09	331.70	56.32	94.79	140.32	236.16
1995	239.79	383.18	82.55	131.91	169.38	270.67
1996	191.10	290.85	72.55	110.42	144.71	220.25
1997	192.95	288.07	82.74	123.53	184.35	275.23
1998	221.01	332.18	92.81	139.49	231.44	347.85
1999	190.05	280.51	78.35	115.64	205.04	302.64
2000	179.42	259.62	127.01	183.78	189.00	273.48
2001	188.68	276.79	113.92	167.12	188.92	277.15
2002	193.42	282.01	109.41	159.52	162.85	237.44
2003	223.73	317.47	110.95	157.44	145.38	206.29
2004	215.10	287.80	65.56	87.72	149.03	199.40
2005	216.34	268.69	64.62	80.26	149.05	185.12
2006	219.47	244.49	68.83	76.68	148.26	165.16
2007	221.40	230.92	61.56	64.21	167.09	174.27
2008	**196.13**	**196.13**	**55.86**	**55.86**	**159.29**	**159.29**
Average	199.78	471.78	77.63	184.49	152.57	346.26
Standard Deviation	24.07	251.45	24.01	120.16	28.24	155.97

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 2007, the 2008 total longline landings decreased 30%, with bigeye landings decreasing 15%. Yellowfin landings decreased in 2008, down 52%.

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
2007	5,991	3,439	2,134
2008	4,215	2,926	1,014
Average	8,696	3,995	4,031
Standard Deviation	2,689	1,243	1,819

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 ***	**Interview with Bycatch**	**Total Number of Interview**	**Percent of Interview 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
2007								
2008	1	0	1	3,495	.02	1	98	1.02

*”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 31.5 million pounds worth about $80.8 million (ex-vessel revenue) in 2008. The longline fishery was the largest of all commercial pelagic fisheries in Hawaii and represented 85% of the total commercial pelagic landings and 89% of the ex-vessel revenue. The MHI troll accounted for 9% and 7% 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 61% of the total in 2008. Bigeye tuna alone accounted for 71% of the tunas and 43% of all pelagic landings. Billfish landings made up 22% of the total landings in 2008. Swordfish was the largest of these, at 61% of the billfish and 14% of the total landings. Landings of other pelagic management unit species (PMUS) represented 33% of the total landings in 2008. Mahimahi was the largest component of other pelagic landings at 27% and 4% of the total 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.

<u>The Hawaii-based Longline Fishery:</u> 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 average weight per fish from the market sample data to estimate total landings. The estimated

[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.

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 Survey (MRFSS) has reinitiated operations in Hawaii after a 20-year absence with the first full

[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.

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 3,205 fishermen were licensed in 2008, including 2,090 (65%) 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 (67%) and longline fishermen (24%). The remainder was issued to ika shibi and palu ahi (handline) (7%) and aku boat fishers (1).

	Number of licensees	
Primary Fishing Method	**2007**	**2008**
Trolling	1,399	1,404
Longline	606	512
Ika Shibi & Palu Ahi	131	152
Aku Boat (Pole and Line)	28	22
Total Pelagic	2,164	2,090
Total All Methods	3,150	3,205

Plan Team Recommendations

2008 Recommendations

- The Pelagic Plan Team recommends that the International Module include a table showing the annual catches by weight for species caught by the US longline fishery as submitted to the Inter-American Tropical Tuna Commission (IATTC) and Western & Central Pacific Fisheries Commission (WCPFC).

- The Pelagic Plan Team recommends that the Hawaii module incorporate the catch rate, lbs/hr, for trolling and handline in addition to lbs/trip for years 2003 and thereafter.

- The Pelagic Plan Team made no recommendation on management measures for the Cross Seamount mixed gear pelagic fishery, other than to note that it had previously questioned the need for management in a fishery which was so clearly in decline. The Pelagic Plan Team did, however, recommend that the seamount monchong, *Eumigistes illustris*, be maintained in the Pelagics Fishery Ecosystem Plan Management Unit.

Table 1. Hawaii commercial pelagic landings, revenue, and average price by species, 2007-2008.

	2007			2008		
Species	**Pounds landed (x 1000)**	**Ex-vessel revenue ($1000)**	**Average price ($/lb)**	**Pounds landed (x 1000)**	**Ex-vessel revenue ($1000)**	**Average price ($/lb)**
Tuna PMUS						
Albacore	769	$1,180	$1.60	873	$1,344	$1.67
Bigeye tuna	13,777	$43,768	$3.40	13,511	$49,675	$3.71
Bluefin tuna	1	$0	-	2	$0	-
Skipjack tuna	1,011	$835	$1.14	1,266	$1,189	$1.31
Yellowfin tuna	3,540	$7,553	$2.23	3,478	$8,640	$2.70
Tuna PMUS subtotal	**19,098**	**$53,336**	**$3.03**	**19,148**	**$60,848**	**$3.33**
Billfish PMUS						
Swordfish	3,796	$8,056	$2.12	4,303	$7,172	$1.87
Blue marlin	845	$953	$1.27	1,142	$1,019	$1.11
Striped marlin	637	$1,156	$1.86	1,023	$1,048	$1.02
Other marlins	379	$394	$1.13	567	$375	$0.71
Billfish PMUS subtotal	**5,657**	**$10,559**	**$1.97**	**7,036**	**$9,614**	**$1.79**
Other PMUS						
Mahimahi	1,670	$3,633	$2.62	1,416	$3,174	$2.54
Ono (wahoo)	856	$2,177	$3.04	964	$2,225	$2.62
Opah (moonfish)	1,223	$2,235	$1.85	1,335	$2,167	$1.68
Oilfish	458	$1,063	$2.32	490	$917	$1.87
Pomfrets	618	$1,523	$2.57	673	$1,662	$2.48
Sharks (whole weight)	418	$201	$0.56	416	$150	$0.44
Other PMUS subtotal	**5,243**	**$10,832**	**$2.29**	**5,294**	**$10,295**	**$2.10**
Other pelagics	42	$50	$1.64	31	$38	$1.08
Total pelagics	**30,040**	**$74,777**	**$2.70**	**31,509**	**$80,795**	**$2.75**

Interpretation: The total commercial pelagic landings in 2008 were 31.5 million pounds, up 5% (=1.5 million pounds) from 2007. Tunas represented 61% of the total landings. Bigeye tuna was the largest component of the tuna ladings at 13.5 million pounds in 2008, down slightly from previous year. Bigeye tuna was the largest component of the landings (43%). Swordfish (14%) was the next largest, followed by yellowfin tuna (11%).

Total Hawaii commercial ex-vessel revenue ($80.8 million) increased by 8% in 2008. Tunas comprised 75% of this total. Bigeye tuna alone accounted for 61% of the total revenue at $49.7 million. Yellowfin tuna revenue increased 14% to $7.6 million. Billfish revenue ($9.6 million) decreased by 9% due to lower swordfish revenue. Swordfish was the third highest contributor to total revenue at $7.2 million. Revenue of other PMUS species decreased modestly (down 5%) in 2008. The total pelagic fish price increased slightly in 2008. Average prices for tuna increased by and other PMUS increased by 10% while while the average price for billfish and other PMUS both decreased by 9% in 2008.

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, 2007-2008.

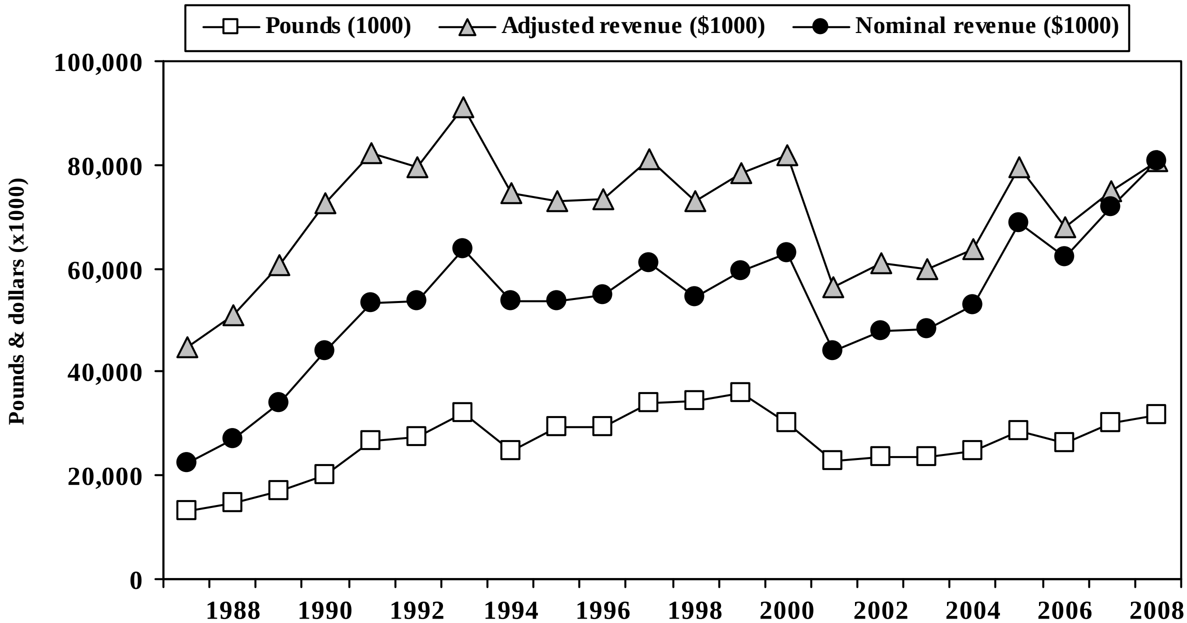
	2007			2008		
Fishery	**Pounds landed (x 1000)**	**Ex-vessel revenue ($1000)**	**Average price ($/lb)**	**Pounds landed (x 1000)**	**Ex-vessel revenue ($1000)**	**Average price ($/lb)**
Longline	24,700	$65,400	$2.79	26,681	$71,900	$2.82
MHI trolling	2,813	$5,643	$2.59	2,902	$5,470	$2.41
MHI handline	980	$1,658	$2.01	680	$1,480	$2.44
Offshore handline	589	$829	$2.12	267	$550	$2.24
Aku boat	654	$700	$1.09	700	$960	$1.24
Other gear	304	$547	$2.25	279	$435	$2.38
Total	**30,040**	**$74,777**	**$2.70**	**31,509**	**$80,795**	**$2.75**

Interpretation: The longline fishery is the largest commercial fishery in Hawaii. Longline landings and revenue were 26.7 million pounds and $71.9 million, respectively, in 2008. Landings increased by 2 million pounds while revenue increased by $6.5 million. The average price for the longline fishery in 2008 was about the same as the previous year. The MHI troll fishery is the second largest commercial fishery. It produced 2.9 million pounds worth $5.5 million in 2008. Landings and revenue for this fishery in 2008 were close to the previous year. The MHI handline fishery produced 680,000 pounds of pelagic landings worth $1.5 million while the offshore handline fishery total landings were 267,000 pounds worth $550,000 in 2008. Aku boat fishery landings and revenue were up 7% and 37%, respectively in 2008.

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, 1987-2008.



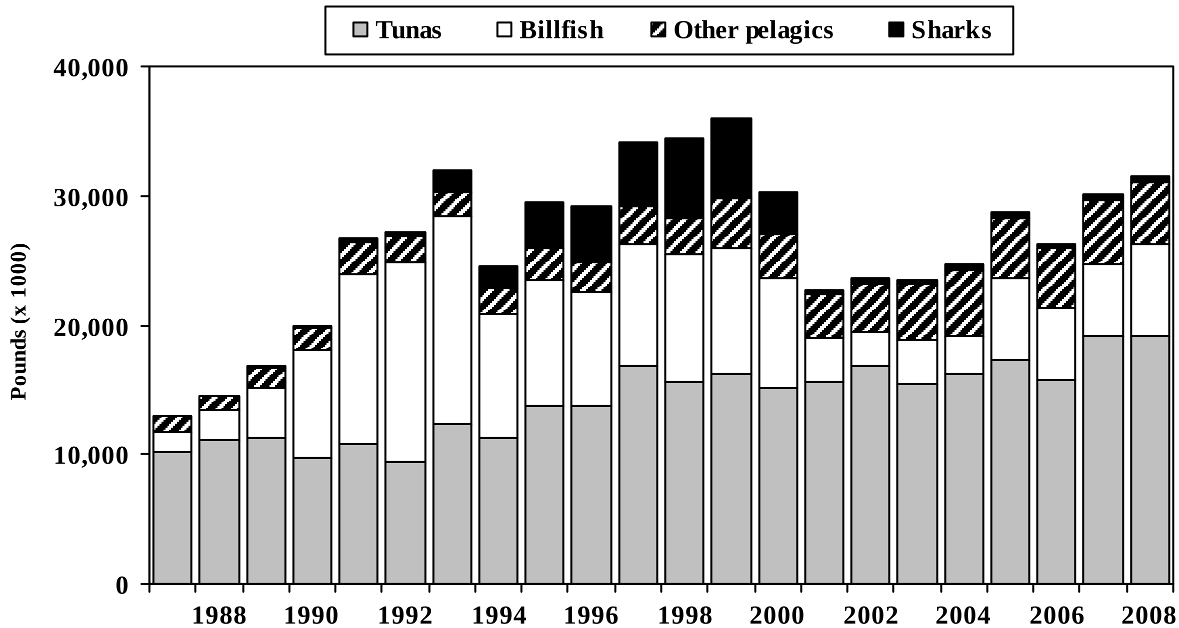
Interpretation: Commercial landings and revenue in 2008 were both above their respective long-term averages. The landings increased by 1.5 million pounds while revenue increased by $9 million in 2008. Gear and species specific changes over the 22-year period are explained in greater detail in the following 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.

Hawaii pelagic landings and revenue

Year	Pounds (1000)	Nominal revenue ($1000)	Adjusted revenue ($1000)	Honolulu CPI
1987	13,025	$22,493	$44,810	114.9
1988	14,569	$27,090	$50,952	121.7
1989	16,860	$34,166	$60,766	128.7
1990	19,933	$43,850	$72,681	138.1
1991	26,664	$53,170	$82,234	148.0
1992	27,252	$53,810	$79,414	155.1
1993	31,931	$63,680	$91,045	160.1
1994	24,569	$53,610	$74,598	164.5
1995	29,437	$53,720	$73,150	168.1
1996	29,157	$54,710	$73,363	170.7
1997	34,165	$60,840	$81,014	171.9
1998	34,473	$54,628	$72,912	171.5
1999	36,004	$59,320	$78,352	173.3
2000	30,299	$63,025	$81,829	176.3
2001	22,778	$43,896	$56,322	178.4
2002	23,592	$48,035	$60,983	180.3
2003	23,460	$48,299	$59,922	184.5
2004	24,738	$53,023	$63,678	190.6
2005	28,727	$68,808	$79,627	197.8
2006	26,325	$62,333	$68,138	209.4
2007	30,040	$71,706	$74,777	219.5
2008	31,509	$80,795	$80,795	228.9
Average	**26,341.2**	**53,409.4**	**70,970.9**	
SD	**6,223.1**	**13,713.0**	**11,500.6**	

Figure 2. Hawaii commercial tuna, billfish, shark, and other pelagic PMUS landings, 1987-2008.



Interpretation: Hawaii's pelagic landings increased in 2008. The increase was primarily attributed to billfish landings, which went up 24% in 2008. There were small increases in tuna and other PMUS landings sharks.

Source and Calculations: The landings values are obtained by adding the landings values for species in the pelagic species groups defined below and all of the longline and non-longline fisheries for each year.

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

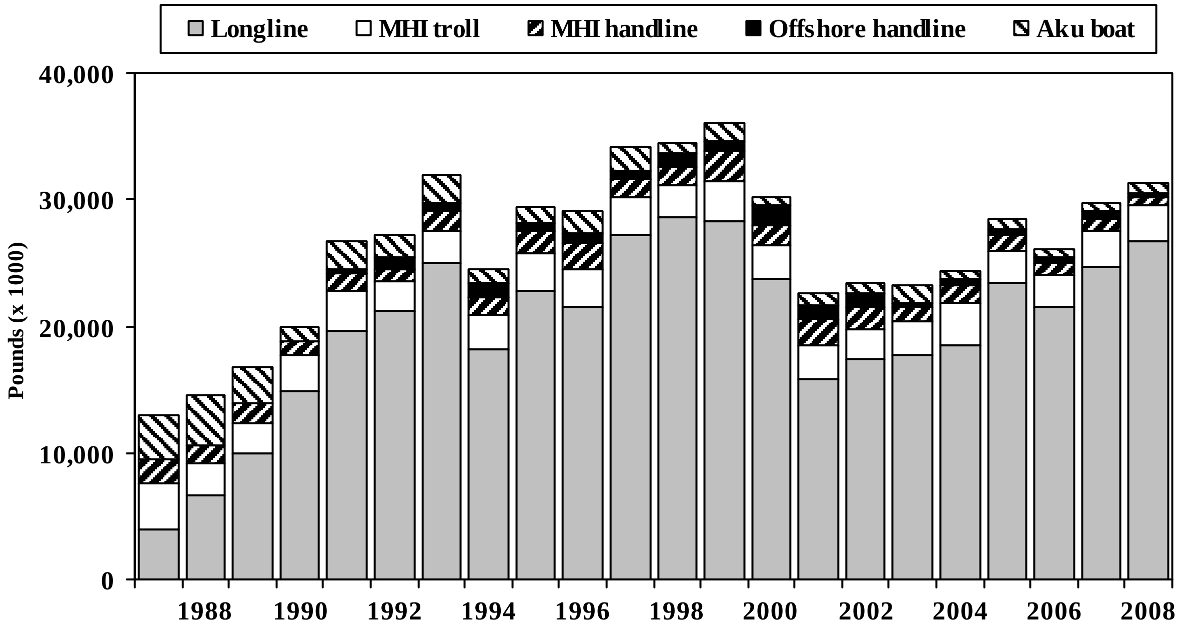
Billfishes: Blue marlin, Black marlin, Sailfish, Spearfish, Striped marlin, Swordfish, Unclassified billfish

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	13,025
1988	11,197	2,301	978	94	14,570
1989	11,223	3,880	1,553	203	16,860
1990	9,726	8,278	1,707	222	19,933
1991	10,794	13,129	2,423	318	26,664
1992	9,461	15,355	2,026	410	27,252
1993	12,417	15,928	1,850	1,736	31,931
1994	11,309	9,526	1,977	1,757	24,570
1995	13,820	9,723	2,426	3,468	29,437
1996	13,685	8,796	2,349	4,327	29,157
1997	16,813	9,492	2,850	5,010	34,165
1998	15,556	9,923	2,782	6,212	34,473
1999	16,145	9,758	3,828	6,273	36,005
2000	15,157	8,535	3,346	3,253	30,298
2001	15,561	3,469	3,414	333	22,778
2002	16,771	2,728	3,726	366	23,591
2003	15,367	3,470	4,265	358	23,460
2004	16,142	3,019	5,158	418	24,737
2005	17,246	6,403	4,686	393	28,728
2006	15,696	5,660	4,633	337	26,326
2007	19,115	5,656	4,851	418	30,040
2008	19,148	7,036	4,910	416	31,509
Average	**14,203.6**	**7,437.4**	**3,046.9**	**1,653.0**	**26,341.3**
SD	**2,988.8**	**4,086.3**	**1,300.8**	**2,091.9**	**6,223.1**

Figure 3. Total commercial pelagic landings by gear type 1987-2008.



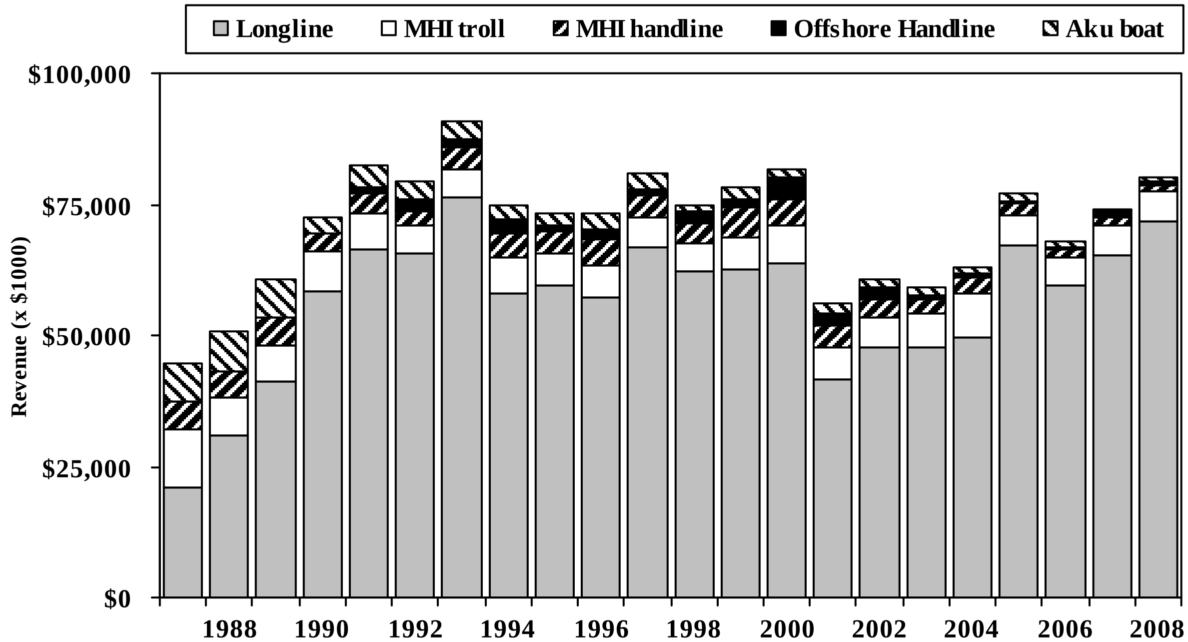
Interpretation: Hawaii commercial pelagic landings in 2007 were dominated by longline landings. Total landings increased largely due to higher landings by the longline fishery whose landings increased 8% in 2008. MHI troll and MHI handline fisheries are the next two largest fisheries in Hawaii. MHI troll 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.

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

	Hawaii pelagic total landings (1000 pounds)					
Year	**Longline**	**MHI troll**	**MHI handline**	**Offshore handline**	**Aku boat**	**Total**
1987	3,893	3,709	1,914	-	3,503	13,025
1988	6,713	2,445	1,471	-	3,940	14,569
1989	9,966	2,401	1,487	-	2,962	16,860
1990	14,790	2,901	1,060	68	1,116	19,933
1991	19,608	3,102	1,477	331	2,146	26,664
1992	21,190	2,394	945	987	1,735	27,252
1993	25,005	2,578	1,532	679	2,137	31,931
1994	18,138	2,810	1,287	1,175	1,159	24,569
1995	22,733	2,966	1,733	714	1,291	29,437
1996	21,564	2,994	1,963	793	1,844	29,157
1997	27,160	3,016	1,479	563	1,947	34,165
1998	28,655	2,471	1,369	1,134	845	34,473
1999	28,377	3,013	2,413	888	1,312	36,004
2000	23,786	2,562	1,711	1,458	708	30,299
2001	15,800	2,737	2,066	1,080	994	22,778
2002	17,390	2,387	1,695	1,067	936	23,592
2003	17,654	2,691	1,083	386	1,378	23,460
2004	18,474	3,378	1,404	487	656	24,738
2005	23,323	2,596	1,283	398	932	28,727
2006	21,514	2,581	816	483	661	26,325
2007	24,700	2,813	980	598	654	30,040
2008	26,681	2,902	680	267	700	31,509
Average	**19,868.8**	**2,793.0**	**1,447.6**	**616.1**	**1,525.3**	**26,341.2**
SD	**6,642.1**	**335.9**	**426.8**	**422.3**	**935.3**	**6,223.1**

than the sum of the the other five fisheries as it includes contributions from the “Other Gear” fishery.

Figure 4. Total commercial pelagic ex-vessel revenue by gear type 1987-2008.

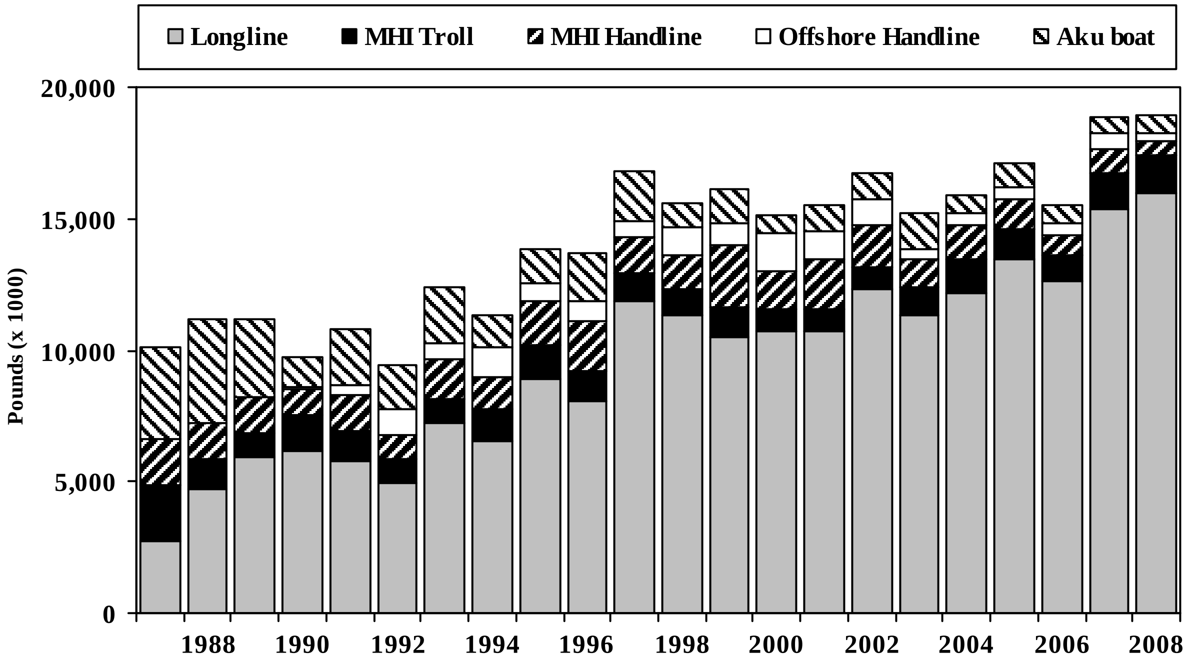


Interpretation: Ex-vessel revenue from Hawaii's pelagic fisheries increased 8% in 2008 due to higher revenue by the longline fishery. The longline fishery was, by far, the largest revenue generating fishery with the MHI troll and MHI handline fisheries ranked as the next two largest fisheries. Offshore handline revenue rose in the early 1990s, peaked in 2000 and declined thereafter with revenue dropping and remaining below $1 million from 2005. Revenue from the aku boat fishery declined from the late 1980s due fleet attrition and lower landings.

	Hawaii pelagic total revenue ($1000)					
Year	Longline	MHI troll	MHI handline	Offshore Handline	Aku boat	Total
1987	$21,100	$11,029	$5,192	-	$7,473	$44,838
1988	$31,000	$7,288	$4,992	-	$7,642	$50,922
1989	$41,300	$6,935	$5,197	-	$7,374	$60,805
1990	$58,500	$7,449	$3,454	$161	$3,104	$72,676
1991	$66,400	$6,955	$3,916	$824	$4,185	$82,313
1992	$65,500	$5,552	$2,589	$2,180	$3,564	$79,421
1993	$76,300	$5,456	$4,181	$1,608	$3,453	$91,012
1994	$58,200	$6,814	$4,362	$2,709	$2,553	$74,639
1995	$59,400	$6,088	$4,274	$1,313	$2,111	$73,216
1996	$57,300	$6,235	$4,920	$1,746	$3,204	$73,415
1997	$66,700	$5,975	$4,053	$1,080	$3,186	$80,995
1998	$62,200	$5,353	$3,682	$2,264	$1,476	$75,027
1999	$62,600	$6,188	$5,681	$1,659	$2,211	$78,381
2000	$63,900	$7,111	$4,797	$4,308	$1,516	$81,799
2001	$41,700	$5,869	$4,500	$2,254	$1,796	$56,304
2002	$47,600	$5,705	$3,693	$2,088	$1,600	$60,920
2003	$47,900	$6,435	$2,600	$708	$1,655	$59,937
2004	$49,700	$8,170	$3,013	$1,021	$1,036	$63,612
2005	$67,100	$5,695	$2,448	$486	$1,245	$77,227
2006	$59,500	$5,291	$1,484	$550	$962	$68,226
2007	$65,400	$5,643	$1,658	$829	$700	$74,763
2008	$71,900	$5,473	$1,414	$558	$870	$80,795
Average	**$56,418.2**	**$6,486.8**	**$3,731.9**	**$1,288.5**	**$2,859.9**	**$70,965.5**
SD	**$13,462.4**	**$1,282.4**	**$1,260.9**	**$1,063.6**	**$2,121.7**	**$11,455.8**

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.

Figure 5. Hawaii commercial tuna landings by gear type, 1987-2008.

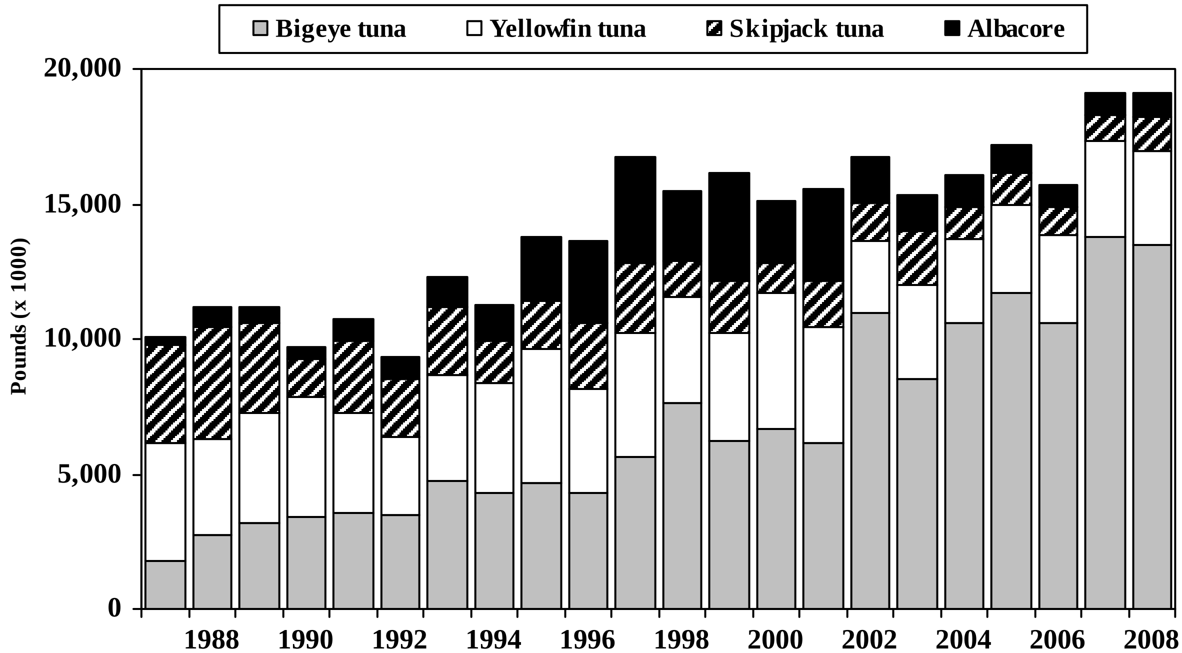


Interpretation Longline gear was the largest single contributor to Hawaii commercial tuna landings since 1988 and reached a record level in 2008. Tuna landings by the MHI troll fishery were highest in 1987, dropped the following year, and remained around its long-term average thereafter. Landings by the MHI handline fishery peaked in 1999 and dropped to a record low in 2008. Offshore handline tuna landings decreased substantially in 2008 and well below its long-term average. The aku boat fishery was on a declining trend with landings below 1 million pounds in 8 of the past 9 years.

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.

	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	10,700	878	1,440	1,397	707	15,157
2001	10,730	799	1,942	1,045	993	15,561
2002	12,346	804	1,598	1,010	935	16,771
2003	11,337	1,080	1,015	379	1,375	15,367
2004	12,181	1,316	1,286	462	654	16,142
2005	13,462	1,115	1,201	390	931	17,246
2006	12,625	975	749	469	661	15,696
2007	15,355	1,370	931	569	653	19,115
2008	15,961	1,434	586	244	699	19,148
Average	**9,515.7**	**1,149.9**	**1,350.3**	**692.0**	**1,523.4**	**14,203.6**
SD	**3,633.0**	**288.6**	**407.9**	**356.6**	**934.5**	**2,988.7**

Figure 6. Species composition of the tuna landings, 1987-2008.

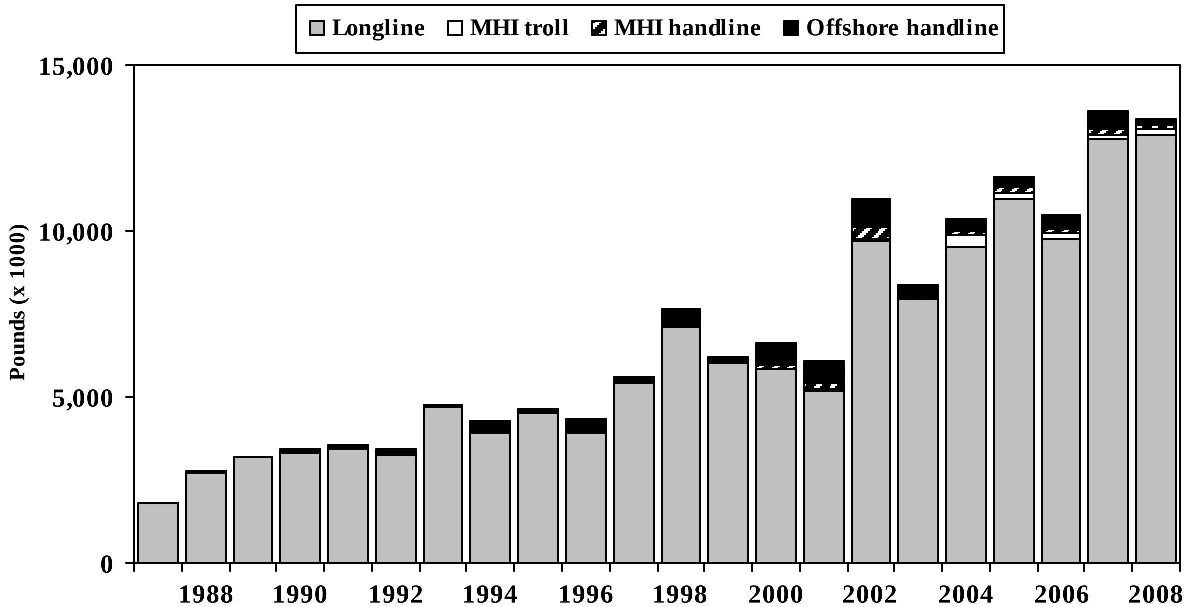


Interpretation: Bigeye tuna was the largest component of the tuna landings and was down slightly in 2008 from a record level in 2007. Yellowfin tuna was the second largest component of the tuna landings. Yellowfin tuna landings were below its long-term average for the past 7 years. Skipjack tuna landings decreased over time with its lowest level in 2007 and increased in 2008. Albacore landings grew rapidly peaking in 1999 and declined thereafter dropping to less than 1 million pounds in the past three years.

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	11,197
1989	3,208	4,064	3,298	626	11,223
1990	3,425	4,460	1,389	422	9,726
1991	3,573	3,661	2,691	846	10,794
1992	3,456	2,943	2,099	854	9,461
1993	4,768	3,872	2,546	1,122	12,417
1994	4,280	4,106	1,553	1,293	11,309
1995	4,667	4,940	1,814	2,328	13,820
1996	4,330	3,851	2,426	3,020	13,685
1997	5,595	4,628	2,608	3,920	16,813
1998	7,641	3,896	1,326	2,645	15,556
1999	6,212	4,012	1,909	3,979	16,145
2000	6,642	5,037	1,127	2,331	15,157
2001	6,124	4,306	1,694	3,421	15,561
2002	10,969	2,664	1,435	1,671	16,771
2003	8,511	3,471	1,989	1,348	15,367
2004	10,556	3,170	1,181	1,167	16,142
2005	11,734	3,243	1,189	1,047	17,246
2006	10,628	3,233	1,044	767	15,696
2007	13,777	3,540	1,011	769	19,115
2008	13,511	3,478	1,266	873	19,148
Average	**6,735.9**	**3,838.3**	**1,972.0**	**1,613.0**	**14,203.6**
SD	**3,639.5**	**620.3**	**881.7**	**1,137.8**	**2,988.8**

Figure 7. Hawaii bigeye tuna landings, 1987-2008.

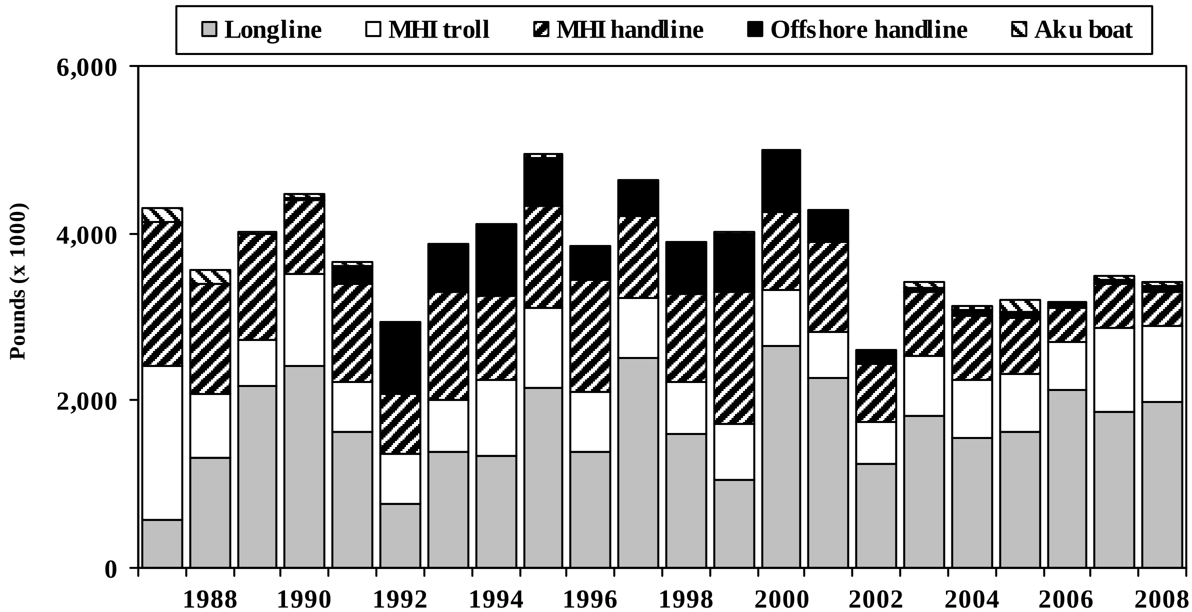


Interpretation: Annual bigeye tuna landings have increased more than seven-fold over the 20 year period with a record 13.7 million pounds in 2007. Bigeye tuna landings decreased 2% in 2008. The longline fishery reached a record 12.9 million pounds bigeye tuna in 2008 and account for 96% of the total. The offshore handline fishery was the second largest producer of bigeye tuna in Hawaii and was followed by the MHI troll and MHI handline fisheries, respectively.

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	5,836	15	141	650	6,642
2001	5,193	23	226	660	6,124
2002	9,674	86	353	850	10,969
2003	7,922	80	74	313	8,511
2004	9,534	328	125	385	10,556
2005	10,976	188	142	321	11,734
2006	9,765	154	135	414	10,628
2007	12,741	138	188	526	13,777
2008	12,908	174	86	183	13,511
Average	**6,267.2**	**58.9**	**81.7**	**330.2**	**6,735.9**
SD	**3,326.4**	**86.0**	**88.0**	**228.5**	**3,639.5**

Figure 8. Hawaii yellowfin tuna landings, 1987-2008.



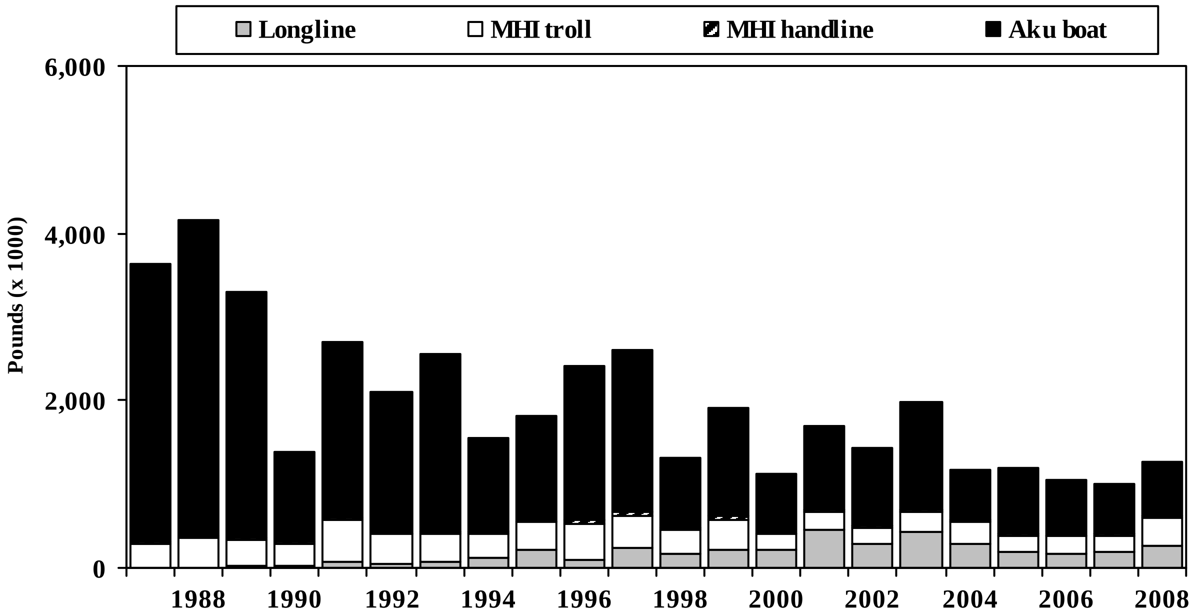
Interpretation: Annual landings of yellowfin tuna were low during the past seven years. The longline fishery typically had the highest yellowfin tuna landings. The MHI troll fishery was usually the second largest producer of yellowfin tuna followed by the MHI handline and offshore handline fisheries,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

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.

.

	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	5,037
2001	2,277	542	1,078	379	4	4,306
2002	1,235	500	711	151	6	2,664
2003	1,815	726	746	52	73	3,471
2004	1,559	690	770	75	38	3,170
2005	1,624	706	662	67	149	3,243
2006	2,117	587	413	52	6	3,233
2007	1,857	1,022	518	42	50	3,540
2008	1,981	909	417	60	49	3,478
Average	**1,700.2**	**774.3**	**988.9**	**359.4**	**43.0**	**3,838.3**
SD	**555.1**	**283.6**	**353.4**	**295.7**	**52.8**	**620.3**

Figure 9. Hawaii skipjack tuna landings, 1987-2008.

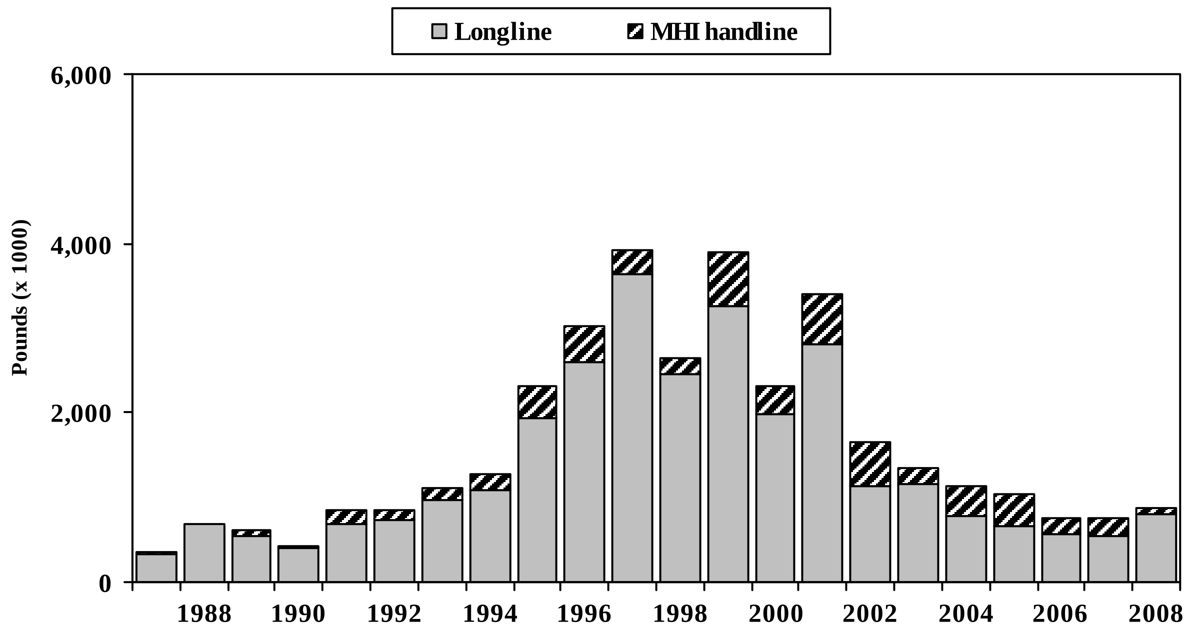


Interpretation: Skipjack tuna landings were on a declining trend with landings in 2008 at 36% below its long-term average. Since the aku boat fishery accounted for most of the skipjack tuna landings, the main source of overall decline was this fishery. Skipjack tuna landings by the aku boat fishery were below the long-term average for the past 11 years. The decline in skipjack tuna landings was not apparent or as apparent in other fisheries. Skipjack tuna landings by the longline fishery were on a increasing trend while landings by the MHI troll fishery exceeded its long-term average in 2008.

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	455	215	30	988	1,694
2002	282	203	20	927	1,443
2003	438	237	16	1,292	1,989
2004	293	246	23	615	1,181
2005	197	191	21	779	1,189
2006	162	220	10	648	1,044
2007	202	192	15	600	1,011
2008	263	336	19	643	1,266
Average	**172.9**	**293.3**	**26.1**	**1,478.0**	**1,972.8**
SD	**128.5**	**81.9**	**15.0**	**908.5**	**881.2**

Figure 10. Hawaii albacore landings, 1987-2008.

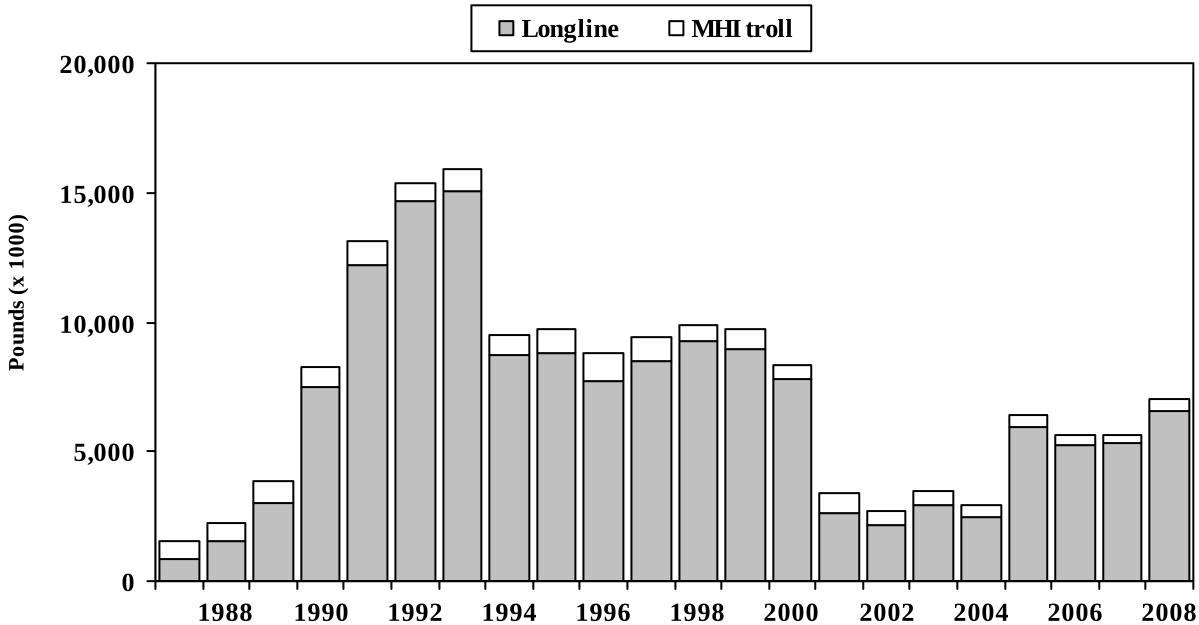


Interpretation: Albacore landings increased more than 11-fold from 1987 to 1999 and was on a declining trend thereafter. Albacore landings were 46% below the long-term average in 2008. The longline and MHI handline fisheries, account for almost all of the albacore landings and were responsible for the 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 21-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	1,979	5	347	2,331
2001	2,803	13	605	3,421
2002	1,145	9	511	1,668
2003	1,160	10	176	1,348
2004	790	7	351	1,167
2005	663	14	370	1,047
2006	577	2	188	767
2007	554	7	208	769
2008	807	3	62	873
Average	**1,353.4**	**9.8**	**248.6**	**1,612.9**
SD	**997.9**	**18.0**	**183.2**	**1,137.8**

Figure 11. Hawaii commercial billfish landings by gear type, 1987-2008.

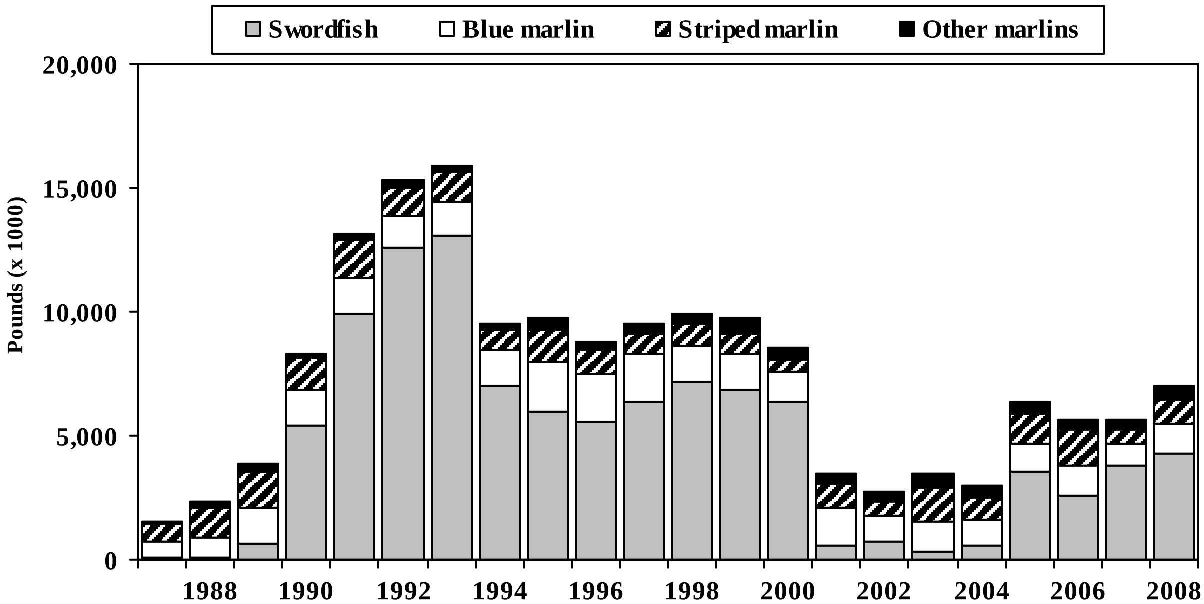


Interpretation: Two major factors affected billfish landings since 1987. The first was the growth of the longline fishery for swordfish in the early 1990s. The second was a series of management decisions that were intended to minimized longline interactions with sea turtles. These decisions strongly 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 7 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	7,817	506	201	8,535
2001	2,630	780	51	3,469
2002	2,160	535	26	2,728
2003	2,954	491	18	3,472
2004	2,471	481	23	3,019
2005	5,909	473	17	6,402
2006	5,248	395	13	5,660
2007	5,322	315	14	5,656
2008	6,580	431	17	7,036
Average	**6,727.2**	**672.2**	**33.6**	**7,437.5**
SD	**4,009.8**	**195.5**	**38.5**	**4,086.2**

Figure 12. Species composition of the billfish landings, 1987-2008.

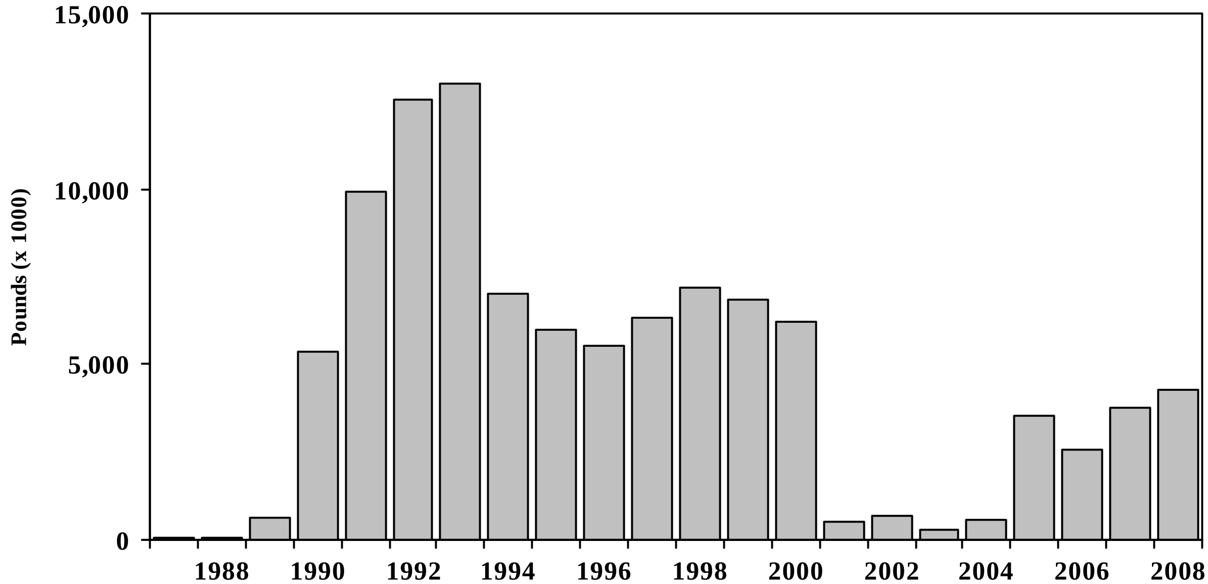


Interpretation: The billfish landings consisted mostly of marlins and small landings of swordfish from 1987 through 1989. However, in 1990 the billfish composition changed and total landings more than doubled as longline vessels began targeting swordfish. Swordfish landings continued to dominate billfish landings from 1990 through 2000 despite a 46% decrease in 1994. Swordfish landings dropped 91% in 2001 from regulatory actions and remained low through 2004. Swordfish reestablished itself as the dominant component of the billfish landings from 2005 through 2008 when targeting of swordfish was once again allowed under a new suite of regulations. Blue marlin composed 15% of the billfish landings with landings peaking in 1995-1997. There was considerable inter-annual variability with striped marlin landings but were close to its long-term average in 2008.

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.

	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	6,404	1,146	548	438	8,535
2001	562	1,527	1,001	380	3,469
2002	703	1,050	615	360	2,728
2003	316	1,176	1,373	606	3,470
2004	599	993	937	490	3,019
2005	3,538	1,135	1,221	510	6,403
2006	2,581	1,222	1,438	418	5,660
2007	3,796	845	637	379	5,656
2008	4,303	1,142	1,023	567	7,036
Average	**4,703.1**	**1,317.8**	**1,043.2**	**373.4**	**7,437.4**
SD	**3,899.2**	**343.0**	**289.2**	**134.9**	**4,086.3**

Figure 13. Hawaii swordfish landings, 1987-2008.

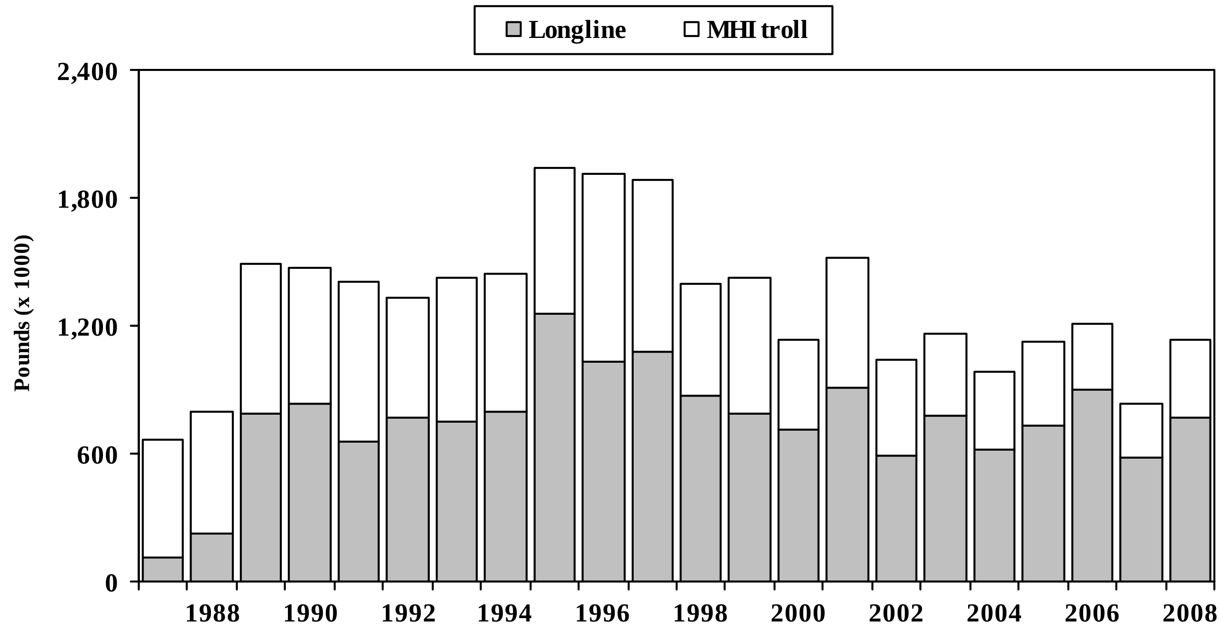


Interpretation: The trend in swordfish landings reflected both an increase in the number of vessels in the longline fishery and widespread targeting of swordfish by the fishery. Swordfish landings rose rapidly, peaking in 1993, and falling the following year. Landings remained relatively steady up to 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 during 2005 through 2008 as longline fishers became more proficient using techniques mandated under the new requirements. Swordfish landings by the MHI handline fishery were negligible.

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	6,205	5	193	6,404
2001	519	4	39	562
2002	681	3	19	703
2003	301	1	12	316
2004	549	0	16	599
2005	3,527	1	10	3,538
2006	2,573	1	8	2,581
2007	3,781	2	12	3,796
2008	4,285	1	14	4,303
Average	**4,678.5**	**1.4**	**21.3**	**4,703.1**
SD	**3,900.4**	**1.2**	**39.0**	**3,899.2**

Figure 14. Hawaii blue marlin landings, 1987-2008.

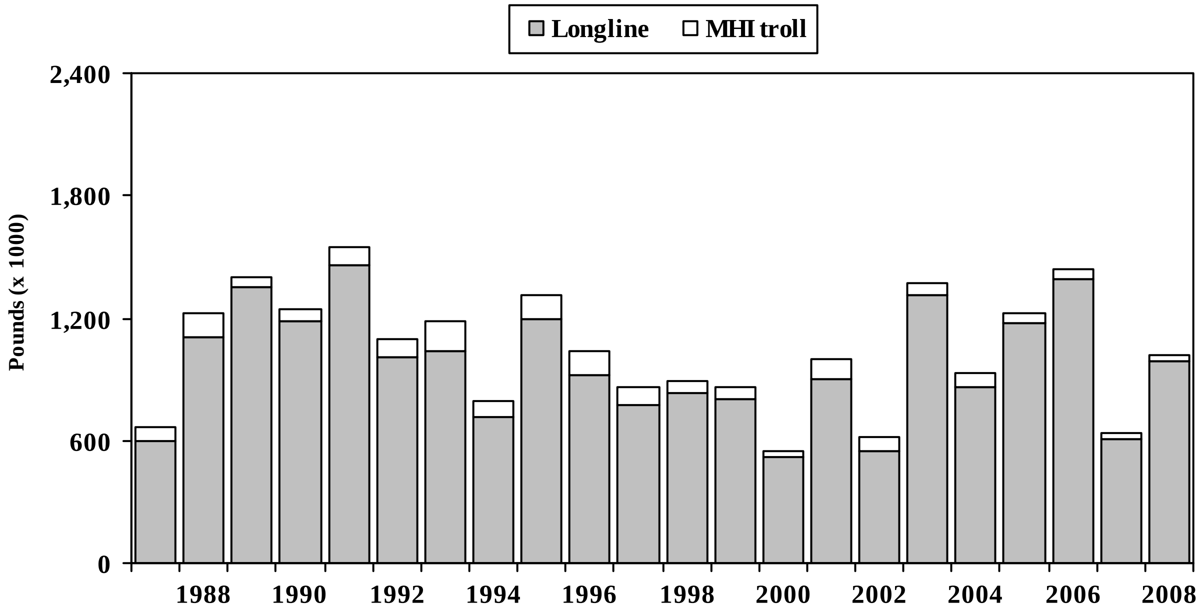


Interpretation: The two fisheries that landed the most blue marlin were the longline and MHI troll fisheries. Blue marlin landings by the longline fishery was slightly higher than its long-term average in 2008 while blue marlin landings by the MHI troll fishery were below the long-term average for the past 7 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	1,050
2003	777	390	5	1,176
2004	623	360	5	993
2005	731	394	6	1,135
2006	896	318	4	1,222
2007	577	262	2	845
2008	766	370	3	1,142
Average	**751.0**	**555.8**	**9.2**	**1,317.8**
SD	**246.8**	**167.7**	**5.0**	**343.0**

Figure 15. Hawaii striped marlin landings, 1987-2008.

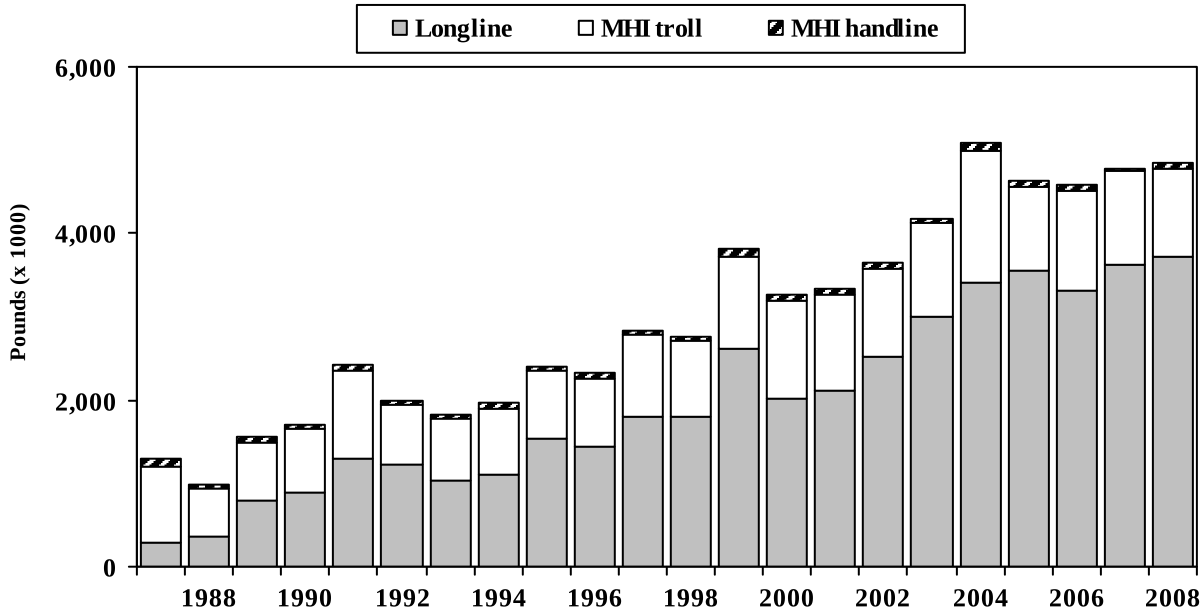


Interpretation: Striped marlin landings varied considerably over the 22-year period but were close to its long-term average in 2008. Striped marlin was landed primarily by the longline fishery. The MHI troll fishery was the second largest producer of striped marlin in Hawaii. The MHI troll fishery accounted for 3% of the total striped marlin landings in 2008. 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 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.

	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	902	93	5	1,001
2002	550	65	1	615
2003	1,308	63	1	1,373
2004	858	74	2	937
2005	1,177	43	0	1,221
2006	1,390	47	0	1,438
2007	609	28	0	637
2008	993	30	0	1,023
Average	**968.9**	**72.8**	**1.3**	**1,043.2**
SD	**281.3**	**31.8**	**1.1**	**289.2**

Figure 16. Hawaii commercial landings of other pelagic MUS by gear type, 1987-2008.

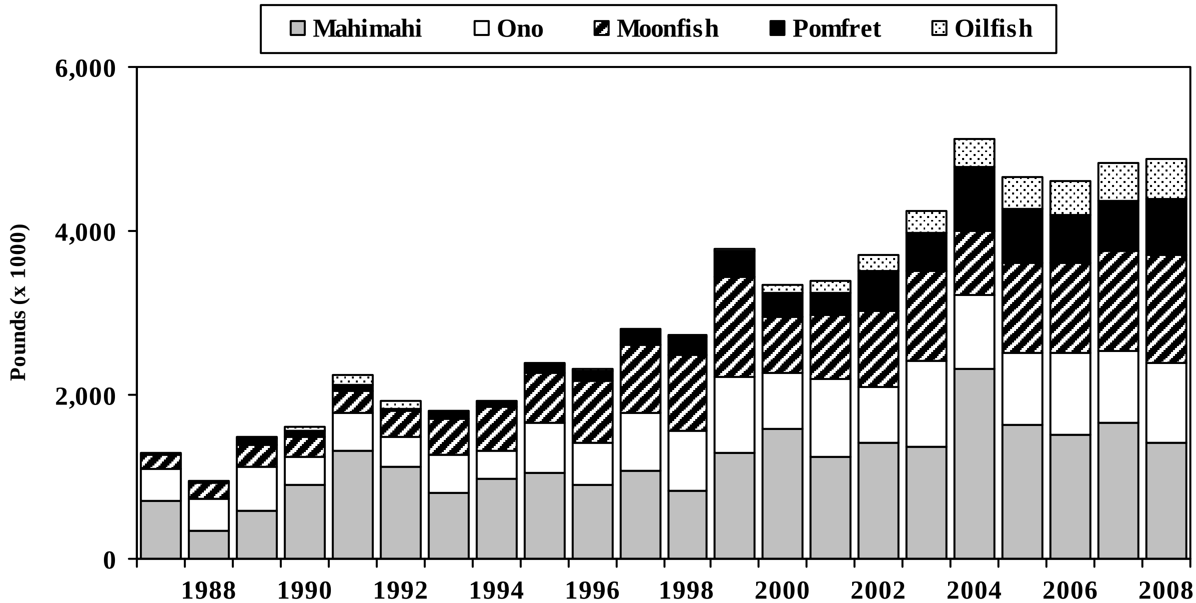


Interpretation: The landings of other pelagic MUS were considerably greater than the long-term average. The increase was attributed primarily to the longline fishery. The MHI troll fishery ranked second in other pelagic MUS landings and was above its long-term average in 2008. The other pelagic MUS landings by the MHI handline and offshore handline fisheries were low in 2008.

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 pelagic MUS by gear type (1000 lbs)					
Year	**Longline**	**MHI troll**	**MHI handline**	**Offshore handline**	**Aku boat**	**Total**
1987	283	907	102	-	2	1,294
1988	357	569	48	-	4	978
1989	799	691	62	-	1	1,553
1990	887	768	52	0	0	1,707
1991	1,285	1,067	66	5	0	2,423
1992	1,216	731	45	21	14	2,026
1993	1,030	744	50	23	3	1,850
1994	1,104	800	55	18	0	1,977
1995	1,530	815	61	20	0	2,426
1996	1,440	806	86	17	0	2,349
1997	1,807	974	55	9	5	2,850
1998	1,807	912	50	13	0	2,782
1999	2,618	1,109	81	20	0	3,828
2000	2,019	1,178	70	69	1	3,346
2001	2,114	1,159	73	41	1	3,414
2002	2,525	1,048	71	44	1	3,726
2003	3,010	1,119	50	18	3	4,265
2004	3,408	1,581	95	22	2	5,158
2005	3,563	1,009	65	9	1	4,686
2006	3,308	1,212	54	14	0	4,633
2007	3,613	1,128	35	19	1	4,851
2008	3,731	1,037	77	18	1	4,910
Average	**1,975.2**	**971.0**	**63.8**	**21.1**	**1.8**	**3,046.9**
SD	**1,095.9**	**226.1**	**17.0**	**15.6**	**3.0**	**1,300.8**

Figure 17. Species composition of other pelagic MUS landings, 1987-2008.

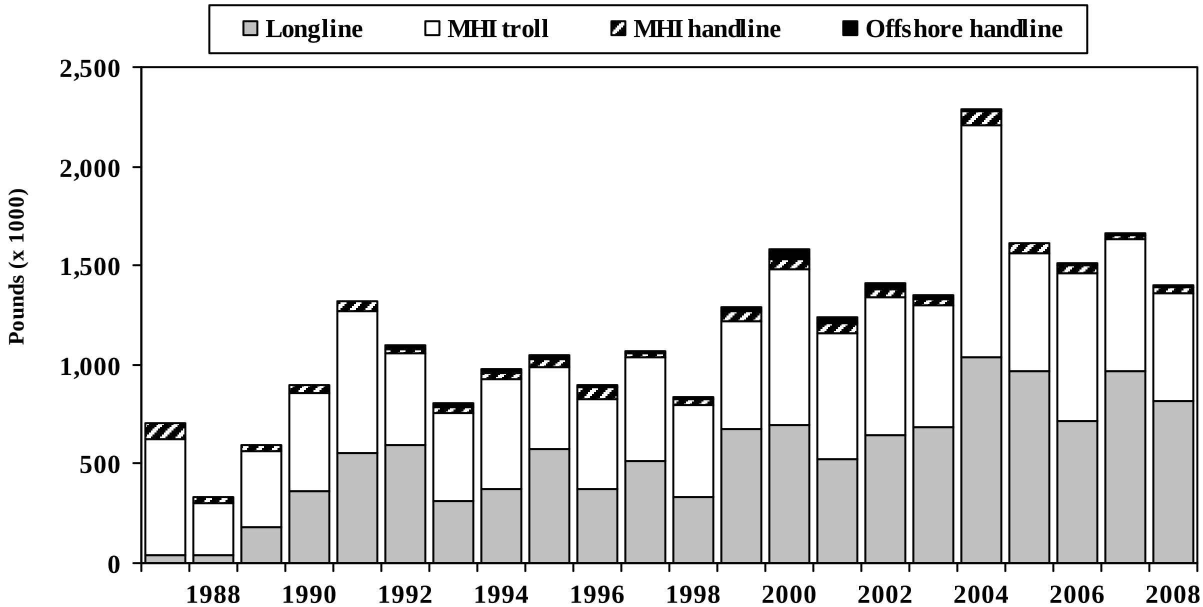


Interpretation: Mahimahi was the largest component of other pelagic landings. Mahimahi landings were above the long-term average for the past 10 years. Ono landings increased gradually and were above its long-term average since 1997. Landings of moonfish, pomfret, and oilfish rose substantially over the 22-year period due to the growth in the longline fishery.

Source and Calculations: The other pelagic MUS 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 MUS 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	1,553
1990	894	353	253	66	52	1,707
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	3,346
2001	1,252	945	768	276	143	3,414
2002	1,418	687	910	492	201	3,726
2003	1,362	1,053	1,091	459	278	4,265
2004	2,311	919	781	768	344	5,158
2005	1,623	891	1,094	658	386	4,686
2006	1,519	1,000	1,084	583	417	4,633
2007	1,670	856	1,223	618	458	4,851
2008	1,416	964	1,335	673	490	4,910
Average	**1,184.5**	**672.3**	**715.9**	**281.5**	**145.5**	**3,046.9**
SD	**433.8**	**240.8**	**370.7**	**248.4**	**169.3**	**1,300.8**

Figure 18. Hawaii mahimahi landings, 1987-2008.

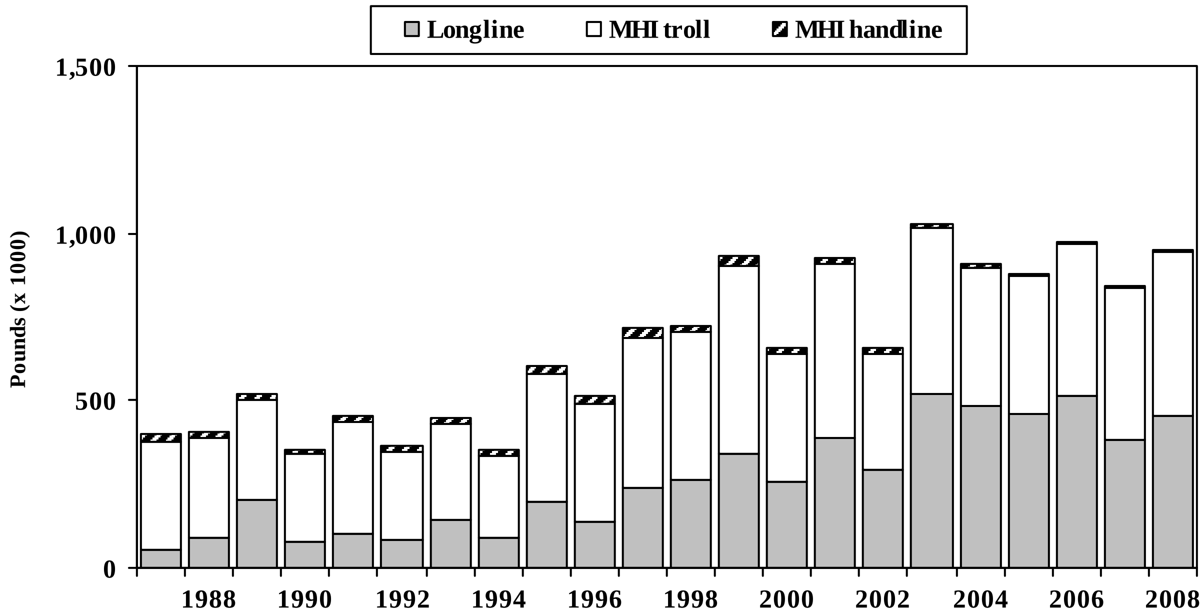


Interpretation: Mahimahi landings were higher than the long-term average for the past ten years. The highest landing for this species was in 2004 with records for both the longline and troll fisheries. Ninety-six percent of mahimahi landings were attributable to the MHI troll and longline fisheries. The MHI handline, offshore handline, and aku boat landings of mahimahi in 2008 were very low and below their averages.

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.

	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	1	1,252
2002	645	693	48	26	1	1,418
2003	686	618	30	14	3	1,362
2004	1,041	1,166	72	14	2	2,311
2005	972	592	44	7	1	1,623
2006	713	752	36	8	0	1,519
2007	966	670	21	6	1	1,670
2008	821	544	30	7	1	1,416
Average	**546.0**	**578.9**	**39.5**	**14.4**	**1.8**	**1,184.5**
SD	**276.6**	**183.1**	**15.0**	**12.9**	**3.0**	**433.8**

Figure 19. Hawaii ono (wahoo) landings, 1987-2008.



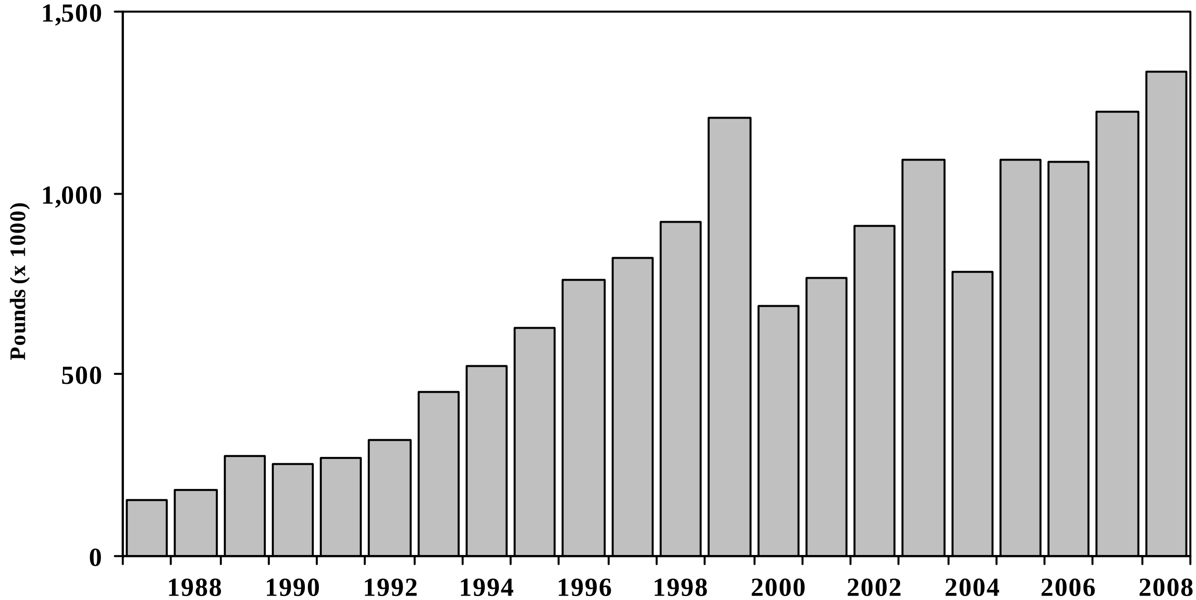
Interpretation: Ono landings were above the long-term average from 1997 with the highest total in 2003. The MHI troll and longline fisheries accounted for 98% of the ono landings in 2008. The MHI troll fishery typically contributed the greatest fraction of these landings. Ono landings by the longline fishery were above the MHI troll fishery landings during 2003-2006.

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	516	18	945
2002	292	350	15	687
2003	519	498	13	1,053
2004	486	412	8	919
2005	458	413	10	891
2006	511	457	9	1,000
2007	381	455	7	856
2008	454	489	10	964
Average	**262.1**	**385.3**	**17.4**	**672.3**
SD	**157.9**	**90.8**	**6.3**	**240.8**

Figure 20. Hawaii moonfish landings, 1987-2008.

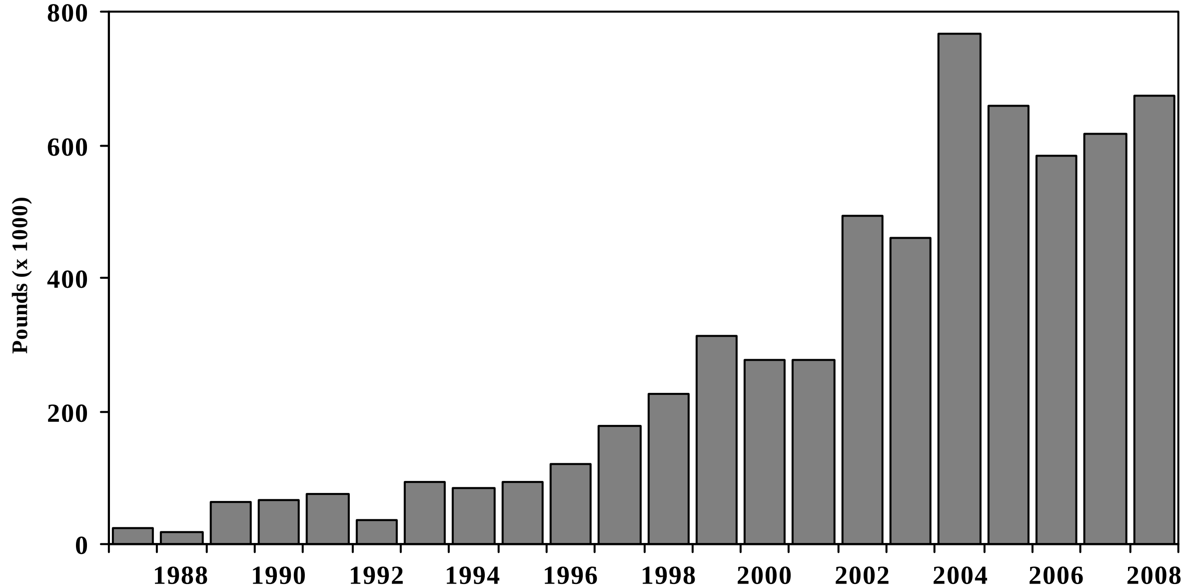


Interpretation: Moonfish are unique among the pelagic MUS because they are caught exclusively by the longline fishery. Moonfish landings were at record 1.3 million pounds in 2008. Moonfish appear to have 3 cycles where there were four to five years of increasing landings followed by a significant drop..

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

Year	Moonfish landings (1000 lbs) 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
2007	1,223	1,223
2008	1,335	1,335
Average	**715.9**	**715.9**
SD	**370.7**	**370.7**

Figure 21. Hawaii pomfret landings, 1987-2008.

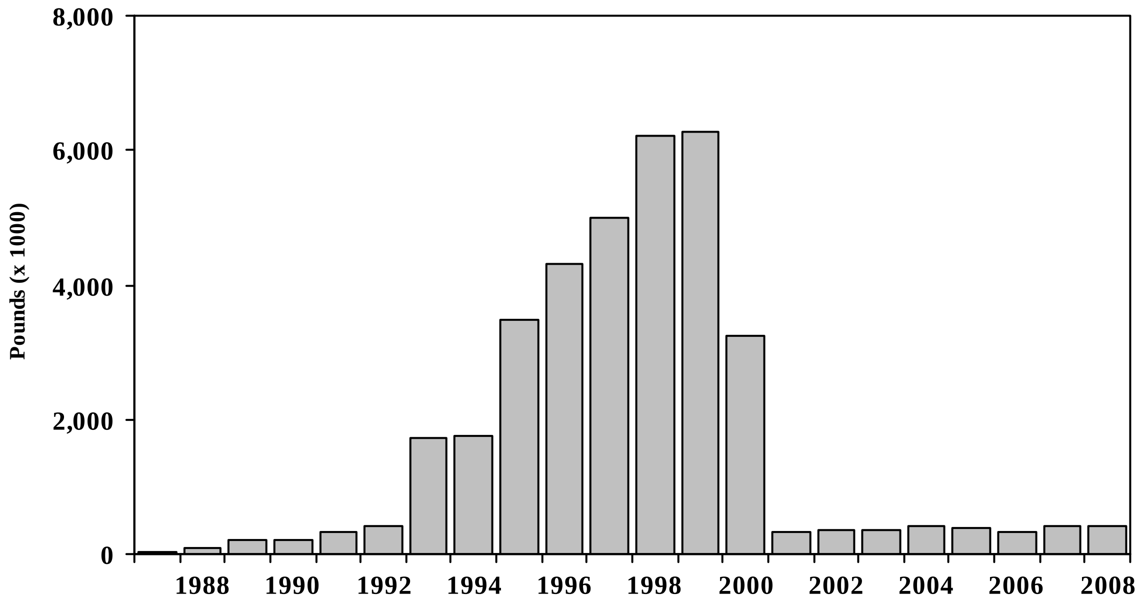


Interpretation: Landings of pomfrets came primarily from the longline fishery. The total in 2008 was the second highest over the 22 year period with record landings in 2004. Pomfret landings rose gradually from 1987 to 1996 with substantially higher landings observed from 2002, peaking in 2004 and remaining stable thereafter.

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	3	0	277
2001	268	6	0	276
2002	463	6	14	492
2003	416	6	0	459
2004	734	14	5	768
2005	632	9	1	658
2006	558	8	3	583
2007	572	6	11	618
2008	612	34	6	673
Average	**268.3**	**4.2**	**1.8**	**281.5**
SD	**232.5**	**7.8**	**3.9**	**248.4**

Figure 22. Hawaii shark landings, 1987-2008.

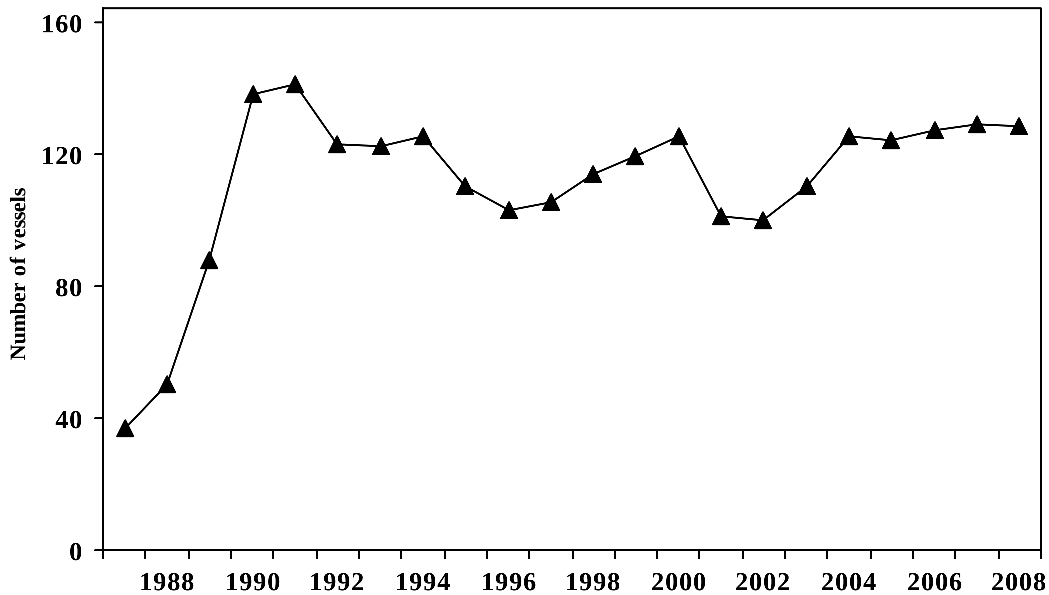


Interpretation: Sharks were landed almost exclusively by the longline fishery. Shark landings increased dramatically from 1987 to a peak of 6.3 million pounds in 1999. Sharks were landed headed and gutted in the late 1980's but a market for shark fins began in the early 1990's. Finning sharks then became 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 2008.

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	3,250	3,253
2001	326	333
2002	359	366
2003	353	358
2004	414	418
2005	389	393
2006	333	337
2007	410	418
2008	409	416
Average	**1,650.7**	**1,653.0**
SD	**2,093.0**	**2,091.9**

Figure 23. Number of Hawaii-based longline vessels, 1987-2008.



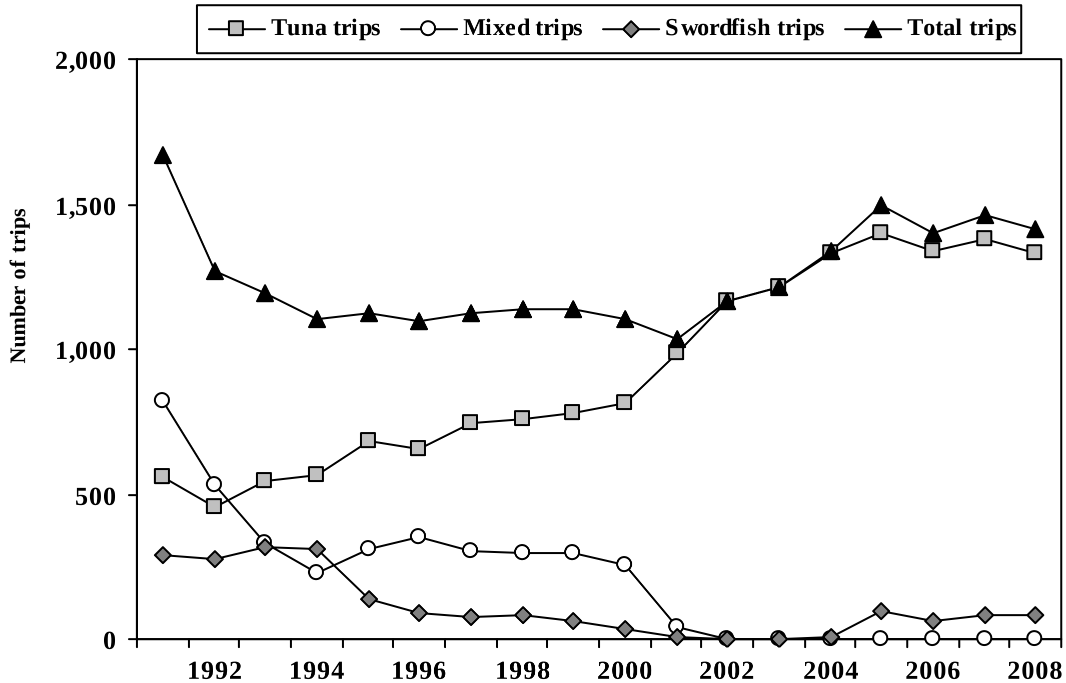
<u>Interpretation:</u> There were 128 active Hawaii-based longline vessels in 2008, down 1 vessel from 2007. One hundred four six longline vessels targeted tunas exclusively and 1 vessel targeted swordfish exclusively throughout the entire year. Twenty-three vessels targeted both swordfish and tunas at some time during 2008.

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.

<u>Source and Calculations:</u> 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 1991-2008 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
2007	129
2008	128
Average	**111.1**
SD	**25.5**

Figure 24. Number of trips by the Hawaii-based longline fishery, 1991-2008.

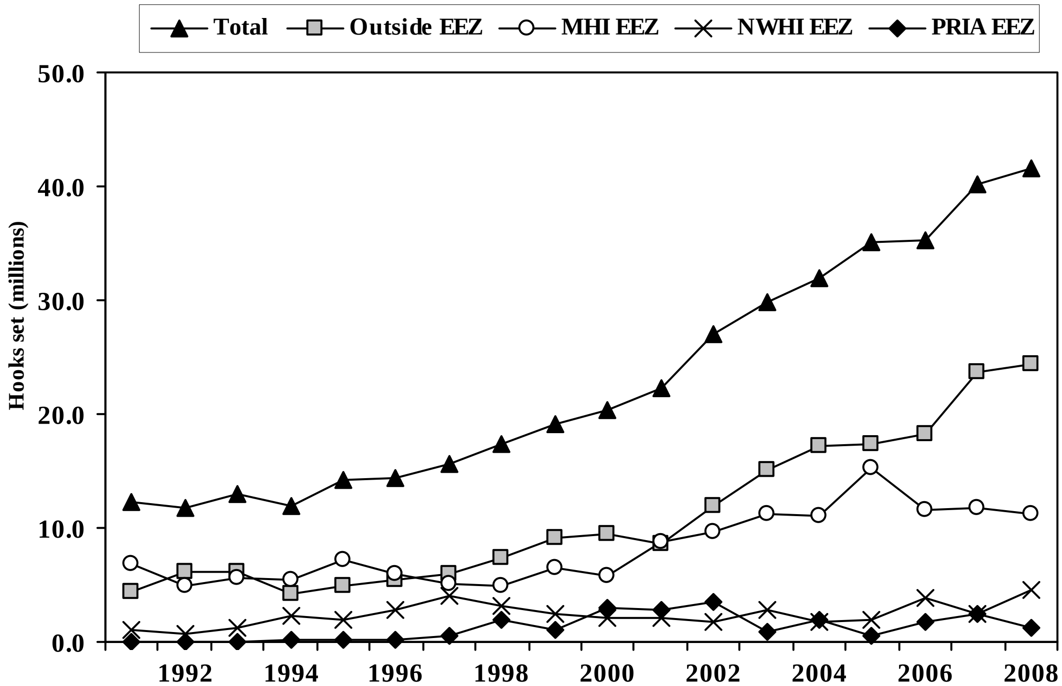


Interpretation: The Hawaii-based longline fleet made 1,414 trips in 2008. Total number of trips was stable for the past 5 years and above the long-term average in 2008. A large majority (94%) of the trips targeted tunas, with the remainder targeting swordfish.

Source and Calculations: The number of trips was compiled from NMFS federal longline logbook data collected from 1991 to 2008. 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 during 1991-1999. Vessel operators were required to declare their trip type (tuna or swordfish target) before embarking on a trip from 2000-2008.

	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	1,496	1,397	0	99
2006	1,401	1,341	0	60
2007	1,462	1,381	0	81
2008	1,414	1,333	0	81
Average	**1,249.3**	**928.2**	**209.0**	**112.3**
SD	**174.9**	**337.3**	**228.0**	**109.9**

Figure 25. Number of hooks set by the Hawaii-based longline fishery, 1991-2008.

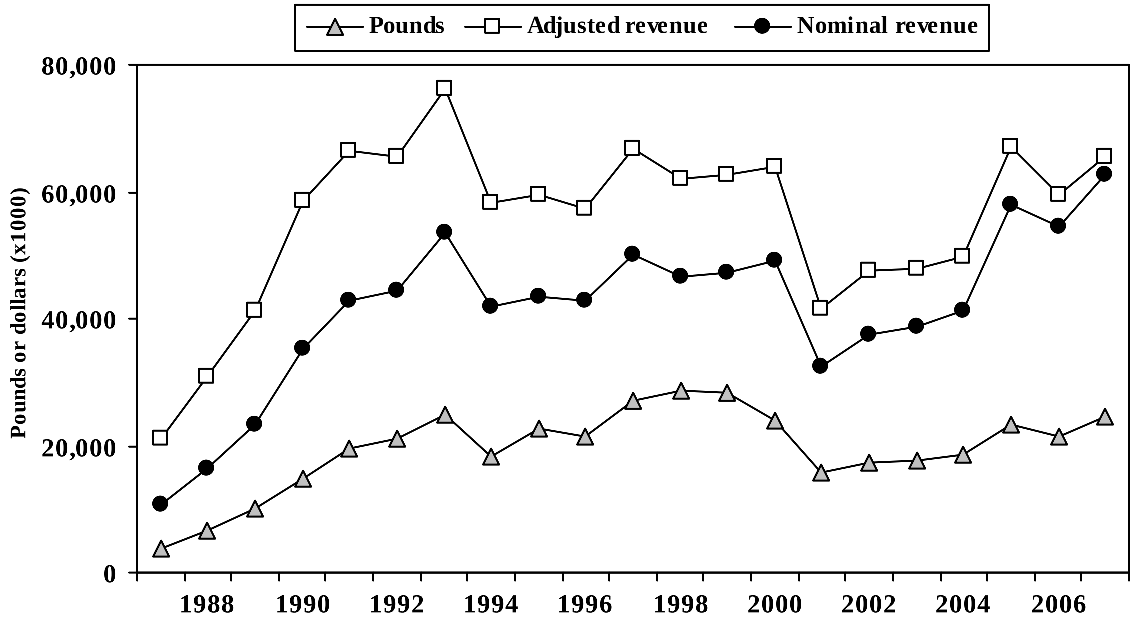


Interpretation: The total number of hooks set by the Hawaii-based longline fishery increased steadily since 1994 to a record 41.5 million hooks in 2008. Much of the increase is due to the shift in effort from swordfish and mixed target to tuna. Tuna sets typically set more hooks per day than swordfish and mixed target set types. Most of the hooks set were in the areas outside the EEZ (59%) and MHI EEZ (27%) in 2008. Effort in the NWHI EEZ (11%) increased while effort in the EEZ of Pacific Remote Island Areas (PRIAs) (3%) decreased in 2008.

Source and Calculations: Number of hooks set was compiled from NMFS federal longline logbook data collected from 1991 to 2008. 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	17.3	15.2	2.0	0.5	35.0
2006	18.2	11.5	3.8	1.8	35.3
2007	23.6	11.7	2.5	2.4	40.2
2008	24.4	11.2	4.6	1.3	41.5
Average	**11.08**	**8.24**	**2.39**	**1.24**	**22.95**
SD	**6.61**	**3.10**	**1.02**	**1.16**	**10.29**

Figure 26. Hawaii longline landings and revenue, 1987-2008.



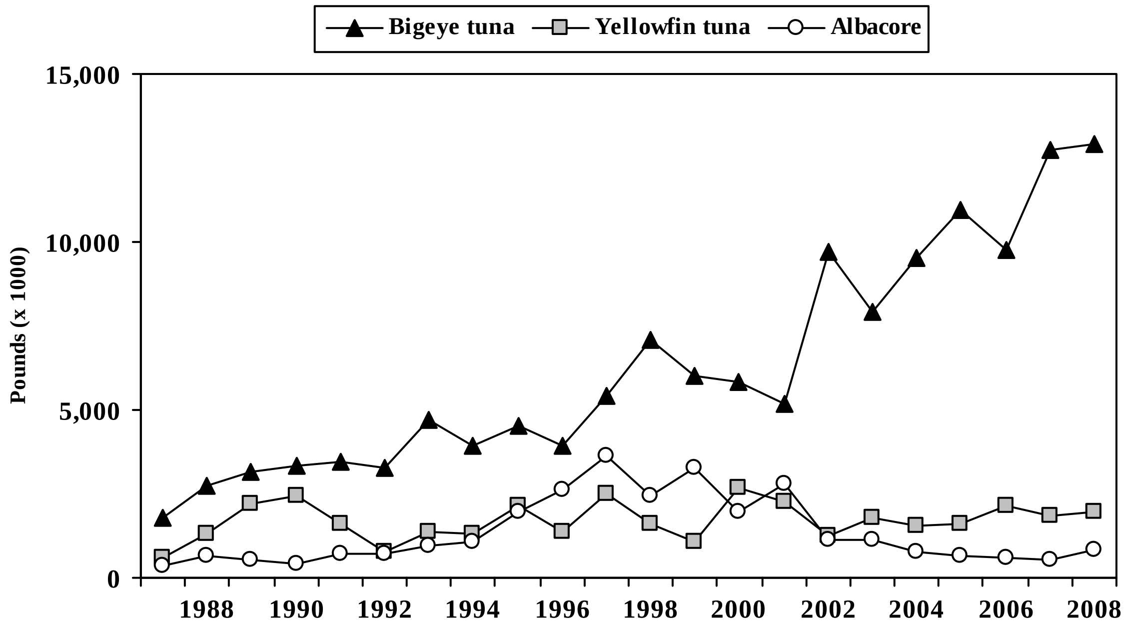
Interpretation: Hawaii longline landings trended upwards from 2001. Total landings in 2008 were 34% higher than long-term average. Inflation adjusted revenue also trended higher during the same period. Revenue in 2008 was 27% higher than long-term average.

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 2008. The adjusted revenue was calculated by multiplying nominal revenue by the Honolulu CPI for the current year and then dividing by the Honolulu CPI.

Year	Pounds	Adjusted revenue	Nominal revenue	Honolulu CPI
1987	3,893	$21,100	$10,600	114.9
1988	6,713	$31,000	$16,500	121.7
1989	9,966	$41,300	$23,200	128.7
1990	14,790	$58,500	$35,300	138.1
1991	19,608	$66,400	$42,900	148.0
1992	21,190	$65,500	$44,400	155.1
1993	25,005	$76,300	$53,400	160.1
1994	18,138	$58,200	$41,800	164.5
1995	22,733	$59,400	$43,600	168.1
1996	21,564	$57,300	$42,700	170.7
1997	27,160	$66,700	$50,100	171.9
1998	28,655	$62,200	$46,600	171.5
1999	28,377	$62,600	$47,400	173.3
2000	23,786	$63,900	$49,200	176.3
2001	15,800	$41,700	$32,500	178.4
2002	17,390	$47,600	$37,500	180.3
2003	17,654	$47,900	$38,600	184.5
2004	18,474	$49,700	$41,400	190.6
2005	23,323	$67,100	$58,000	197.8
2006	21,514	$59,500	$54,400	209.4
2007	24,700	$65,400	$62,700	219.5
2008	26,681	$71,900	$71,900	228.9
Average	**19,868.8**	**56,418.2**	**42,940.9**	
SD	**6,642.1**	**13,462.4**	**14,103.6**	

Figure 27. Hawaii longline tuna landings, 1987-2008.



Interpretation: The three major tuna species landed by the Hawaii-based longline fishery are bigeye tuna, yellowfin tuna, and albacore. Landings of bigeye tuna increased to 12.9 million pounds in 2008, up slightly from 2007. It was also the largest component of the longline landings and made up 81% of the tuna landings. Yellowfin tuna was above to its long-term average in 2008 at 2.0 million pounds. Albacore landings were 40% below its long-term average in 2008 and showed a substantial decline from its peak in 1997. The longline fishery also landed small amounts of skipjack tuna and bluefin tuna.

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 (1992-2008).

	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	5,836	2,656	1,979	221	7	10,700
2001	5,193	2,277	2,803	455	2	10,730
2002	9,674	1,235	1,145	282	2	12,346
2003	7,922	1,815	1,160	438	1	11,337
2004	9,534	1,559	790	293	1	12,181
2005	10,976	1,624	663	197	1	13,462
2006	9,765	2,117	577	162	1	12,625
2007	12,741	1,857	554	202	0	15,355
2008	12,908	1,981	807	263	1	15,961
Average	**6,267.2**	**1,700.2**	**1,353.4**	**172.9**	**21.1**	**9,515.7**
SD	**3,326.4**	**555.1**	**997.9**	**128.5**	**29.7**	**3,633.0**

Figure 28a. Hawaii longline billfish landings, 1987-2008.

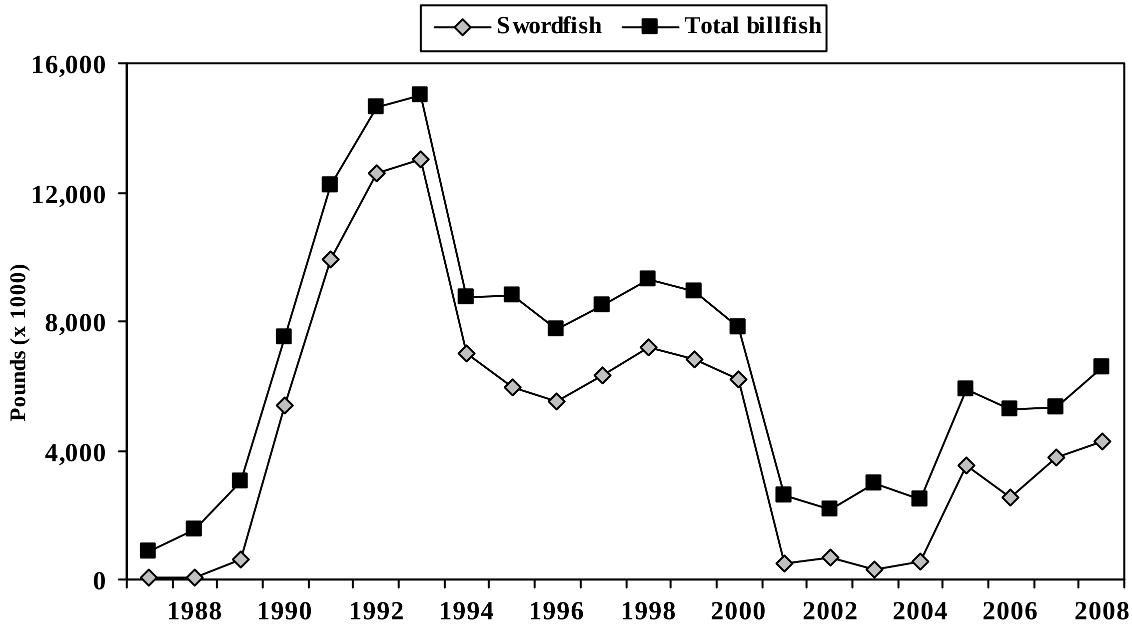
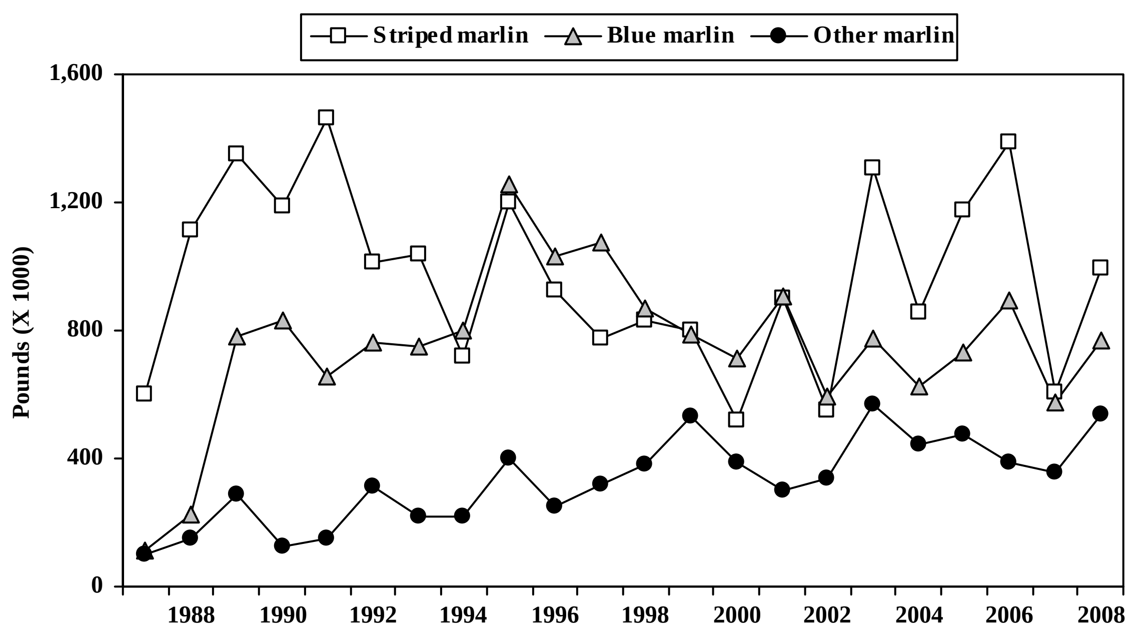


Figure 28b. Hawaii longline marlin landings, 1987-2008.



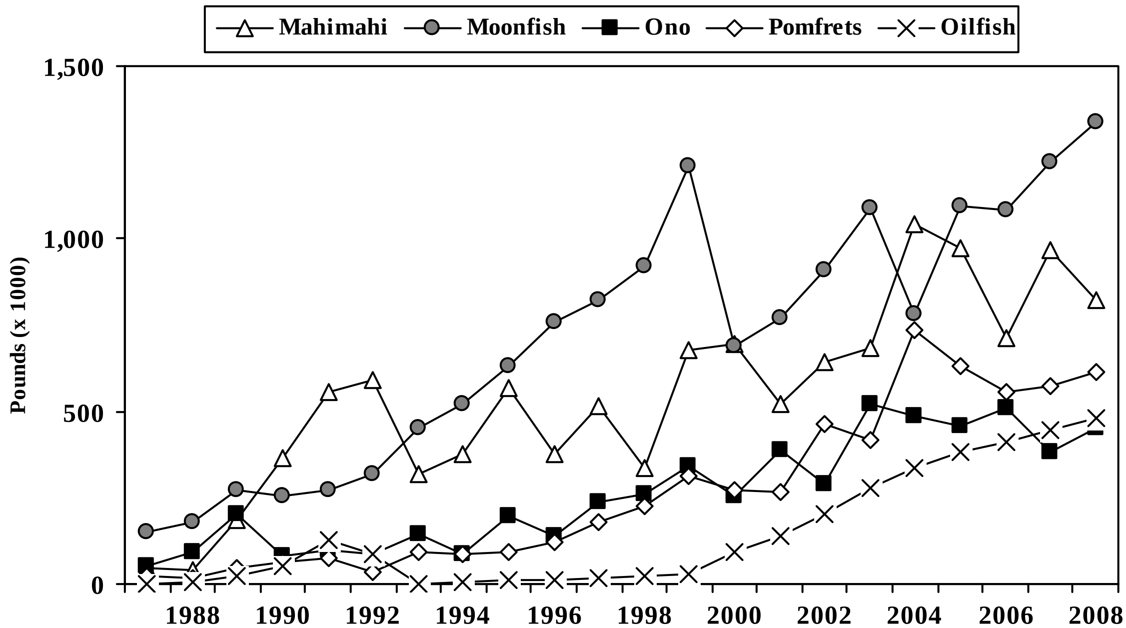
Interpretation: Billfish landings was 6.6 m,illion pounds in 2008, close to its long-term average. The increase observed in 2008 was attributable to higher landings of swordfish as well as marlins. The swordfish-targeted longline fishery target was able to operate throughout the entire year because the fishery managed to keep the number of loggerhead and leather back sea turtle interactions below the allowable levels. Swordfish landings by the Hawaii longline fishery in 2008 was significantly higher than those landed during 2001-2004 and at a record level since the reopening of the shallow-set longline fishery for swordfish.

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 slightly above their respective long-term averages in 2008. Other marlin, primarily spearfish, was on a increasing trend.

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 (1992-2008).

	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	6,205	517	711	385	7,817
2001	519	902	909	299	2,630
2002	681	550	593	337	2,160
2003	301	1,308	777	567	2,954
2004	549	858	623	441	2,471
2005	3,527	1,177	731	473	5,909
2006	2,573	1,390	896	389	5,248
2007	3,781	609	577	355	5,322
2008	4,285	993	766	536	6,580
Average	**4,678.5**	**968.9**	**751.0**	**328.8**	**6,727.2**
SD	**3,900.4**	**281.3**	**246.8**	**134.4**	**4,009.8**

Figure 29. Hawaii longline landings of other pelagic MUS, 1987-2008.



Interpretation: Longline landings of other pelagic MUS show an increasing trend with landings at 3.7 million pounds in 2008, 89% above the long-term average. Moonfish was dominant component in this category at 1.3 million pounds in 2008, 86% above the long-term average. Mahimahi composed a large fraction of the landings with landings 50% higher than its long-term average in 2008. Ono and pomfret landings increased substantially during the 21-year period with record landings in 2003 and 2004, respectively.

Source and Calculations: Estimates of longline catch of other pelagic MUS 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 (1992-2008).

	Hawaii longline landings of other pelagic PMUS (1000 lbs)					
Year	**Mahimahi**	**Moonfish**	**Ono**	**Pomfrets**	**Oilfish**	**Total**
1987	45	152	53	23	2	283
1988	39	182	90	18	3	357
1989	183	274	202	49	24	799
1990	366	253	80	66	52	887
1991	555	270	101	75	130	1,285
1992	593	320	85	37	85	1,216
1993	316	454	142	92	0	1,030
1994	377	524	87	85	4	1,104
1995	570	629	195	93	10	1,530
1996	375	760	140	121	11	1,440
1997	518	823	239	178	15	1,807
1998	336	922	262	225	26	1,807
1999	679	1,210	343	313	29	2,618
2000	694	691	256	272	93	2,019
2001	523	768	390	268	141	2,114
2002	645	910	292	463	200	2,525
2003	686	1,091	519	416	277	3,010
2004	1,041	781	486	734	335	3,408
2005	972	1,093	458	632	380	3,563
2006	713	1,084	511	558	412	3,308
2007	966	1,223	381	572	448	3,613
2008	821	1,335	454	612	480	3,731
Average	**546.0**	**715.9**	**262.1**	**268.3**	**143.5**	**1,975.2**
SD	**276.6**	**370.7**	**157.9**	**232.5**	**166.1**	**1,095.9**

Figure 30a. Hawaii longline blue and total shark landings, 1987-2008.

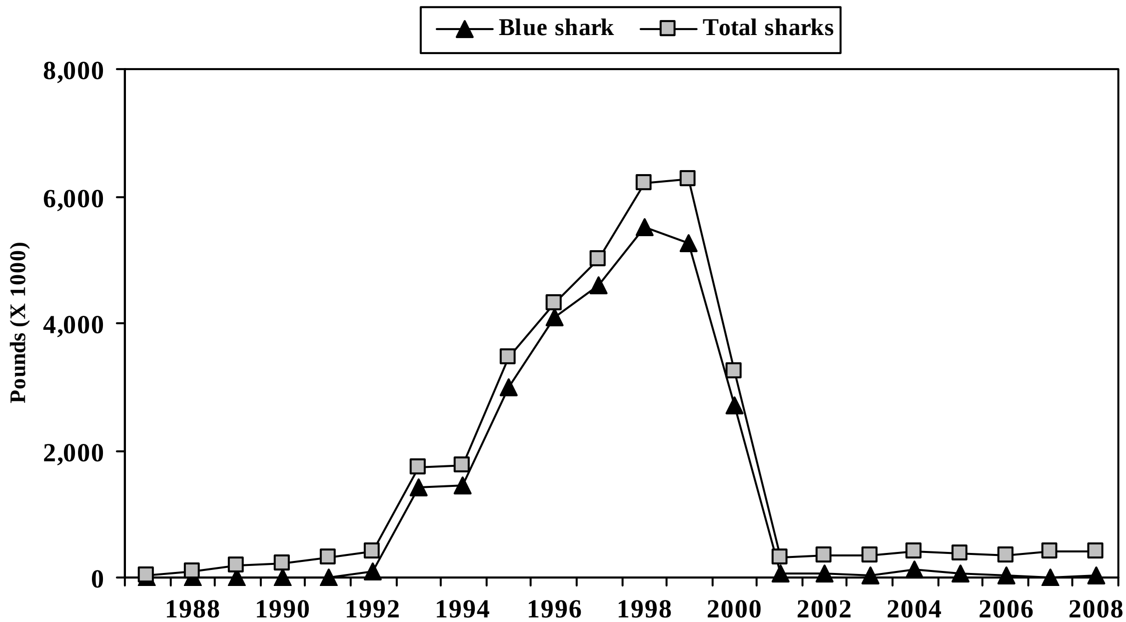
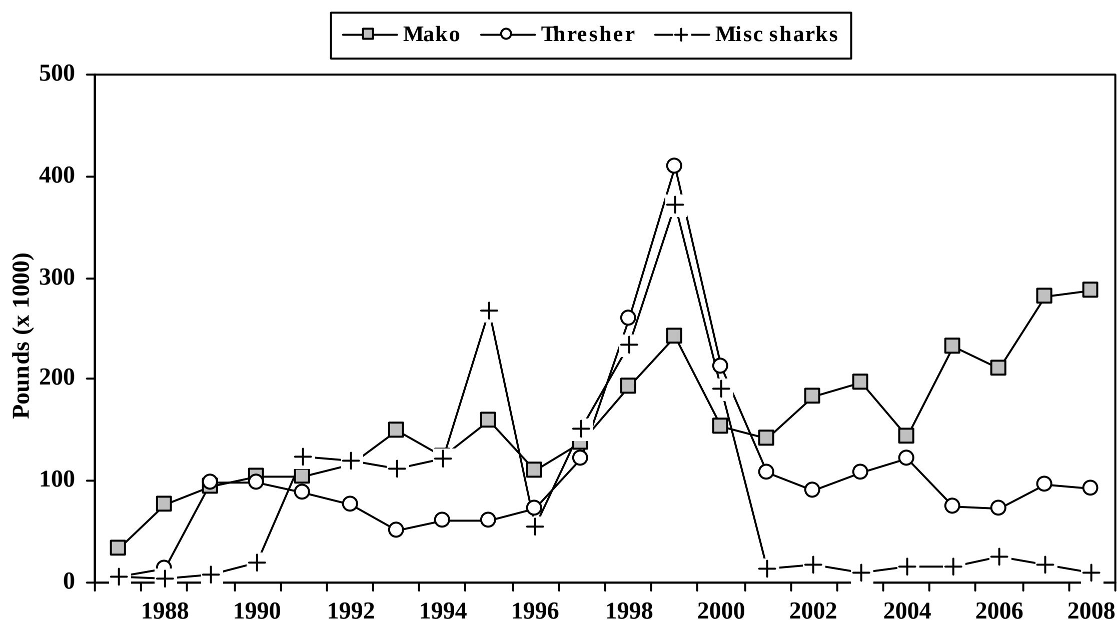


Figure 30b. Hawaii longline mako, thresher and other shark landings, 1987-2008.



<u>Interpretation:</u> Shark landings in 2008 were 75% 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.

<u>Source and Calculations:</u> 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.

	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	191	3,250
2001	63	142	109	13	326
2002	67	184	90	17	359
2003	39	196	109	9	353
2004	130	144	123	16	414
2005	66	233	75	15	389
2006	26	210	73	25	333
2007	15	281	97	17	410
2008	18	287	93	10	409
Average	**1,296.8**	**158.0**	**109.0**	**86.8**	**1,650.7**
SD	**1,942.6**	**64.9**	**86.7**	**102.8**	**2,093.0**

Table 3. Hawaii-based longline catch (number of fish) by area, 1991-2008.

	Tunas			Billfishes				Other Pelagic PMUS			
Year	Bigeye tuna	Yellowfin tuna	Albacore	Swordfish	Blue marlin	Striped marlin	Other billfish	Mahimahi	Ono (wahoo)	Moonfish	Sharks
Main Hawaiian Islands											
1991	**22,517**	**7,150**	5,763	13,598	**2,881**	**18,117**	**8,197**	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	5,262	**4,168**	**12,472**	**6,900**	**30,410**	2,656	**4,041**	22,560
1996	**29,803**	**7,715**	19,259	4,634	**3,556**	**7,163**	**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	29,203	4,835	23,805	2,357	1,709	**5,607**	6,691	11,654	2,579	5,161	17,449
2000	21,546	5,240	5,952	2,510	1,557	2,438	3,486	17,586	1,201	2,759	16,561
2001	**36,928**	5,671	10,448	1,027	2,151	**7,651**	**4,029**	**21,608**	3,223	**3,404**	16,086
2002	51,177	2,463	2,706	752	873	**3,449**	3,761	21,374	1,345	3,373	14,810
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
2007	43,887	6,127	1,236	1,926	635	2,405	3,250	21,599	2,862	2,946	16,725
2008	34,807	**13,090**	1,303	1,210	991	3,397	4,917	14,791	2,562	2,456	13,188
Northwestern Hawaiian Islands											
1991	4,473	1,375	481	9,472	342	3,845	1,082	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	939	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	2,887	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	15,150
2000	7,660	1,395	2,969	6,679	418	2,309	1,082	6,458	224	750	11,446
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
2007	11,390	1,973	966	2,385	161	1,212	737	3,011	476	927	7,416
2008	18,378	8,062	1,271	2,700	913	3,939	2,622	7,041	1,590	1,384	9,135
Pacific Remote Island Areas											
1991	374	439	30	25	17	60	45	84	21	0	237
1992	70	42	0	16	7	1	7	6	8	0	223
1993	0	0	0	0	0	0	0	0	0	0	0
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	17,666	6,313	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	762	733	916	1,202	1,916	448	8,307
2001	5,563	**20,777**	9,493	224	1,072	1,047	683	1,705	2,150	277	5,195
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
2007	14,509	3,257	1,432	248	426	383	567	870	1,677	137	4,452
2008	5,977	2,245	2,421	120	310	292	603	1,530	1,118	126	2,671

Table 3 (Cont.) Hawaii-based longline catch (number of fish) by area, 1991-2008.

	Tunas			Billfishes				Other Pelagic PMUS			
Year	Bigeye tuna	Yellowfin tuna	Albacore	Swordfish	Blue marlin	Striped marlin	Other billfish	Mahimahi	Ono (wahoo)	Moonfish	Sharks
Outside EEZ											
1991	13,559	4,305	**7,777**	**43,194**	1,008	6,730	3,511	**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**	3,165	4,885	3,220	23,315	**2,801**	1,382	**57,922**
1996	17,588	6,227	**23,719**	**29,495**	1,878	4,250	2,658	9,507	**2,116**	1,776	**64,081**
1997	26,149	**10,990**	**30,887**	**29,627**	2,457	4,080	2,819	**30,730**	**3,668**	2,314	**49,935**
1998	**37,762**	**8,004**	**25,621**	**28,269**	**2,125**	3,408	3,872	**10,157**	**4,068**	3,462	**59,180**
1999	**36,883**	4,817	**35,659**	**29,323**	**1,857**	4,857	**7,401**	**27,743**	**5,435**	**5,628**	**51,475**
2000	**37,804**	9,956	**22,088**	**27,600**	**1,772**	**2,459**	**3,527**	**32,529**	**4,410**	**3,079**	**43,049**
2001	27,712	9,460	**27,841**	**2,545**	**2,440**	5,209	3,414	17,715	**7,225**	3,068	**20,152**
2002	**62,068**	4,278	**9,643**	**2,275**	**2,025**	3,076	**4,215**	**22,407**	**4,791**	**4,658**	**23,196**
2003	**56,190**	**12,950**	**13,782**	**1,777**	**2,437**	8,417	7,076	**25,702**	**10,963**	**6,943**	**29,085**
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**
2007	**89,650**	**14,923**	**7,210**	**19,714**	**2,069**	**4,207**	**5,999**	**57,401**	**7,541**	**10,361**	**47,170**
2008	**93,161**	11,129	**11,642**	**19,889**	**2,011**	**6,781**	**7,789**	**43,877**	**8,969**	**11,156**	**37,391**
Total catch											
1991	40,923	13,269	14,051	66,289	4,248	28,752	12,835	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	54,799	16,061	30,460	79,554	5,124	18,207	5,680	26,012	4,439	4,515	154,601
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	37,428	8,806	22,554	11,771	59,813	6,565	6,367	101,292
1996	63,566	17,577	57,328	38,133	6,634	15,789	7,806	23,227	4,457	7,315	100,794
1997	79,784	29,043	71,084	39,681	8,255	12,637	9,024	49,302	8,310	8,254	85,835
1998	98,780	21,708	48,689	43,775	5,348	14,328	11,503	22,179	8,261	9,167	99,909
1999	80,272	16,970	67,300	37,964	4,934	14,417	17,111	44,255	10,276	12,399	87,537
2000	74,493	38,379	39,775	37,023	4,509	7,939	9,011	57,775	7,751	7,036	79,363
2001	78,724	37,077	51,430	4,169	6,424	16,435	9,008	44,951	13,381	7,779	46,911
2002	140,847	20,373	20,588	3,668	3,971	8,892	10,080	48,223	8,878	9,290	50,616
2003	107,126	27,922	20,863	3,540	5,653	25,935	18,447	55,336	18,365	11,899	69,418
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
2007	159,436	26,280	10,844	24,273	3,291	8,207	10,553	82,881	12,556	14,371	75,763
2008	152,323	34,526	16,637	23,919	4,225	14,409	15,931	67,239	14,239	15,122	62,385

Interpretation: The bolded numbers in Table 5 show the area with the highest catch for a particular species. Almost all of the Hawaii-based longline catches were highest outside of the U.S. EEZ in 2008. 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 2008. 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, 1987-2008.

	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	68	51	13	-
2007	82	73	54	15	-
2008	86	57	52	17	-
Average	**78.0**	**81.6**	**53.1**	**17.7**	**234.1**
SD	**6.6**	**19.8**	**5.7**	**2.0**	**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	186
2007	174	74	176	33	48	192
2008	198	67	183	33	60	249
Average	**159.2**	**60.9**	**161.3**	**32.1**	**49.6**	**173.2**
SD	**20.3**	**6.6**	**15.8**	**1.7**	**6.2**	**37.5**

Table 4. Average weight of the Hawaii-based longline landings by species, 1987-2008 (continued).

	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	85	13	17	176	193
2007	12	31	86	15	16	189	190
2008	12	32	89	14	15	184	205
Average	**14.8**	**32.0**	**97.9**	**15.0**	**18.7**	**165.5**	**171.7**
SD	**3.4**	**2.0**	**7.3**	**2.0**	**3.3**	**18.2**	**25.8**

<u>Interpretation:</u> 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 1987-2008. The average weight of bigeye tuna showed small change over the 21 year period, ranging from 64 pounds to 88 pounds. Bigeye tuna average weight was more than 80 pounds for the past 4 years and was 86 pounds in 2008. Yellowfin tuna average weight showed the most variation ranging from 57 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. 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 and was a record 198 pounds in 2008.

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 to 74 and was 67 pounds in 2008.

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 2008. 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.

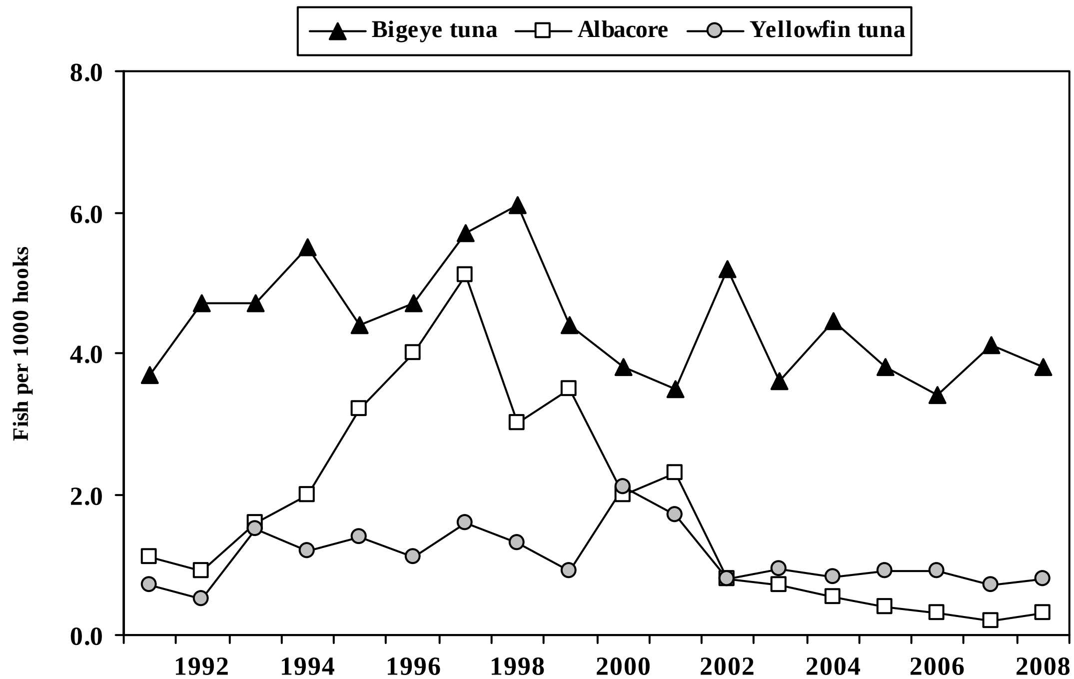
Table 5. Bycatch, retained catch, and total catch for the Hawaii-based longline fishery, 2008

Interpretation: Bycatch of the Hawaii-based longline fishery was measured in number of fish released. The total bycatch for all species combined was 14% in 2008. Tunas, which are the primary target species of the longline fleet, had a low bycatch rate (3.2%). The number of bigeye tuna released was highest for all tuna species although the bycatch rate was relatively low (1.3%). Swordfish had a bycatch rate of 8.8% in 2008. Although marlins and other miscellaneous pelagic catch are not targeted, these species are highly marketable and also have low rates of discards (1.0% and 1.3%, respectively). Ninety-six percent of the sharks caught 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.

	Number released	Percent released	Kept	Caught
Tuna				
Albacore	1,170	7.0	15,467	16,637
Bigeye tuna	2,760	1.8	149,563	152,323
Bluefin tuna	0	0.0	4	4
Skipjack tuna	1,446	8.8	15,043	16,489
Yellowfin tuna	1,765	5.1	32,761	34,526
Other tuna	5	15.6	27	32
Billfish				
Blue marlin	49	1.2	4,176	4,225
Spearfish	157	1.0	15,308	15,465
Striped marlin	143	1.0	14,266	14,409
Other marlin	7	1.5	459	466
Swordfish	2,111	8.8	21,808	23,919
Other pelagic fish				
Mahimahi	1,180	1.8	66,059	67,239
Moonfish	75	0.5	15,047	15,122
Oilfish	615	2.0	29,451	30,066
Pomfret	188	0.4	42,880	43,068
Wahoo	60	0.4	14,179	14,239
Miscellaneous fish	57	3.9	1,387	1,444
Total (non-shark)	**11,788**	**2.6**	**437,885**	**449,673**
Sharks				
Blue shark	52,730	99.7	182	52,912
Mako shark	2,141	58.0	1,553	3,694
Thresher shark	3,972	89.5	466	4,438
Other sharks	1,256	93.7	85	1,341
Total sharks	**60,099**	**96.3**	**2,286**	**62,385**

Figure 31. Hawaii longline CPUE for major tunas on tuna trips, 1991-2008.



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, declined to a low of 3.4 in 2006, and was 3.8 in 2008. Bigeye tuna CPUE was usually highest in the MHI EEZ.

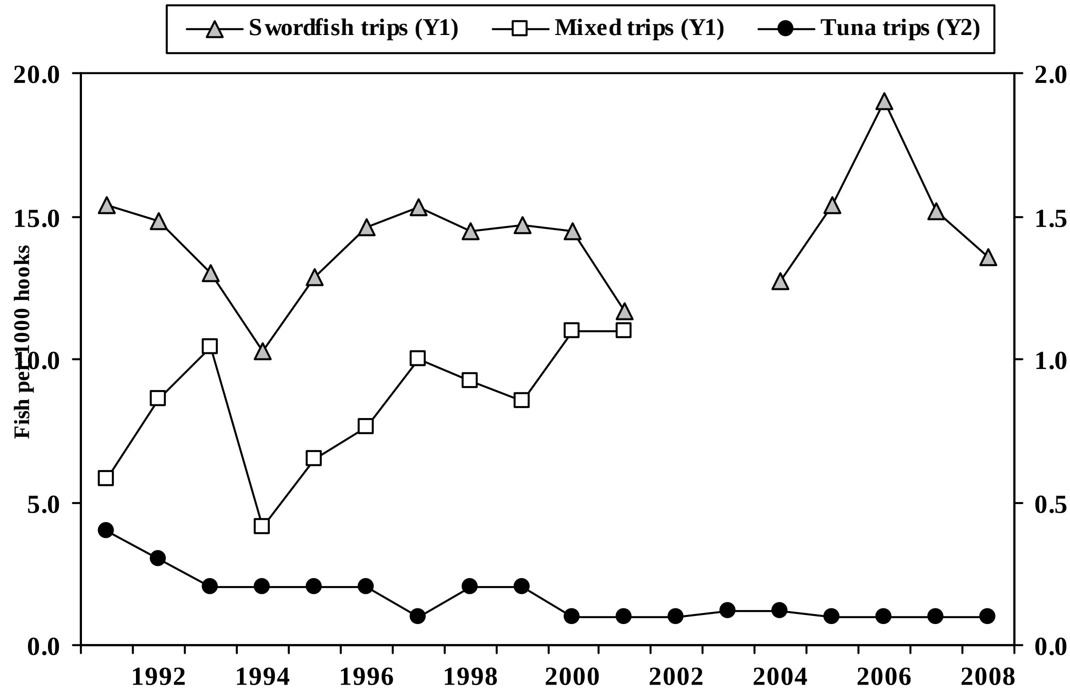
Albacore generally sells for a substantially lower price than bigeye tuna, so it is seldom targeted or is caught incidentally. Albacore CPUE rose rapidly in the early 1990s, peaked in 1997, then declined to a record low of 0.2 fish per 1000 hooks in 2007. Albacore CPUE is usually higher outside of the U.S. EEZ.

CPUE for yellowfin tuna was at its lowest level at 0.5 in 1992, peaked at 2.1 in 2000, declined just below 1.0 two years later and has remained below that level thereafter. High yellowfin tuna CPUEs were observed in the EEZ of Kingman Reef and Palmyra Atoll.

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.

	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
2007	4.1	0.2	0.7
2008	3.8	0.3	0.8
Average	**4.42**	**1.77**	**1.10**
SD	**0.80**	**1.47**	**0.42**

Figure 32. Hawaii longline swordfish CPUE by trip type, 1991-2008.



<u>Interpretation:</u> 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 that 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 19.0 then decreased to 13.6 in 2008.

Tuna-target trips had significantly lower swordfish CPUEs compared to the swordfish targeted trips. Swordfish CPUE was 40 to 200 times lower on tuna-target trips when compared to swordfish-target trips.

<u>Source and Calculation:</u> 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.

	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
2007	15.2	-	0.1
2008	13.6	-	0.1
Average	**14.23**	**8.43**	**0.16**
SD	**1.94**	**2.24**	**0.08**

Figure 33a. Longline blue marlin CPUE by trip type, 1992-2008.

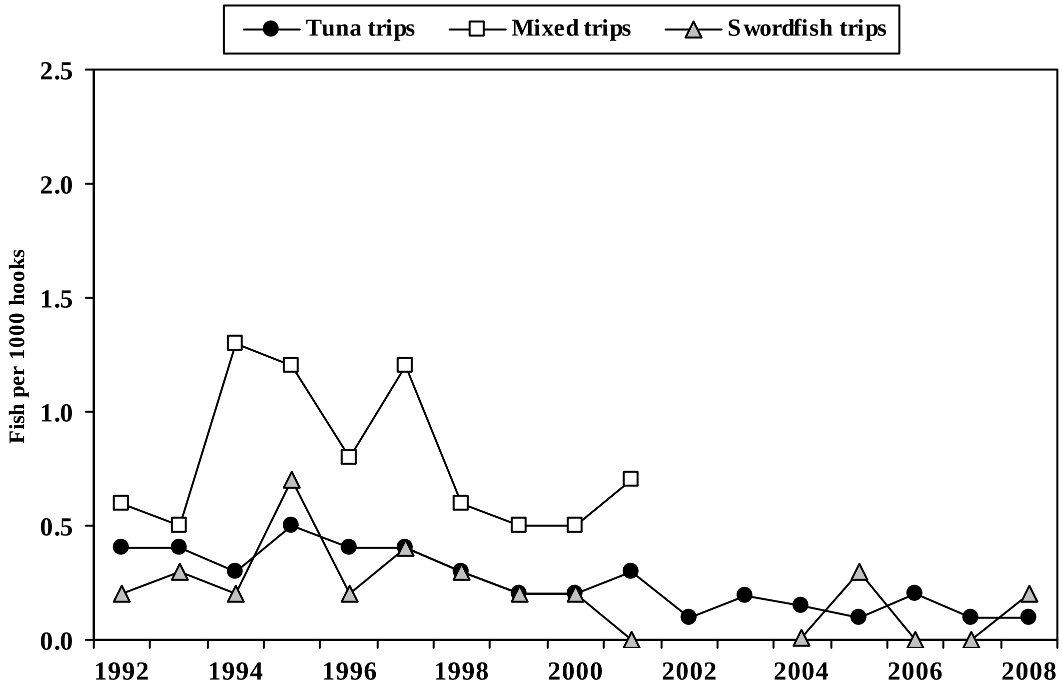
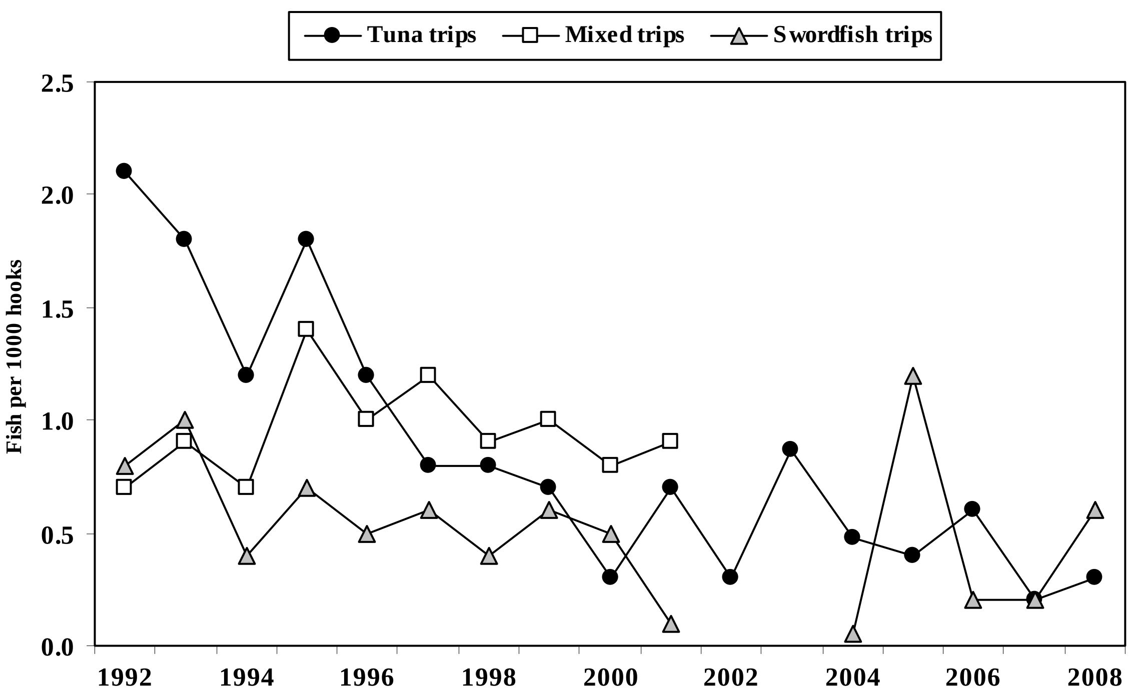


Figure 33b. Longline striped marlin CPUE by trip type, 1992-2008



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. CPUE for both blue marlin and striped marlin were lower in the more recent years of the time series.

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.

	Blue marlin			Striped marlin		
Year	**Tuna trips**	**Mixed trips**	**Swordfish trips**	**Tuna trips**	**Mixed trips**	**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
2007	0.1	-	0.0	0.2	-	0.2
2008	0.1	-	0.2	0.3	-	0.6
Average	**0.26**	**0.79**	**0.21**	**0.86**	**0.95**	**0.52**
SD	**0.13**	**0.32**	**0.18**	**0.58**	**0.22**	**0.32**

Figure 34a. Hawaii longline mahimahi CPUE by trip type, 1991-2008.

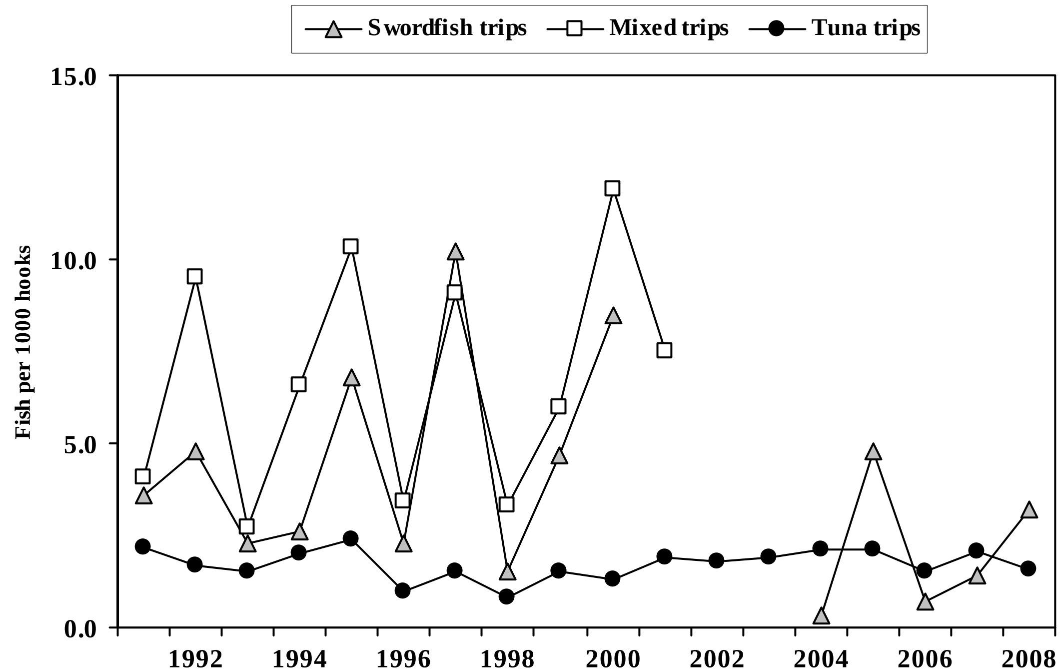
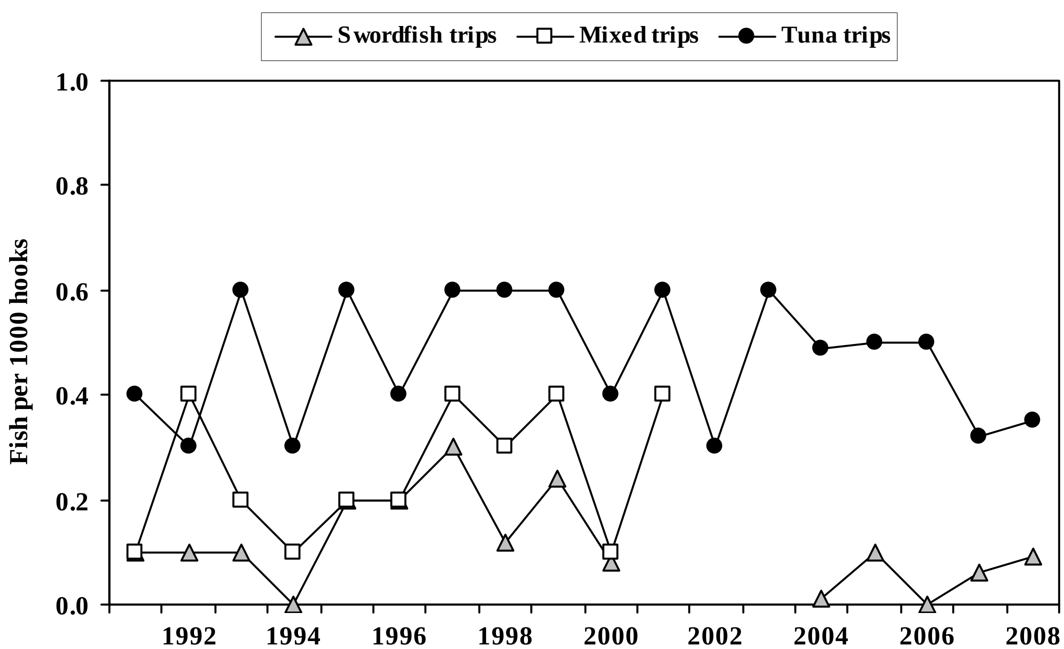


Figure 34b. Hawaii longline ono (wahoo) CPUE by trip type, 1991-2008.



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 with much more annual variability 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 in 2008 was close to its long-term CPUE.

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.

	Mahimahi			Ono		
Year	Tuna trips	Mixed trips	Swordfish trips	Tuna trips	Mixed trips	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
2007	2.1	-	1.4	0.3	-	0.1
2008	1.6	-	3.2	0.4	-	0.1
Average	**1.71**	**6.76**	**3.85**	**0.47**	**0.25**	**0.11**
SD	**0.42**	**3.16**	**2.85**	**0.12**	**0.13**	**0.09**

Figure 35a. Hawaii longline moonfish CPUE by trip type, 1991-2008.

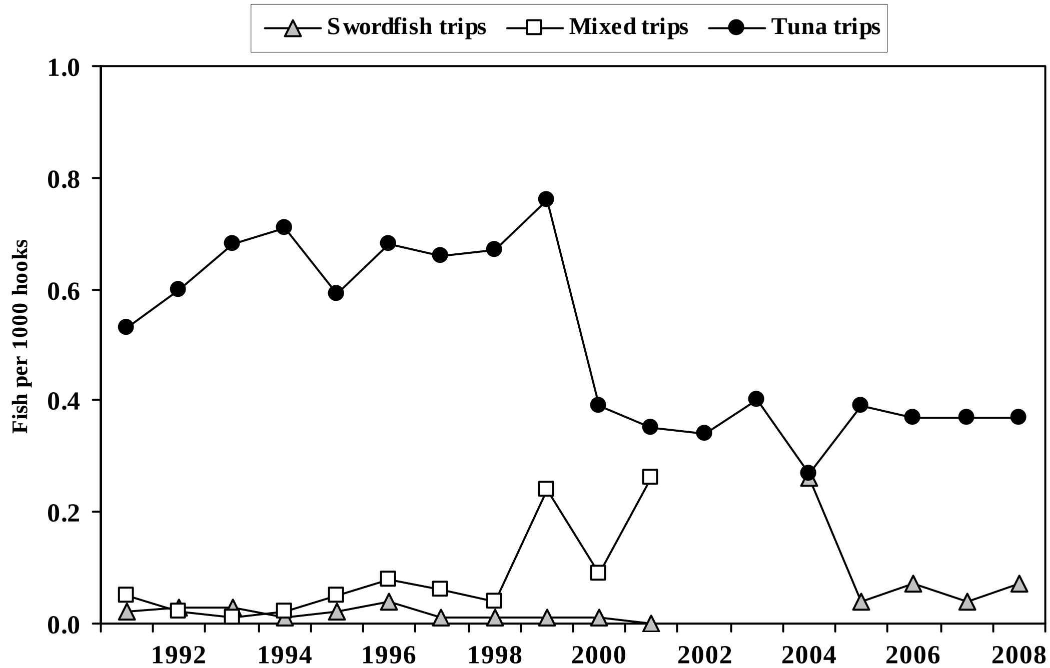
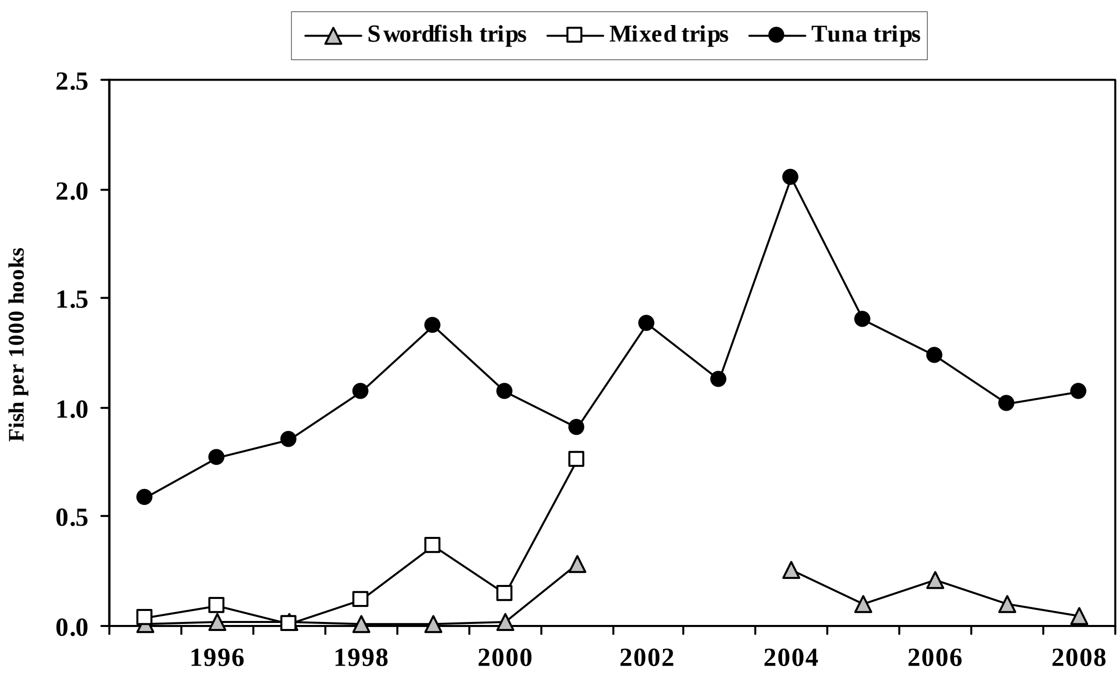


Figure 35b. Hawaii longline pomfret CPUE by trip type, 1994-2008.

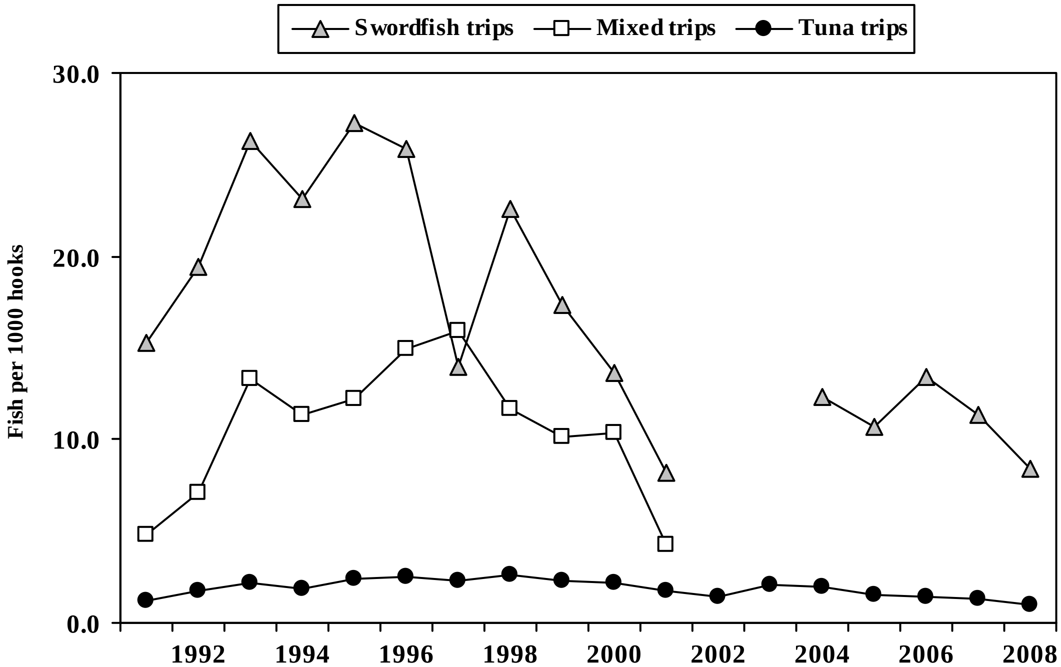


Interpretation: Moonfish and pomfrets were caught incidentally by the longline fishery. There were substantial differences in moonfish and pomfret CPUE among the different trip types. CPUE for both moonfish and pomfret was higher on tuna-target trips. Moonfish CPUE during 2000-2008 appear to be about half compared to the period 1993-1999. Pomfret CPUE showed a general increase from 1995 through 2004 then declined in the following years.

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.

	Moonfish			Pomfret		
Year	Tuna trips	Mixed trips	Swordfish trips	Tuna trips	Mixed trips	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
2007	0.4	-	0.0	1.0	-	0.1
2008	0.4	-	0.1	1.1	-	0.1
Average	**0.51**	**0.08**	**0.04**	**1.14**	**0.22**	**0.09**
SD	**0.16**	**0.09**	**0.06**	**0.35**	**0.27**	**0.10**

Figure 36. Hawaii longline blue shark CPUE by trip type, 1991-2008.

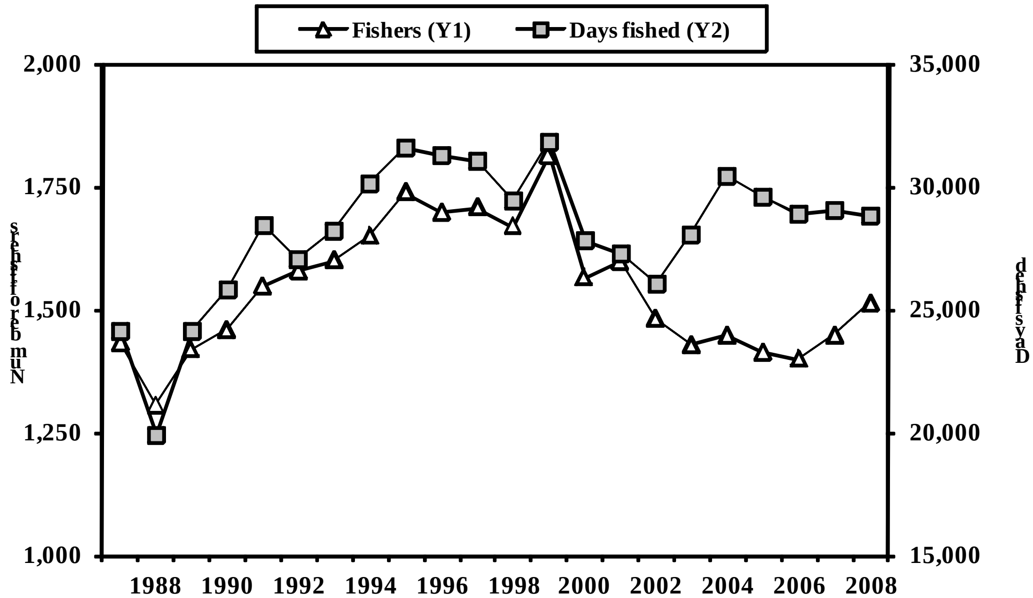


Interpretation: Blue sharks are caught incidentally by the longline fishery. The blue shark CPUE on swordfish-targeted trips is always considerably greater (by about 8-fold) than on tuna-targeted trips. Blue shark CPUE on swordfish targeted trips during 2004-2008 was compared to CPUE in the 1990s One 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
2007	11.3	-	1.3
2008	8.4	-	1.0
Average	**16.82**	**10.56**	**1.87**
SD	**6.46**	**3.83**	**0.48**

Figure 37. Number of Main Hawaiian Islands troll fishers and days fished, 1987-2008.



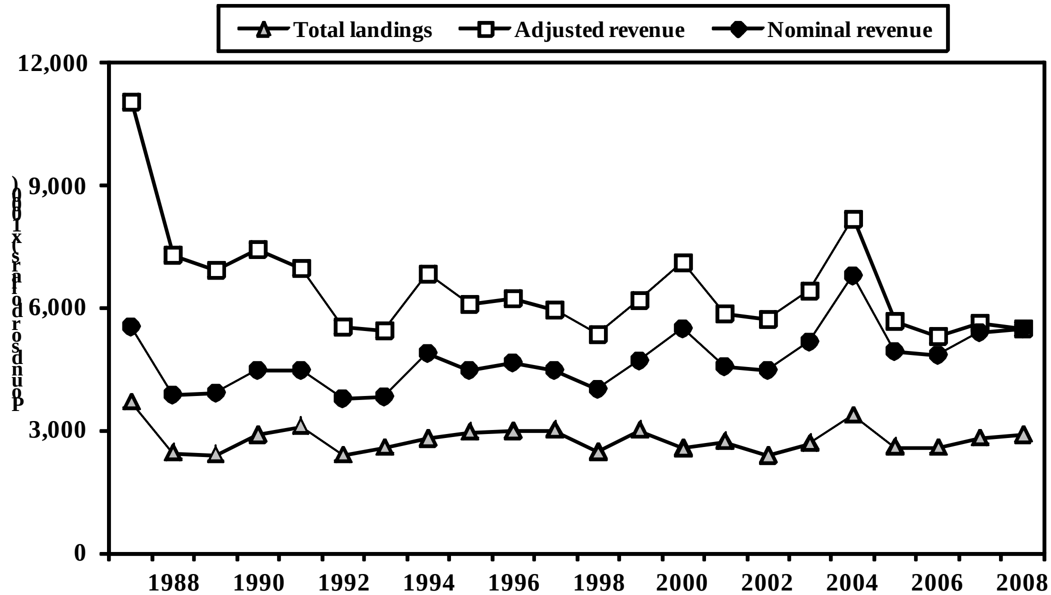
Interpretation: The Main Hawaiian Islands (MHI) troll fishers rose from 1988, peaked in 1999, decreased the following year, and remained relatively low thereafter. There were 1,512 MHI troll fishers in 2008. The pattern for number of days fished by the MHI troll fishery was similar to that of the number of troll fishers up to 2002. The difference between fishers and days fished widens and remains apart up through 2008. The number of days fished by MHI troll fishers was stable from 2004. They fished 28,824 days in 2008.

Year	Fishers	Days fished
1987	1,432	24,092
1988	1,306	19,912
1989	1,418	24,132
1990	1,458	25,830
1991	1,547	28,452
1992	1,578	27,003
1993	1,599	28,170
1994	1,648	30,093
1995	1,737	31,611
1996	1,697	31,238
1997	1,707	31,015
1998	1,669	29,406
1999	1,812	31,801
2000	1,564	27,796
2001	1,597	27,271
2002	1,480	26,070
2003	1,427	28,039
2004	1,447	30,401
2005	1,413	29,571
2006	1,399	28,897
2007	1,447	29,034
2008	1,512	28,824
Average	**1,540.6**	**28,120.8**
SD	**131.1**	**2,843.3**

Source and Calculations: The State of Hawaii, Division of Aquatic Resources (HDAR) issued Commercial Marine Licenses (CMLs) based on the State Fiscal Year (FY); July 1st of one year through June 30th of the following year. A different CML number was issued every FY to each fisher up until the end of FY 1993 (June 30, 1994). To avoid double counting CMLs within a calendar year during this time, the number of fishers was counted as number of unique names of fishermen submitting Commercial Fishing Reports within a calendar year. Beginning in FY 1994, the State began reissuing the same CML number to individual commercial fishers that reapplied for a CML. From this time on the number of MHI troll fishers was counted based on number of unique CMLs submitting Fishing Reports.

The number of days fished by the MHI troll fishery was calculated using the Fishing Report data. A MHI troll day fished is defined as a unique CML number fishing on a unique day for the gear types and fishing areas defined for the MHI troll fishery at the beginning of this module. The number of days fished includes days that fishers did not catch anything or days that fish were caught but not sold.

Figure 38. Main Hawaiian Islands troll landings and revenue, 1987-2008.

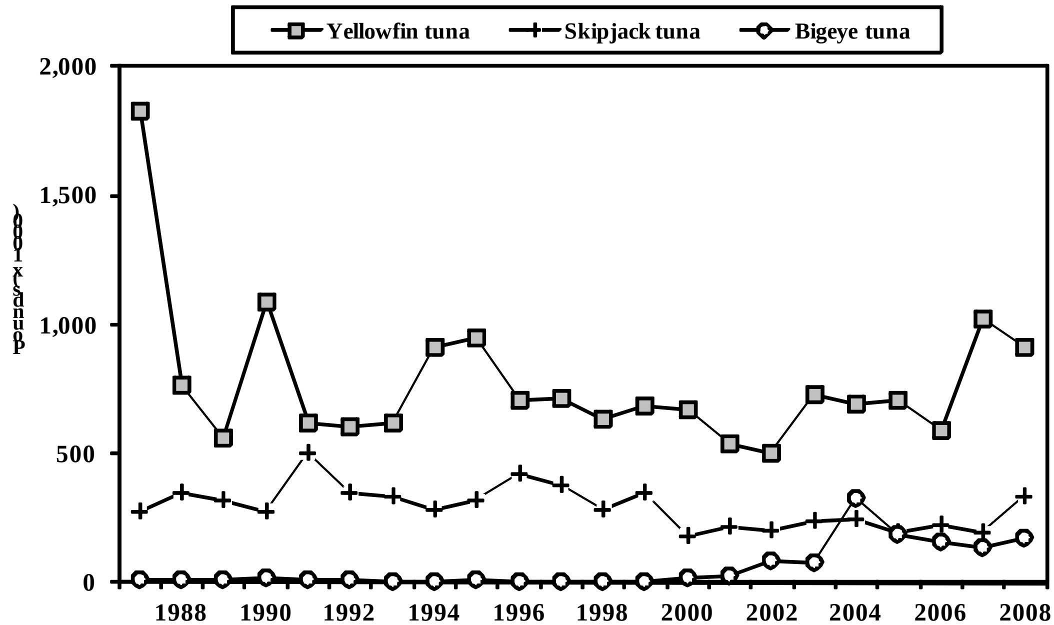


Interpretation: The total landings by the MHI troll fishery in 2008 were 2.9 million pounds worth an estimated $5.5 million. Total landings were close to its long-term average but revenue was 16% below its long-term average. Landings ranged from 2.4 million pounds to 3.7 million pounds from 1987-2008. Adjusted revenue varied substantially from $5.3 million in 2006 to $11.0 million in 1987.

Source and Calculations: Total landings and nominal revenue for the MHI troll fishery were derived from HDAR Commercial Fishing and Marine Dealer Report data. The total landings and nominal revenue values were obtained by adding the landings 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 (2008) Honolulu CPI.

Year	Total landings (1000 lbs)	Adjusted revenue ($1000)	Nominal revenue ($1000)	Honolulu CPI
1987	3,709	$11,029	$5,536	114.9
1988	2,445	$7,288	$3,875	121.7
1989	2,401	$6,935	$3,899	128.7
1990	2,901	$7,449	$4,494	138.1
1991	3,102	$6,955	$4,497	148.0
1992	2,394	$5,552	$3,762	155.1
1993	2,578	$5,456	$3,816	160.1
1994	2,810	$6,814	$4,897	164.5
1995	2,966	$6,088	$4,471	168.1
1996	2,994	$6,235	$4,650	170.7
1997	3,016	$5,975	$4,487	171.9
1998	2,471	$5,353	$4,011	171.5
1999	3,013	$6,188	$4,685	173.3
2000	2,562	$7,111	$5,477	176.3
2001	2,737	$5,869	$4,574	178.4
2002	2,387	$5,705	$4,494	180.3
2003	2,691	$6,435	$5,187	184.5
2004	3,378	$8,170	$6,803	190.6
2005	2,596	$5,695	$4,921	197.8
2006	2,581	$5,291	$4,840	209.4
2007	2,813	$5,643	$5,411	219.5
2008	2,902	$5,473	$5,473	228.9
Average	**2,793.0**	**$6,486.8**	**$4,739.1**	
SD	**335.9**	**$1,282.4**	**$718.5**	

Figure 39. Main Hawaiian Islands troll tuna landings, 1987-2008.

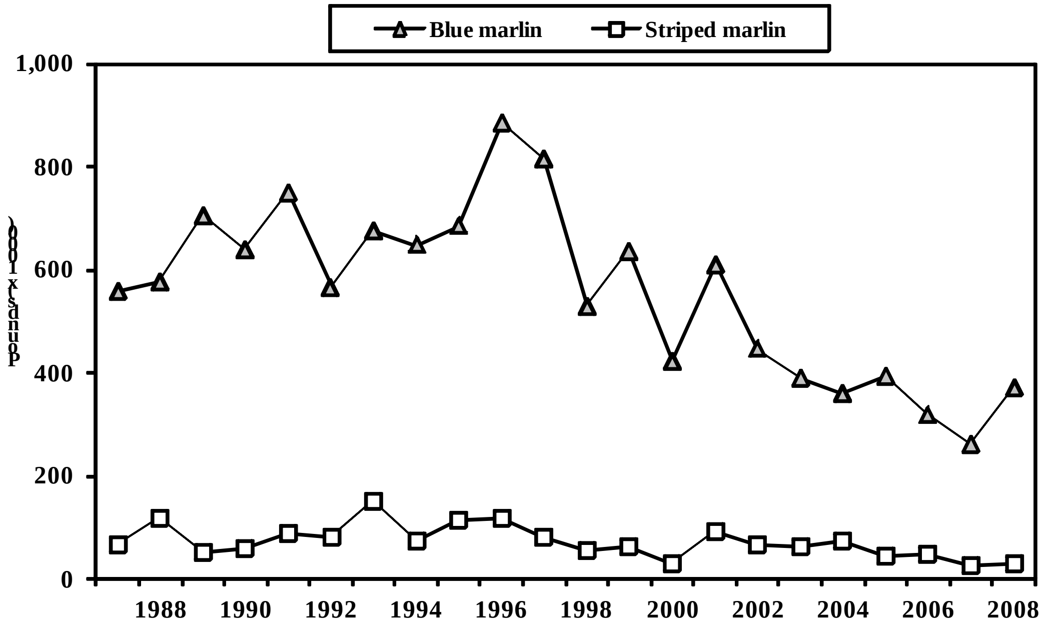


Interpretation: The MHI troll tuna landings was composed predominantly of yellowfin tuna. Yellowfin tuna landings increased dramatically from the mid 1980s, dropped in the late 1980s and remained relatively stable up to 2006 with higher than average landings in 2007 and 2008. Skipjack tuna was the second largest component of the MHI troll landings. Skipjack tuna landings were relatively stable though they have been on a gradual decline. Small quantities of bigeye tuna, albacore, and other tunas were also landed by this fishery.

Source and Calculations: The tuna landing statistics for the MHI troll fishery were derived from HDAR Commercial Fishing and Dealer Report data. The MHI troll fishery tuna landings was calculated by totaling tuna landings by species. Kawakawa and unclassified tunas were combined into the "other tunas" category.

	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	542	215	23	13	5	799
2002	500	203	86	9	6	804
2003	726	237	80	10	27	1,080
2004	690	246	328	7	45	1,316
2005	706	191	188	14	15	1,115
2006	587	220	154	2	12	975
2007	1,022	192	138	7	11	1,370
2008	909	336	174	3	12	1,434
Average	**774.3**	**293.3**	**58.9**	**9.8**	**13.4**	**1,149.9**
SD	**283.6**	**81.9**	**86.0**	**18.0**	**8.9**	**288.6**

Figure 40. Main Hawaiian Islands troll billfish landings, 1987-2008.



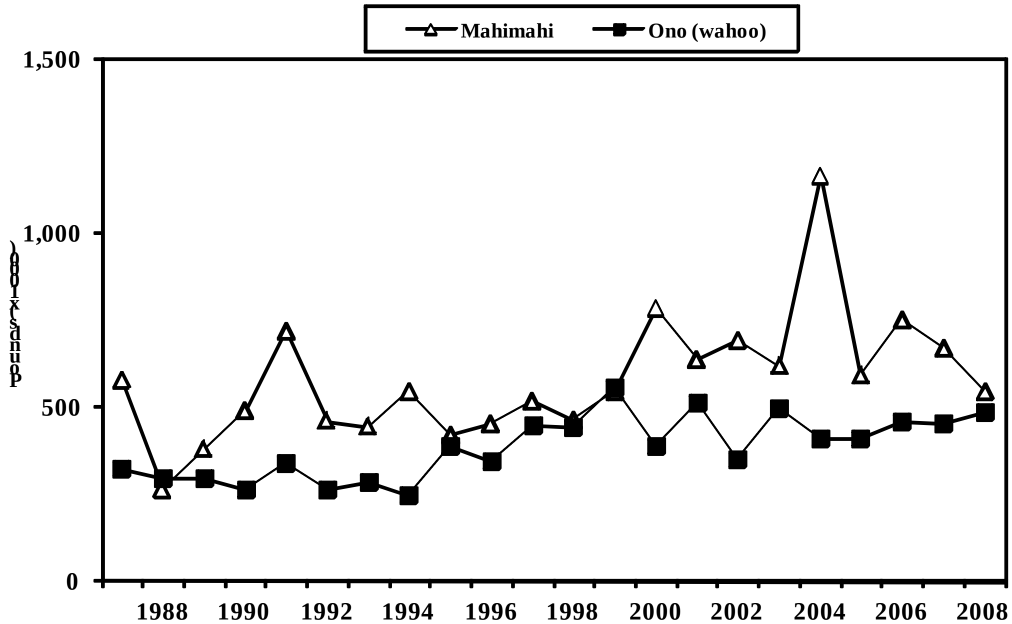
Interpretation: Billfish landings by the MHI troll fishery in 2008 were 431,000 pounds, 36% below the long-term average. Landings of billfish by the MHI troll fishery consisted primarily of blue marlin. Blue marlin landings have been on a decreasing trend from a peak of 885,000 pounds in 1996 to a low of 254,000 pounds in 2007, increasing slightly in 2008. 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 landings statistics for the MHI troll fishery were derived from HDAR Commercial Fishing and Marine Dealer Report data. Billfish landings by the MHI troll fishery was calculated by totaling billfish landings 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	5	506
2001	608	93	75	4	780
2002	446	65	22	3	535
2003	390	63	37	1	491
2004	360	74	46	0	481
2005	394	43	35	1	473
2006	318	47	29	1	395
2007	262	28	23	2	315
2008	370	30	30	1	431
Average	**555.8**	**72.8**	**42.1**	**1.4**	**672.2**
SD	**167.7**	**31.8**	**13.3**	**1.2**	**195.5**

Figure 41. Main Hawaiian Islands troll landings of other pelagic MUS, 1987-2008.

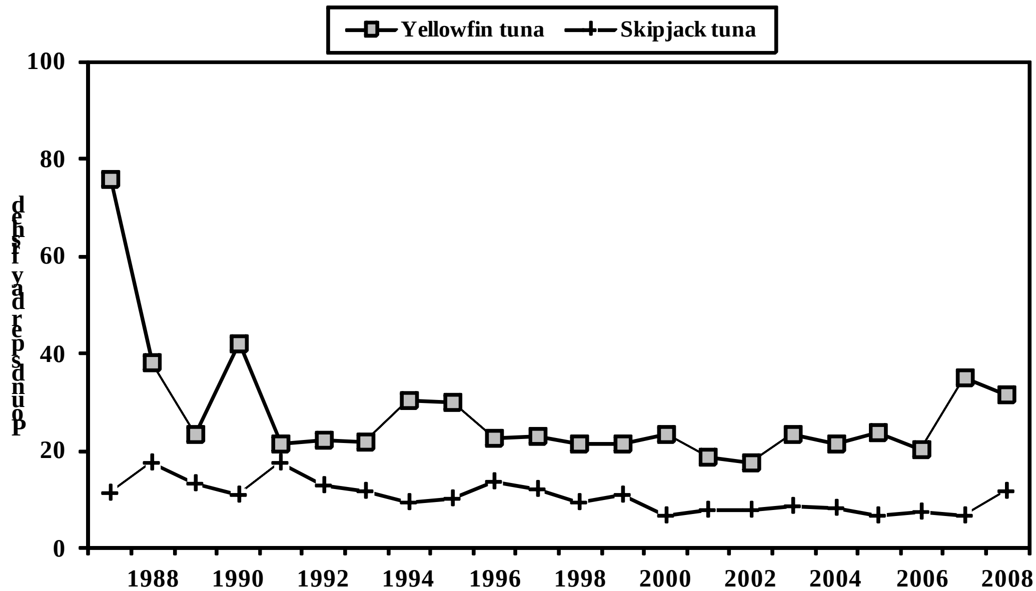


Interpretation: Landings of other pelagic MUS species by the MHI troll fishery in 2008 was 1.0 million pounds, 7% above the long-term average. Mahimahi and ono comprised majority of these landings. Mahimahi landings was 6% below its long-term average while ono landings was 27% above the long-term average in 2008.

Source and Calculations: The other pelagic catch statistics for the MHI troll fishery were derived from HDAR Commercial Fishing and Dealer data. Other pelagic landings by the MHI troll fishery were calculated by totaling other pelagic landings 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	1,178
2001	637	516	6	1,159
2002	693	350	4	1,048
2003	618	498	3	1,119
2004	1,166	412	3	1,581
2005	592	413	4	1,009
2006	752	457	3	1,212
2007	670	455	3	1,128
2008	544	489	4	1,037
Average	**578.9**	**385.3**	**6.9**	**971.0**
SD	**183.1**	**90.8**	**3.8**	**226.1**

Figure 42. Main Hawaiian Islands troll tuna CPUE (pounds per fished and pounds per hour fished), 1987-2008.



Interpretation: MHI troll yellowfin tuna CPUE was consistently higher than skipjack tuna CPUE. Yellowfin tuna CPUE was 32 pounds per day fished in 2008; 14% above the long-term average CPUE. Yellowfin tuna pounds per trip peaked at 76 pounds in 1987 and dropped to of 23 pounds per trip in 1989 and remained close to that level thereafter. Skipjack tuna CPUE was 12 pounds in 2008; above its long-term average for the first time in the past nine years. CPUE for MHI troll pounds per hour fished was above the long-term average in 2008.

Source and Calculations: HDAR commercial fishing report data was used to calculate MHI troll yellowfin tuna and skipjack tuna CPUEs. MHI troll pounds per trip was derived by dividing pounds of yellowfin tuna and skipjack tuna by the number of MHI troll days fished. MHI troll pounds per hour fished was calculated by dividing the pounds of yellowfin tuna and skipjack tuna by the hours trolled in the MHI. The number of days fished includes days that fishers did not catch anything or days that fish were caught but not sold.

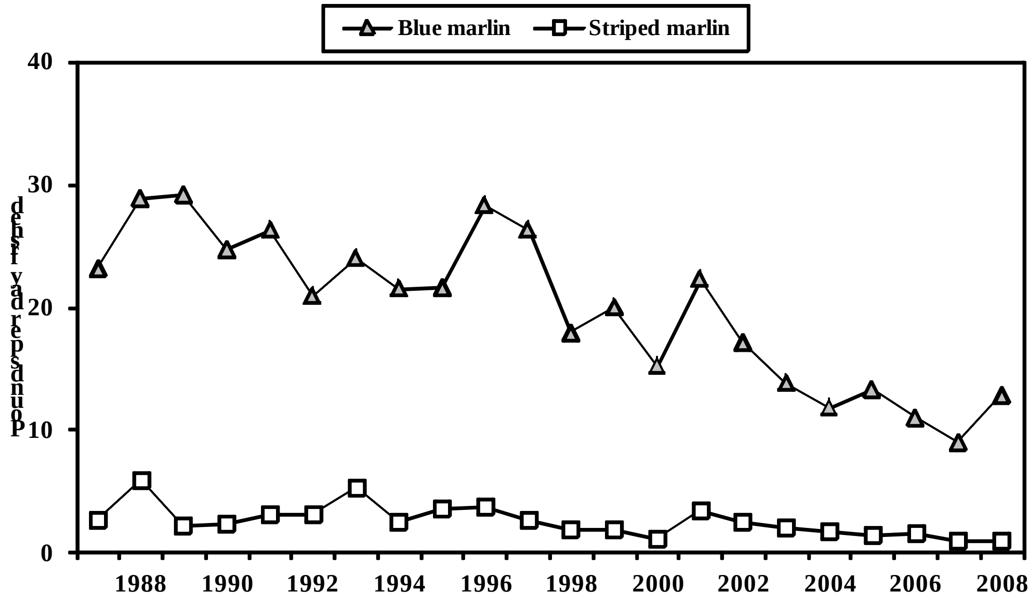
MHI troll tuna CPUE (pounds per day fished)

Year	Yellowfin tuna	Skipjack tuna
1987	75.9	11.5
1988	38.3	17.6
1989	23.2	13.2
1990	42.2	10.8
1991	21.6	17.7
1992	22.4	12.9
1993	21.9	11.8
1994	30.4	9.4
1995	30.0	10.0
1996	22.6	13.6
1997	23.0	12.1
1998	21.6	9.5
1999	21.6	10.9
2000	23.3	6.5
2001	18.7	7.9
2002	17.4	7.8
2003	23.3	8.5
2004	21.3	8.1
2005	23.9	6.5
2006	20.3	7.6
2007	35.2	6.6
2008	31.5	11.7
Average	**27.71**	**10.55**
SD	**12.55**	**3.19**

MHI troll tuna CPUE (pounds per hours fished)

Year	Yellowfin tuna	Skipjack tuna
2003	3.9	1.4
2004	3.6	1.4
2005	4.0	1.1
2006	3.5	1.3
2007	5.9	1.1
2008	5.4	2.0
Average	**4.39**	**1.38**
SD	**1.03**	**0.33**

Figure 43. Main Hawaiian Island troll marlin CPUE (pounds per day fished and pounds per hour fished), 1987-2008.



Interpretation: MHI troll pounds per day fished for blue marlin was substantially higher compared to the CPUE for striped marlin. CPUE for both blue marlin and striped marlin in 2008 was below their long-term average by 36% and 65%, respectively. Blue marlin and striped marlin CPUE were both below their long-term average for the past seven years. The CPUE for both blue marlin and striped marlin appeared to be on a downward trend from the mid 1990s. CPUE for MHI troll pounds per hours fished was close to its long-term average in 2008.

Source and Calculations: The MHI troll CPUE (pounds per day fished and pounds per hour fished) was calculated from the HDAR Commercial Fishing Report data. MHI troll blue marlin and striped marlin landings divided by the MHI troll the number of days fished. MHI troll pounds per hour fished was derived by dividing the MHI troll pounds landed per day by the hours trolled for that day. The number of days fished includes days that fishers did not catch anything or days that fish were caught but not sold.

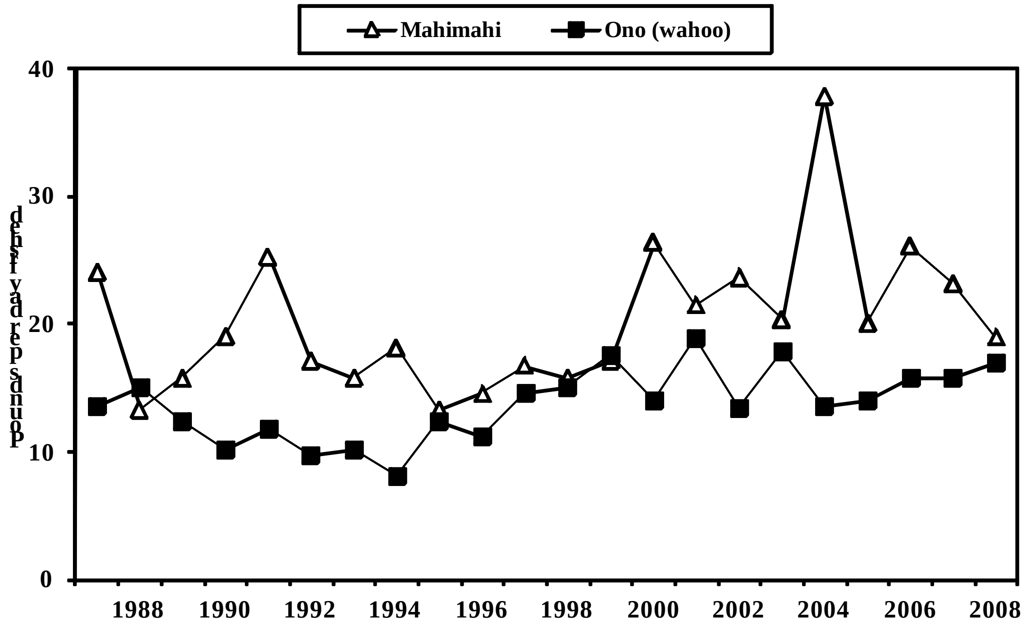
MHI troll marlin CPUE (pounds per day fished)

Year	Blue marlin	Striped marlin
1987	23.1	2.7
1988	28.9	5.9
1989	29.2	2.2
1990	24.7	2.3
1991	26.3	3.1
1992	20.9	3.1
1993	24.0	5.3
1994	21.5	2.5
1995	21.6	3.6
1996	28.3	3.8
1997	26.3	2.7
1998	17.9	1.9
1999	20.0	1.9
2000	15.2	1.1
2001	22.3	3.4
2002	17.1	2.5
2003	13.8	2.0
2004	11.8	1.7
2005	13.3	1.5
2006	11.0	1.6
2007	9.0	1.0
2008	12.8	0.9
Average	**19.95**	**2.58**
SD	**6.21**	**1.27**

MHI troll marlin CPUE (pounds per hours fished)

Year	Blue marlin	Striped marlin
2003	2.3	0.3
2004	2.0	0.3
2005	2.3	0.3
2006	1.9	0.3
2007	1.5	0.2
2008	2.2	0.2
Average	**2.02**	**0.25**
SD	**0.30**	**0.08**

Figure 44. Main Hawaiian Island troll mahimahi and ono CPUE (pounds per day fished and pounds per hour fished, 1987-2008.



Interpretation: MHI troll pounds per day fished for mahimahi was slightly higher and more variable compared to the CPUE for ono. The CPUE for blue marlin was below its long-term average by 6% while striped marlin CPUE was 24% above its long-term average in 2008. Mahimahi and ono CPUE both show a gradual increase from the mid-1990s with a record CPUE from mahimahi in 2004. The MHI troll pounds per hours fished for mahimahi and ono was 3.3 and 2.9, respectively in 2008.

Source and Calculations: The MHI troll CPUE (pounds per day fished and pounds per hour fished) was calculated from the HDAR Commercial Fishing Report data. MHI troll mahimahi and ono landings divided by the MHI troll the number of days fished. MHI troll pounds per hour fished was derived by dividing the MHI troll pounds landed per day by the hours trolled for that day. The number of days fished includes days that fishers did not catch anything or days that fish were caught but not sold.

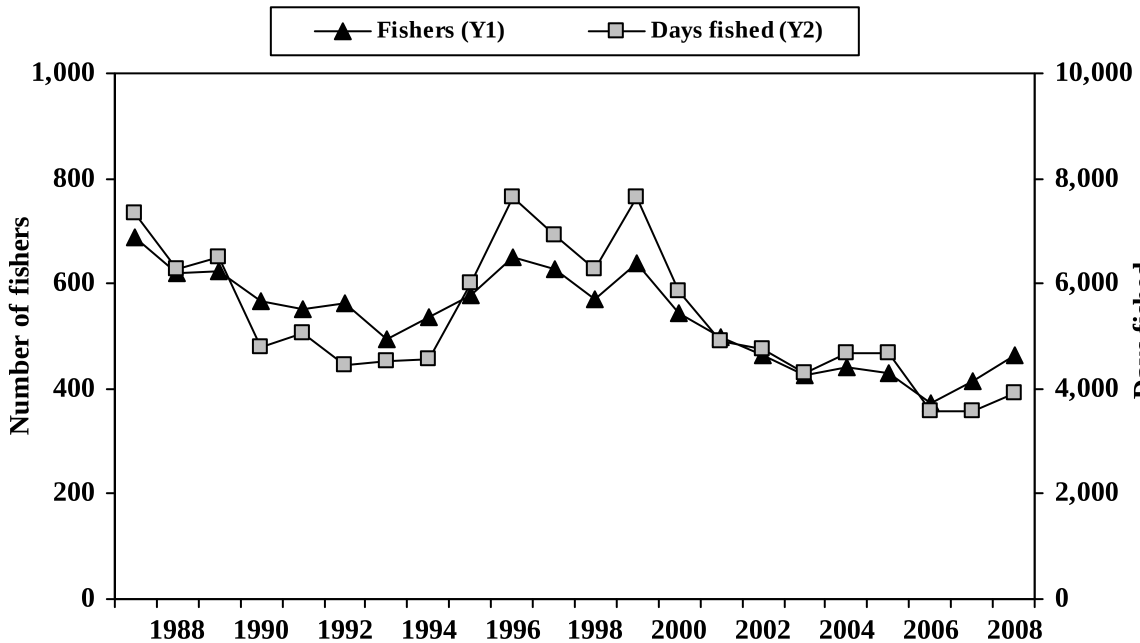
MHI troll mahimahi and ono CPUE (pounds per day fished)

Year	Mahimahi	Ono (wahoo)
1987	24.0	13.5
1988	13.3	15.0
1989	15.7	12.3
1990	19.0	10.1
1991	25.2	11.8
1992	17.1	9.7
1993	15.8	10.2
1994	18.1	8.1
1995	13.3	12.3
1996	14.5	11.1
1997	16.7	14.6
1998	15.8	15.0
1999	17.1	17.5
2000	26.3	13.9
2001	21.4	18.9
2002	23.6	13.4
2003	20.3	17.8
2004	37.7	13.5
2005	20.0	14.0
2006	26.0	15.8
2007	23.1	15.7
2008	18.9	17.0
Average	**20.13**	**13.69**
SD	**5.62**	**2.84**

MHI troll mahimahi and ono CPUE (pounds per hours fished)

Year	Mahimahi	Ono (wahoo)
2003	3.4	3.0
2004	6.3	2.3
2005	3.4	2.4
2006	4.4	2.7
2007	3.9	2.6
2008	3.3	2.9
Average	**4.11**	**2.64**
SD	**1.16**	**0.29**

Figure 45. Number of Main Hawaiian Islands handline fishers and days fished, 1987-2008.



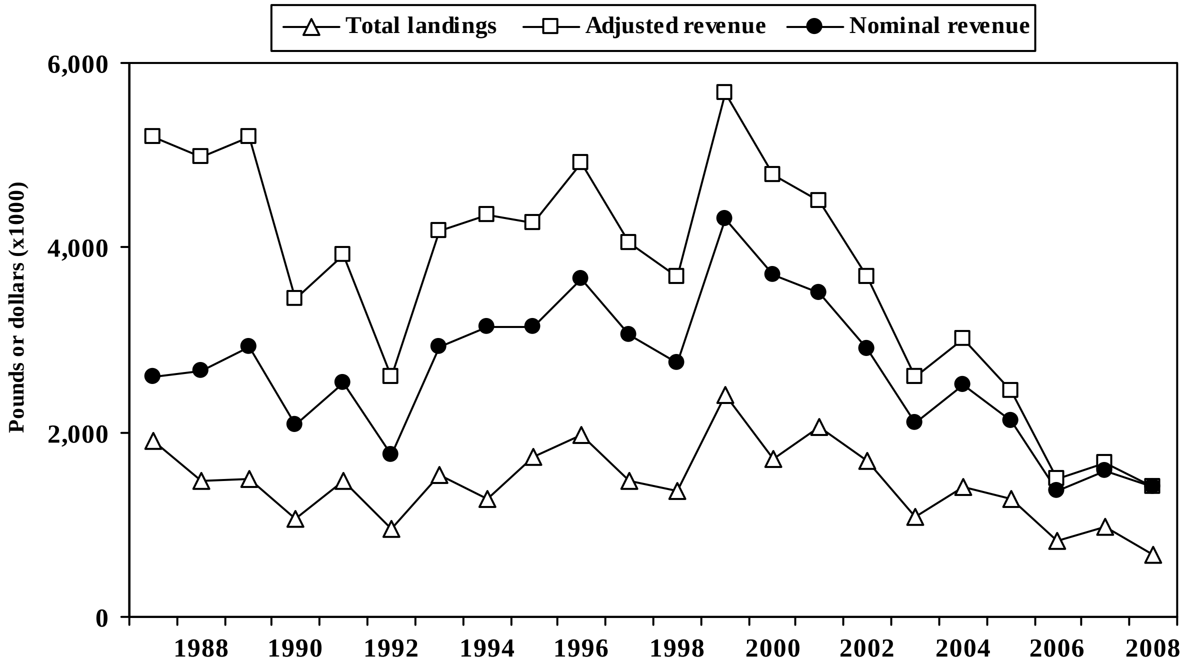
<u>Interpretation:</u> There were 462 MHI handline fishers that fished 3,921 days in 2008. Both measures of effort were below their respective long-term averages. In general, the MHI handline effort was on a downward trend from 1999.

Year	Fishers	Days fished
1987	690	7,356
1988	620	6,280
1989	625	6,511
1990	567	4,791
1991	550	5,072
1992	564	4,462
1993	493	4,537
1994	538	4,548
1995	579	6,022
1996	650	7,655
1997	628	6,911
1998	572	6,259
1999	637	7,625
2000	544	5,862
2001	498	4,912
2002	463	4,770
2003	425	4,315
2004	442	4,658
2005	429	4,692
2006	373	3,577
2007	415	3,581
2008	462	3,921
Average	**534.7**	**5,378.0**
SD	**88.2**	**1,272.3**

<u>Source and Calculations:</u> The State of Hawaii, Division of Aquatic Resources (HDAR) issued Commercial Marine Licenses (CMLs) based on the State Fiscal Year (FY); July 1st of one year through June 30th of the following year. A different CML number was issued every FY to each fisher up until the end of FY 1993(June 30, 1994). To avoid double counting CMLs within a calendar year during this time, the number of fishers was counted as number of unique names of fishermen submitting Commercial Fishing Reports within a calendar year. Beginning in FY 1994, the State began reissuing the same CML number to individual commercial fishers that reapplied for a CML. From this time on the number of MHI handline fishers was counted based on number of unique CMLs submitting Fishing Reports.

The number of days fished by the MHI handline fishery was calculated using the Commercial Fishing Report data. A MHI handline day fished is defined as a unique CML number fishing on a unique day for the gear types and fishing areas defined for the MHI handline fishery at the beginning of this module. The number of days fished includes days that fishers did not catch anything or days that fish were caught but not sold.

Figure 46. Main Hawaiian Island handline landings and revenue, 1987-2008.

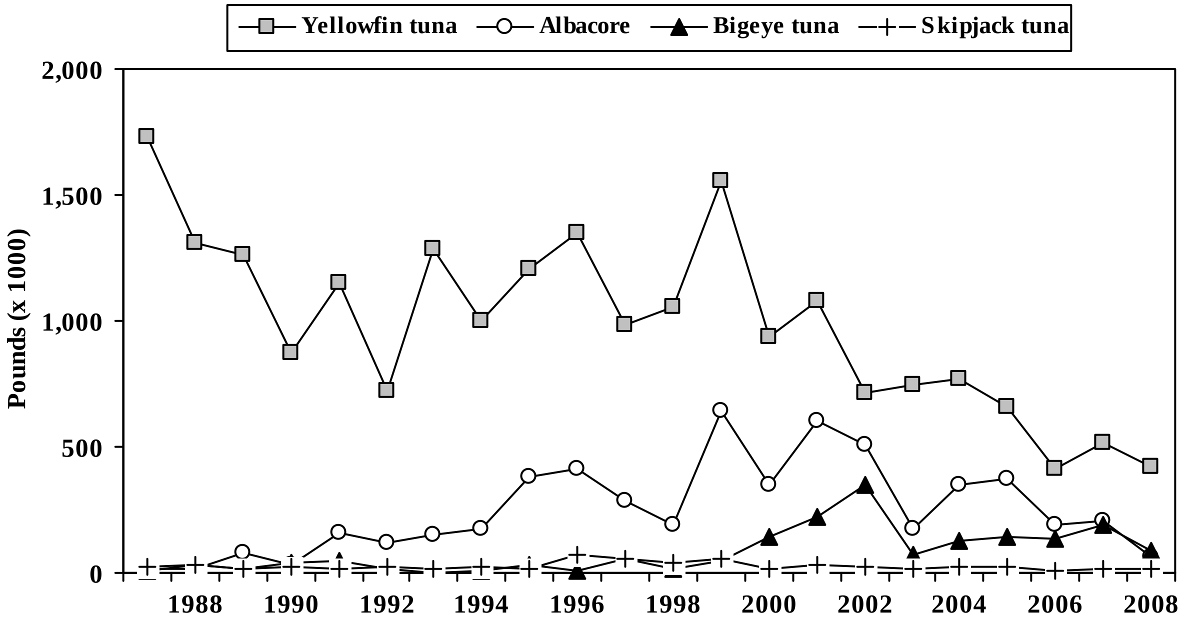


Interpretation: Total landings by the MHI handline fishery were a record low 680,000 pounds, worth an estimated $1.4 million in 2008. Total landings and revenue by this fishery was below the long-term values by 53% and 62%, respectively. The recent pattern for MHI handline fishery landings and revenue 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 Fishing and Marine Dealer Report data. The total landings and nominal revenue values were obtained by adding the landings 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 (2008) Honolulu CPI.

Year	Total landings (1000 lbs)	Adjusted revenue ($1000)	Nominal revenue ($1000)	Honolulu CPI
1987	1,914	$5,192	$2,606	114.9
1988	1,471	$4,992	$2,654	121.7
1989	1,487	$5,197	$2,922	128.7
1990	1,060	$3,454	$2,084	138.1
1991	1,477	$3,916	$2,532	148.0
1992	945	$2,589	$1,754	155.1
1993	1,532	$4,181	$2,924	160.1
1994	1,287	$4,362	$3,135	164.5
1995	1,733	$4,274	$3,139	168.1
1996	1,963	$4,920	$3,669	170.7
1997	1,479	$4,053	$3,044	171.9
1998	1,369	$3,682	$2,759	171.5
1999	2,413	$5,681	$4,301	173.3
2000	1,711	$4,797	$3,695	176.3
2001	2,066	$4,500	$3,507	178.4
2002	1,695	$3,693	$2,909	180.3
2003	1,083	$2,600	$2,096	184.5
2004	1,404	$3,013	$2,509	190.6
2005	1,283	$2,448	$2,115	197.8
2006	816	$1,484	$1,358	209.4
2007	980	$1,658	$1,590	219.5
2008	680	$1,414	$1,414	228.9
Average	**1,447.6**	**$3,731.9**	**$2,668.9**	
SD	**426.8**	**$1,260.9**	**$771.9**	

Figure 47. Main Hawaiian Island handline tuna landings, 1987-2008.

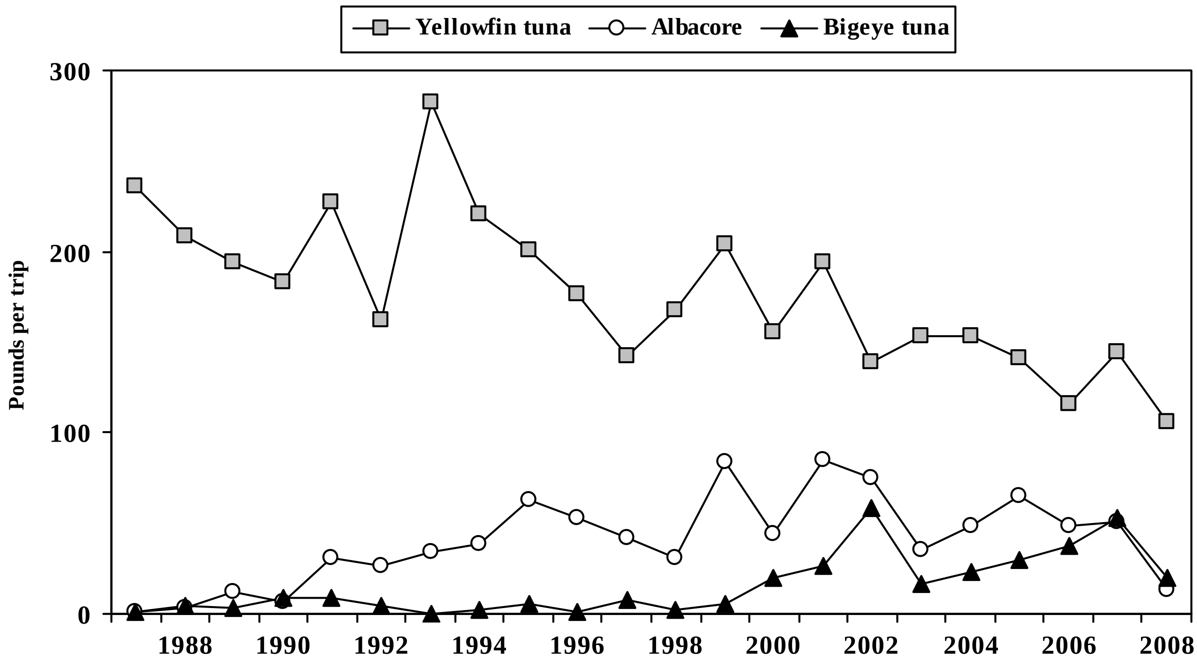


Interpretation: MHI handline tuna landings in 2008 were 586,000 pounds, 57% below the long-term average. The largest component of tuna landings by the MHI handline fishery was yellowfin tuna, followed by bigeye tuna and albacore. Yellowfin tuna landings by MHI handline fishery were 58% below the long-term average. Albacore landings was 75% below is long-term averages while bigeye tuna was up 5% its long-term average.

Source and Calculations: The tuna landing statistics for the MHI handline fishery were derived from HDAR Commercial Fishing and Dealer Report data. The MHI handline fishery tuna landings was calculated by totaling tuna landings by species. Kawakawa and unclassified tunas were combined into 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	347	141	14	2	1,440
2001	1,078	605	226	30	4	1,942
2002	711	511	353	20	3	1,598
2003	746	176	74	16	4	1,015
2004	770	351	125	23	17	1,286
2005	662	370	142	21	5	1,201
2006	413	188	135	10	2	749
2007	518	208	188	15	3	931
2008	417	62	86	19	3	586
Average	**988.9**	**248.6**	**81.7**	**26.1**	**5.1**	**1,350.3**
SD	**353.4**	**183.2**	**88.0**	**15.0**	**3.5**	**407.9**

Figure 48. Main Hawaiian Island handline tuna CPUE (pounds per day fished & pounds per hour fished), 1987-2008.



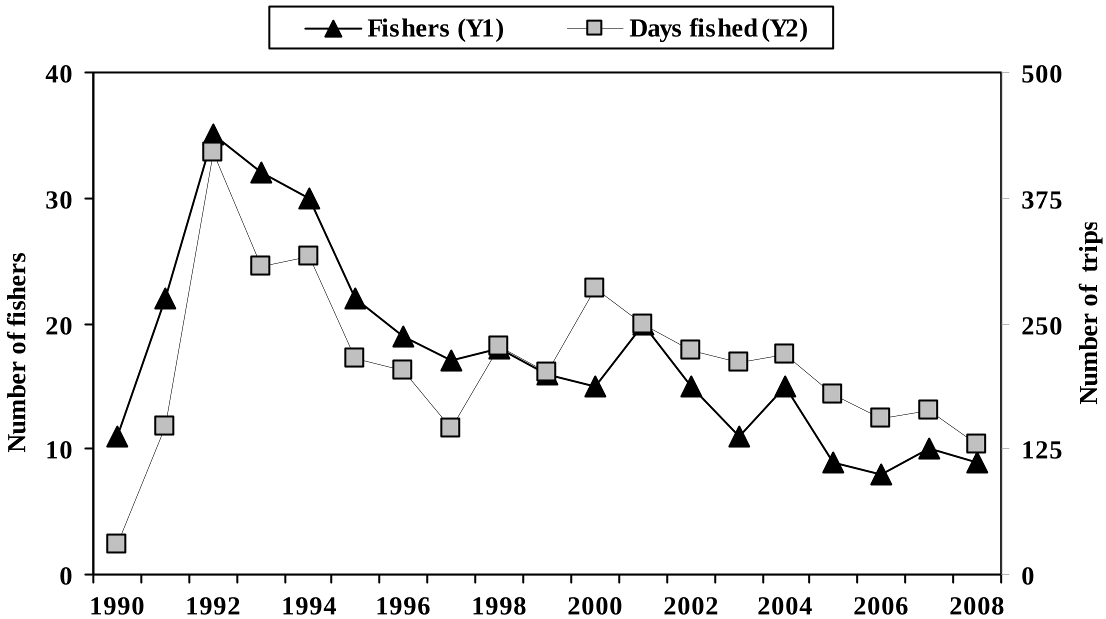
Interpretation: MHI handline tuna CPUE (pounds per day fished) in 2008 was 40% lower than the long-term average. Yellowfin tuna CPUE, the dominant component of the handline landings, was 106 pounds per trip in 2008; 40% below its long-term average. Albacore and bigeye tuna CPUE were above their respective long term averages. The pounds of tuna per hour fished for the MHI handline fishery in 2008 was also below the long-term average.

Year	MHI handline CPUE (pounds per day fished) Yellowfin tuna	Albacore	Bigeye tuna	Total
1987	235.7	1.6	0.8	242.3
1988	208.7	2.9	4.5	222.1
1989	194.4	11.9	2.9	214.0
1990	182.8	6.5	8.6	204.8
1991	227.4	30.9	8.9	272.1
1992	161.8	26.0	4.3	198.3
1993	282.8	33.9	0.4	321.4
1994	220.5	38.7	2.2	266.7
1995	200.4	63.1	5.4	272.7
1996	176.6	53.4	1.4	241.0
1997	142.7	41.5	7.5	200.3
1998	168.0	30.5	2.4	207.4
1999	204.5	84.2	6.0	301.9
2000	155.0	44.3	20.3	222.4
2001	193.9	84.9	26.3	312.0
2002	139.2	74.9	58.0	276.9
2003	153.8	34.8	16.3	209.7
2004	153.8	48.3	23.6	234.3
2005	141.1	65.6	30.3	242.6
2006	115.5	48.3	37.8	205.2
2007	144.6	51.0	52.4	252.9
2008	106.4	13.4	20.4	145.6
Average	**177.71**	**40.48**	**15.49**	**243.41**
SD	**42.30**	**24.63**	**16.70**	**38.85**

Source and Calculations: HDAR commercial fishing report data was used to calculate MHI handline tuna CPUEs. MHI handline pounds per trip was derived by dividing pounds of tuna landings by the number of MHI handline days fished. MHI handline pounds per hour fished was calculated by dividing the pounds of tuna by the hours handline fishing in the MHI. The number of days fished includes days that fishers did not catch anything or days that fish were caught but not sold.

Year	MHI handline CPUE (pounds per hour fished) Yellowfin tuna	Albacore	Bigeye tuna	Total
2003	21.5	4.9	2.3	29.3
2004	21.5	6.8	3.3	32.8
2005	20.3	9.4	4.4	34.9
2006	17.3	7.2	5.6	30.6
2007	22.6	8.0	8.2	39.5
2008	16.7	2.1	3.2	22.9
Average	**19.98**	**6.40**	**4.50**	**31.67**
SD	**2.43**	**2.57**	**2.14**	**5.60**

Figure 49. Number of offshore handline fishers and days fished, 1990-2008.



Interpretation: The offshore tuna handline fishery had 9 fishers that fished 129 days in 2008, slightly less than the previous year but below their respective long-term averages. Both number of fishers and days fished peaked in early 1990s and declined slowly from 2000.

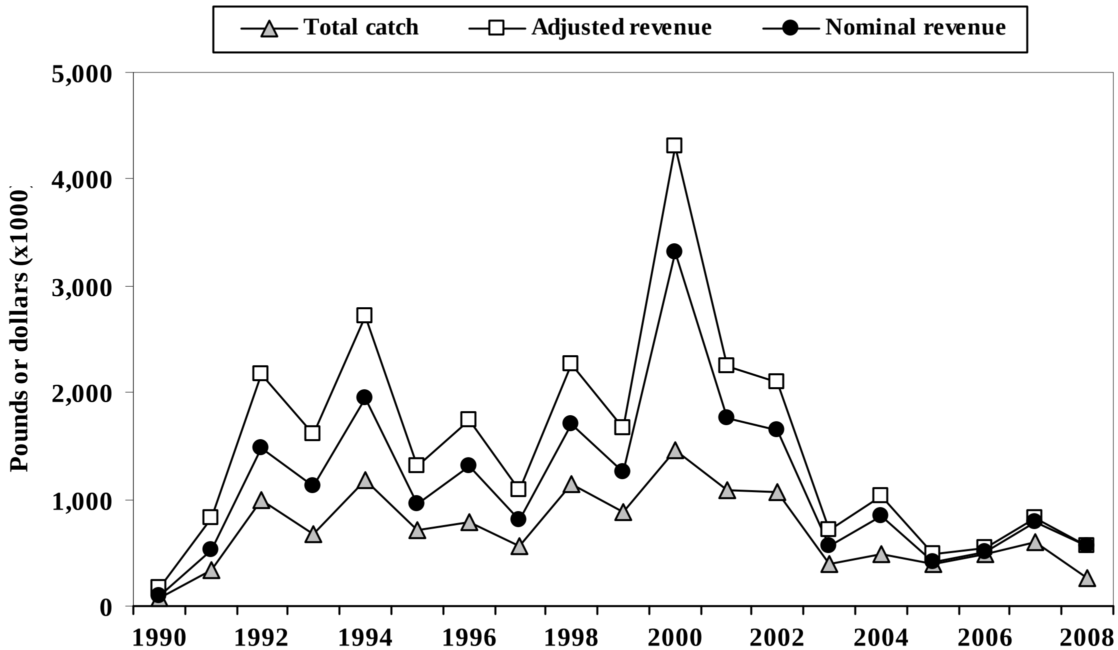
Year	Fishers	Days fished
1990	11	29
1991	22	148
1992	35	420
1993	32	307
1994	30	316
1995	22	216
1996	19	204
1997	17	145
1998	18	228
1999	16	202
2000	15	284
2001	20	250
2002	15	223
2003	11	212
2004	15	220
2005	9	180
2006	8	155
2007	10	164
2008	9	129
Average	**17.6**	**212.2**
SD	**7.9**	**83.6**

Source and Calculations: The State of Hawaii, Division of Aquatic Resources (HDAR) issued Commercial Marine Licenses (CMLs) based on the State Fiscal Year (FY); July 1st of one year through June 30th of the following year. A different CML number was issued every FY to each fisher up until the end of FY 1993 (June 30, 1994). To avoid double counting CMLs within a calendar year during this time, the number of fishers was counted as number of unique names of fishermen submitting Commercial Fishing Reports within a calendar year. Beginning in FY 1994, the State began reissuing the same CML number to individual commercial fishers that reapplied for a CML. From this time on the number of offshore handline fishers was counted based on number of unique CMLs submitting Fishing Reports.

The number of days fished by the offshore handline fishery was calculated using the Commercial Fishing Report data. A offshore handline day fished is defined as a unique CML number fishing on a unique day for the gear types and fishing areas defined for the offshore handline fishery at the beginning of this module. The number of days fished includes days that fishers did not catch anything or days that fish were caught but not sold.

.

Figure 50. Offshore handline landings and revenue, 1990-2008.

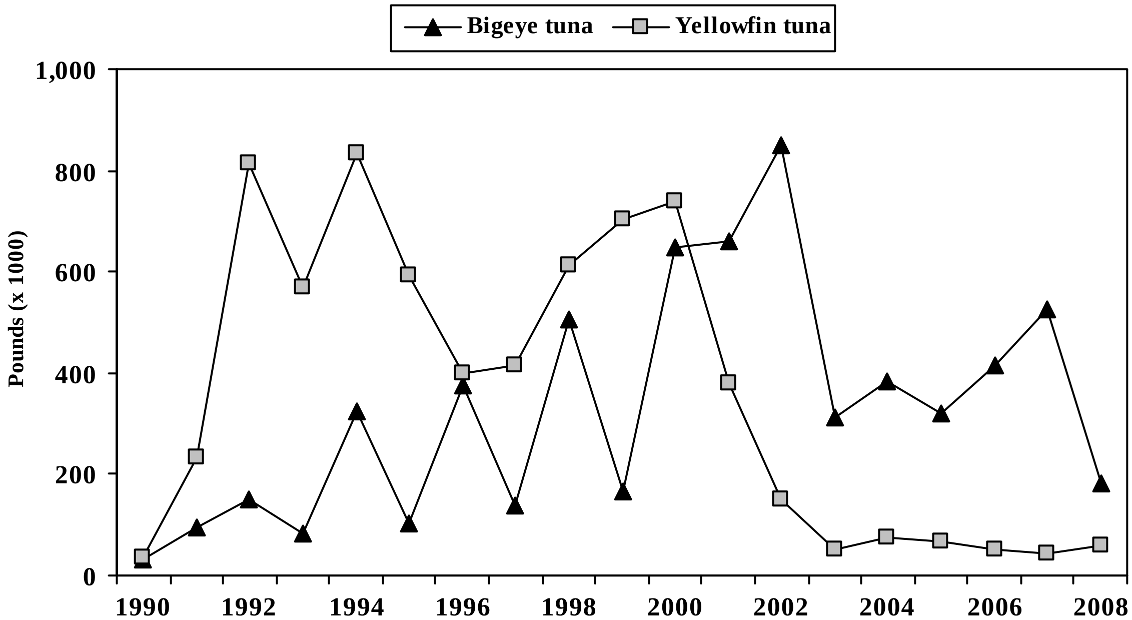


Interpretation: Total landings and revenue by the offshore handline fishery were 267,000 pounds worth an estimated $558,000 in 2008. Total landings and revenue by this fishery decreased by 55% and 33%, respectively in 2008. The recent trend for landings and revenue by the offshore handline fishery was one that showed a peak in 2000, followed by a steep decline to 2003 and remaining low through 2008.

Source and Calculations: Total landings and nominal revenue for the offshore handline fishery were derived from HDAR Commercial Fishing and Marine Dealer Report data. The total landings and nominal revenue values were obtained by adding the landings 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 (2008) Honolulu CPI.

Year	Total landings (1000 lbs)	Adjusted revenue ($1000)	Nominal revenue ($1000)	Honolulu CPI
1990	68	$161	$97	138.1
1991	331	$824	$533	148.0
1992	987	$2,180	$1,477	155.1
1993	679	$1,608	$1,125	160.1
1994	1,175	$2,709	$1,947	164.5
1995	714	$1,313	$964	168.1
1996	793	$1,746	$1,302	170.7
1997	563	$1,080	$811	171.9
1998	1,134	$2,264	$1,696	171.5
1999	888	$1,659	$1,256	173.3
2000	1,458	$4,308	$3,318	176.3
2001	1,080	$2,254	$1,757	178.4
2002	1,067	$2,088	$1,645	180.3
2003	386	$708	$571	184.5
2004	487	$1,021	$850	190.6
2005	398	$486	$420	197.8
2006	483	$550	$503	209.4
2007	598	$829	$795	219.5
2008	267	$558	$558	228.9
Average	**713.4**	**$1,491.9**	**$1,138.2**	
SD	**367.1**	**$999.7**	**$740.8**	

Figure 51. Offshore handline landings, 1990-2008.



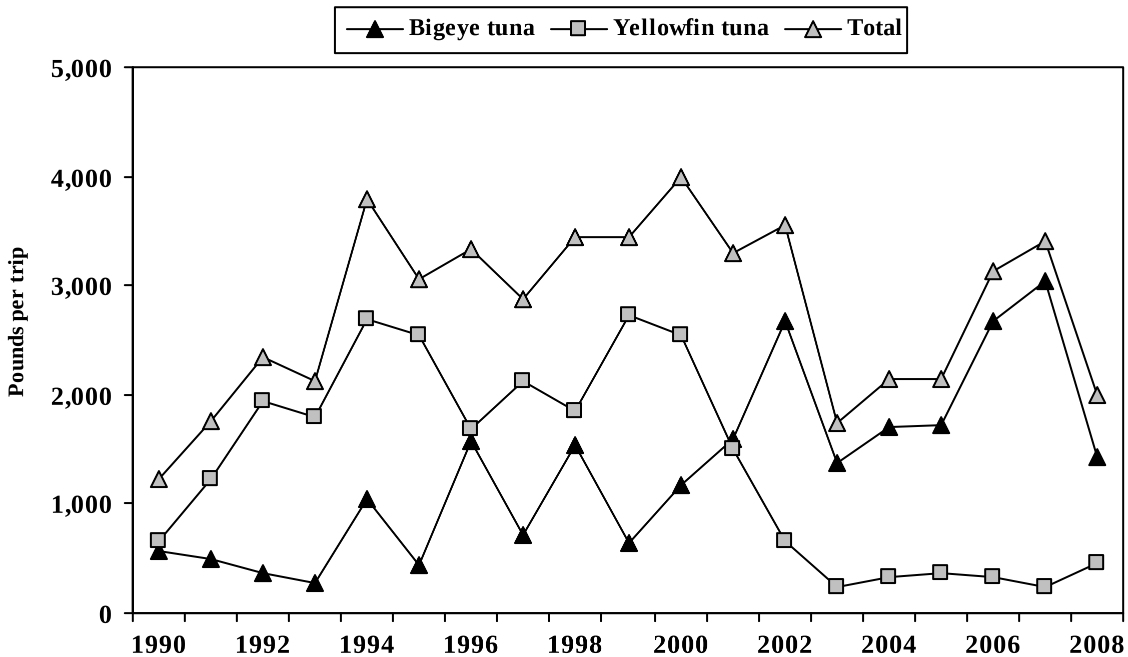
Interpretation: Bigeye tuna was the largest component of the offshore handline landings (69%) followed by yellowfin tuna (22%), and small landings of mahimahi. Yellowfin tuna was the largest component of the landings until 2001 when it was replaced by bigeye tuna. This may reflect better species identification by fishermen (small bigeye tuna and yellowfin tuna can be very difficult to distinguish. In general, bigeye tuna landings had wide inter-annual fluctuation in the 1990s, a steep decline in 2003, followed by a gradual increase through 2007, and a steep decline in 2008.

Most of the tunas landed by the offshore handline fishery are smaller in size than the MHI handline fishery. The yellowfin tuna landings reported in the HDAR commercial fish landings data may actually be bigeye tuna. Therefore, the total tuna landings by the offshore handline fishery may be more accurate than the landings for individual species. HDAR is making an effort to help educate fishermen and fish dealers correctly ID small tunas.

	Offshore handline landings (1000 pounds)			
Year	**Bigeye tuna**	**Yellowfin tuna**	**Mahimahi**	**Total**
1990	31	35	0	68
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	650	739	54	1,458
2001	660	379	35	1,080
2002	850	151	26	1,067
2003	313	52	14	386
2004	385	75	14	487
2005	321	67	7	398
2006	414	52	8	483
2007	526	42	6	598
2008	183	60	7	267
Average	**330.2**	**359.4**	**16.7**	**713.4**
SD	**228.5**	**295.7**	**12.4**	**367.1**

Source and Calculations The landings statistics for the offshore tuna handline fishery were derived from HDAR Commercial Fishing and Marine Dealer Report data. The offshore tuna handline fishery landings was calculated by totaling landings by species.

Figure 52. Offshore handline landings per day fished, 1990-2008.



Interpretation: Offshore handline CPUE was 2,003 pounds in 2008, 30% below its long-term average. Bigeye tuna CPUE in 2008 was 8% higher than its long-term average. In contrast, yellowfin tuna and mahimahi CPUE down were below their long-term averages; by 66% and 21%, 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.

Source and Calculations: The offshore handline CPUE (pounds per day fished) were calculated from the HDAR Fishing Report data. Offshore handline landings from the Fishing Report data was divided by the offshore handline the number of days fished in Figure 49. The total landings were greater than the sum of the three dominant species because it included skipjack tuna, kawakawa, and other pelagic species.

	Offshore handline landings (pounds per day fished)			
Year	Bigeye tuna	Yellowfin tuna	Mahimahi	Total
1990	565	654	1	1,220
1991	500	1,234	24	1,758
1992	358	1,937	49	2,344
1993	266	1,790	73	2,130
1994	1,044	2,689	57	3,790
1995	439	2,538	87	3,065
1996	1,576	1,685	70	3,331
1997	706	2,119	48	2,874
1998	1,539	1,858	39	3,436
1999	636	2,725	79	3,443
2000	1,171	2,539	169	3,989
2001	1,598	1,502	130	3,300
2002	2,669	658	98	3,554
2003	1,367	231	61	1,744
2004	1,712	322	61	2,136
2005	1,726	363	39	2,149
2006	2,674	337	53	3,137
2007	3,039	240	32	3,404
2008	1,421	463	51	2,003
Average	**1,316.1**	**1,362.3**	**64.3**	**2,779.3**
SD	**820.8**	**923.0**	**38.1**	**806.6**

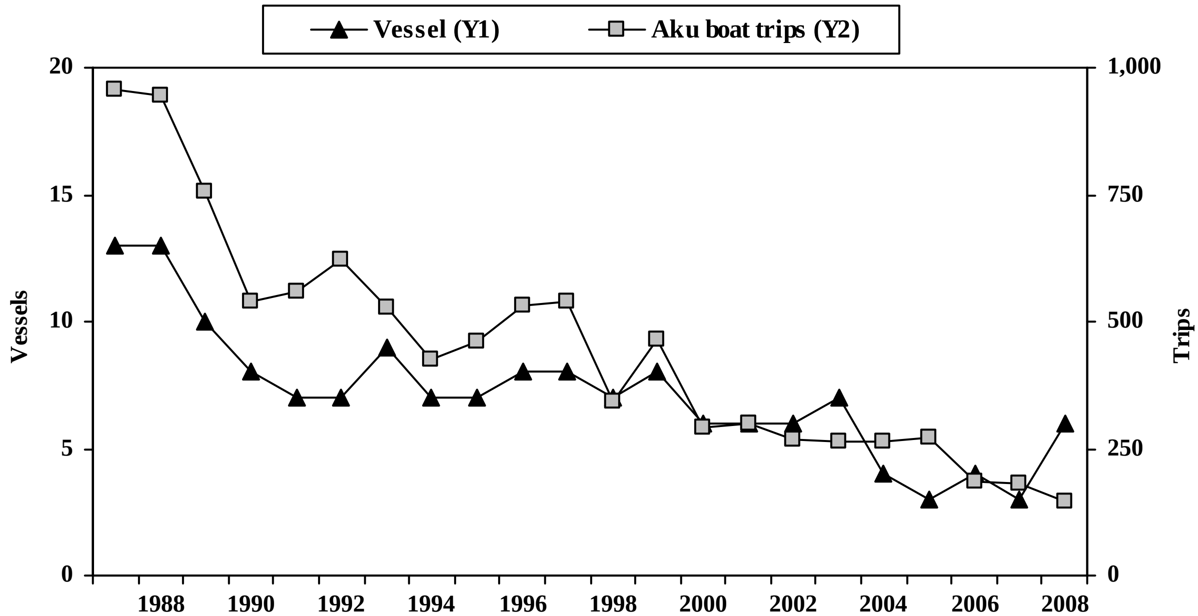
Table 6. Average weight by species for the troll and handline landings, 1987-2008.

	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	82	18	25
1999	48	24	7	31	210	55	88	18	27
2000	48	28	11	48	238	61	177	15	25
2001	42	21	11	41	181	50	150	15	24
2002	38	30	10	42	224	42	152	16	26
2003	46	20	6	30	185	49	118	16	22
2004	43	36	6	27	207	60	142	18	23
2005	48	29	5	23	183	74	107	15	23
2006	47	27	8	29	210	69	128	16	23
2007	49	31	4	35	267	89	133	16	24
2008	51	35	6	26	205	67	158	15	26
Average	**44.5**	**24.8**	**7.7**	**32.9**	**205.8**	**64.0**	**117.1**	**16.3**	**24.0**
SD	**9.5**	**6.1**	**2.2**	**6.7**	**24.6**	**9.7**	**27.6**	**1.9**	**1.6**

Interpretation: The average weight for most species landed by troll and handline gear in 2008 was about the same compared the previous year. The mean weight for albacore, bigeye tuna, and swordfish was higher than their respective long-term average weights in 2008. The mean weight of yellowfin tuna in 2008 was below its long-term mean weight.

Source and Calculations: The average weights were calculated from HDAR commercial fish catch reports. Total weight landed was divided by the total number landed. Landings by the troll and handline fishery is usually landed whole, however, average weight calculations were based on reported weight and may include landings that were processed, i.e., headed and gutted, gilled and gutted.

Figure 53. Hawaii aku boat (pole and line) vessel and trip activity, 1987-2008.

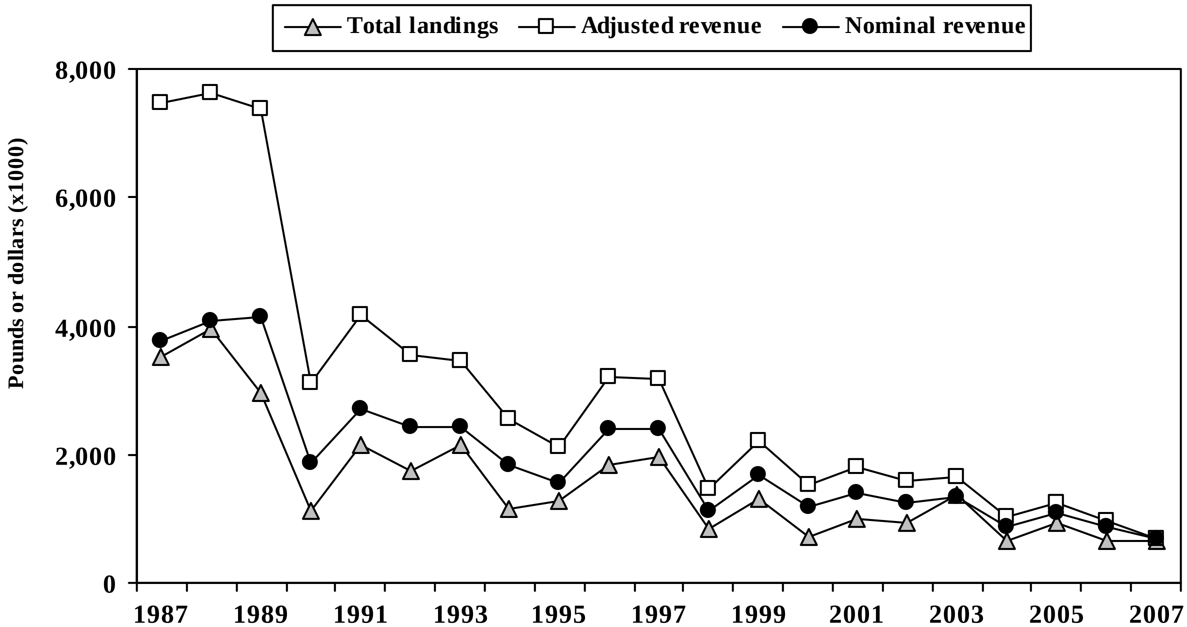


Interpretation: The vessel and trip activity of the aku boat fishery has been in decline over the 22-year period with six aku boat vessels fishing in 2008. The steep decline occurred in the 1980s and was attributed primarily to the closure of the tuna cannery. Attrition of vessels, many which were built 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 2008 was a record low 147 trips.

Source and Calculations: The number of aku boat vessels and trips were counted from HDAR Commercial Aku Boat Report 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 calculate a aku boat trip. The total number of 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	290
2001	6	301
2002	6	268
2003	7	263
2004	4	265
2005	3	270
2006	4	187
2007	3	183
2008	6	147
Average	**7.1**	**447.6**
SD	**2.6**	**228.4**

Figure 54. Hawaii aku boat (pole and line) landings and revenue, 1987-2008.

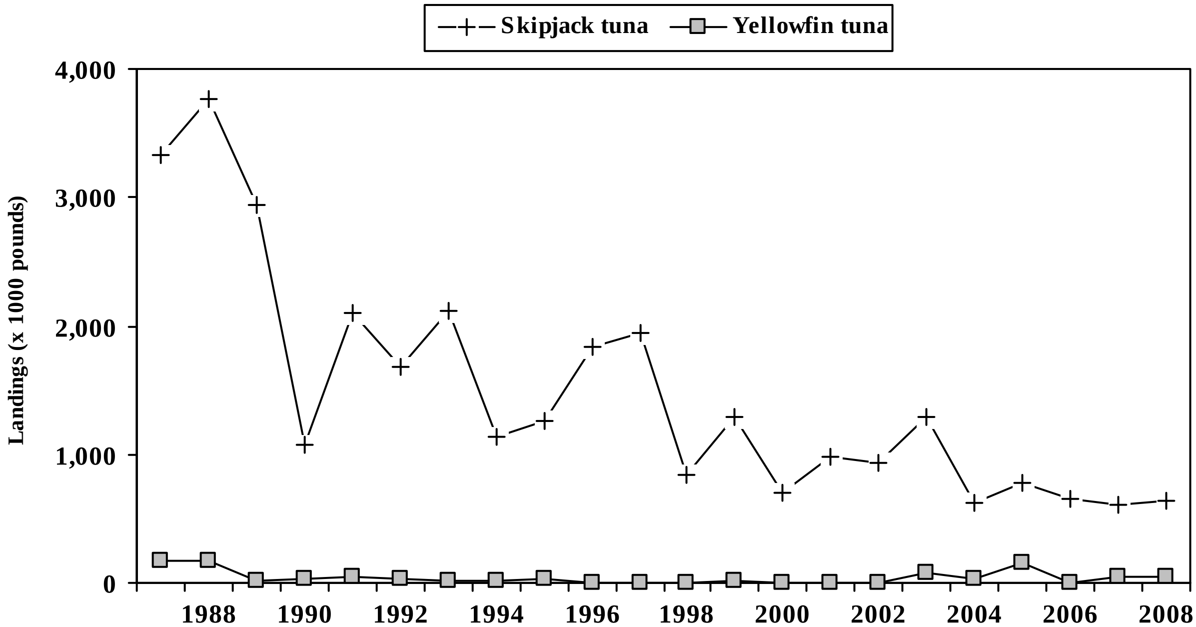


Interpretation: Aku boat landings were 700,000 pounds, worth an estimated $870,000 in 2008, up slightly from the previous year but still far below their long-term averages, -54% and -70%, respectively. The trends for total landings and revenue were similar to the number of aku boat vessels and trip activity. 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 Report data. The total landings and nominal revenue values were obtained by adding the landings 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	$7,473	$3,751	114.9
1988	3,940	$7,642	$4,063	121.7
1989	2,962	$7,374	$4,146	128.7
1990	1,116	$3,104	$1,873	138.1
1991	2,146	$4,185	$2,706	148.0
1992	1,735	$3,564	$2,415	155.1
1993	2,137	$3,453	$2,415	160.1
1994	1,159	$2,553	$1,835	164.5
1995	1,291	$2,111	$1,550	168.1
1996	1,844	$3,204	$2,389	170.7
1997	1,947	$3,186	$2,393	171.9
1998	845	$1,476	$1,106	171.5
1999	1,312	$2,211	$1,674	173.3
2000	708	$1,516	$1,168	176.3
2001	994	$1,796	$1,400	178.4
2002	936	$1,600	$1,260	180.3
2003	1,378	$1,655	$1,334	184.5
2004	656	$1,036	$863	190.6
2005	932	$1,245	$1,076	197.8
2006	661	$962	$880	209.4
2007	654	$700	$671	219.5
2008	700	$870	$870	228.9
Average	**1,525.3**	**2,859.9**	**1,901.7**	
SD	**935.3**	**2,121.7**	**1,035.2**	

Figure 55. Hawaii aku boat (pole and line) fishery landings, 1987-2008.

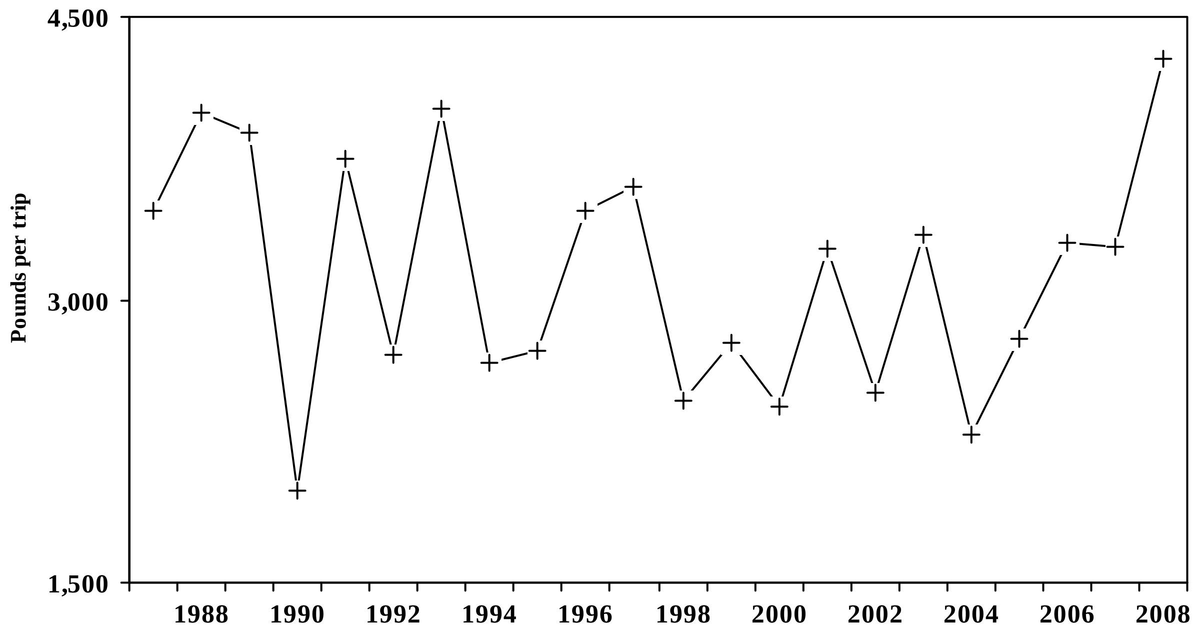


Interpretation: Total aku boat landings in 2008 were 700,000 pounds, 54% below the long-term average. The aku boat fishery landings consisted primarily of skipjack tuna. There were small landings of yellowfin tuna also. Skipjack tuna landings varied annually with an overall downward trend. Part of the 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 Report data. The aku boat landings 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	1	994
2002	927	6	2	1	936
2003	1,292	73	10	3	1,378
2004	615	38	1	2	656
2005	779	149	3	1	932
2006	648	6	7	0	661
2007	600	50	3	1	654
2008	643	49	7	1	700
Average	**1,478.0**	**43.0**	**2.5**	**1.8**	**1,525.3**
SD	**908.5**	**52.8**	**2.8**	**3.0**	**935.3**

Figure 56. Hawaii aku boat (pole and line) fishery total landings per trip, 1987-2008.



Interpretation: The CPUE for skipjack tuna in the aku boat fishery was 4,374 pounds per trip in 2008, 34% higher than the long-term average. The aku boat skipjack tuna landings per trip varied substantially between 1987 and 2006 then increased to a record level in 2008.

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 Report 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	3,988	4,169
1989	3,882	3,913
1990	1,984	2,062
1991	3,746	3,826
1992	2,708	2,794
1993	4,018	4,048
1994	2,667	2,726
1995	2,731	2,806
1996	3,475	3,479
1997	3,596	3,606
1998	2,468	2,477
1999	2,770	2,816
2000	2,429	2,440
2001	3,282	3,304
2002	3,459	3,493
2003	4,913	5,240
2004	2,321	2,475
2005	2,885	3,452
2006	3,465	3,535
2007	3,279	3,574
2008	4,374	4,762
Average	**3,268.8**	**3,393.3**
SD	**728.0**	**781.0**

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.

The CNMI does have Charter boats however these vessels rarely sell any of their landings therefore data used in this report does not include the Charter Boat activities.

The overall pelagic landings in 2008 declined by 37% compared to 2007. Decrease in landings is mostly due to the downward trend in the economic activities in the CNMI. The number of fishermen making pelagic trips has also decline by 32% since 2006. In 2008, Fishermen did not find it profitable to catch pelagics due to the high cost associated with trolling and the lack of demand for their catch.

The primary target and most marketable species for the pelagic fleet are skipjack tuna. In 2008 Skipjack Tuna landings comprised around 80% of the entire pelagic landings. Schools of skipjack tuna have historically been common in near shore waters, providing an opportunity to catch fish with minimal travel time and fuel costs. Skipjack is readily consumed by the local populace and by several Korean restaurants, primarily as sashimi.

Although smaller in size in comparison to other geographical landings, yellowfin tuna and mahimahi are also marketable species in the CNMI but are seasonal. During their seasonal runs, these fish are usually found close to shore and provide easy targets for the local troll fishermen.

In late 2007, Crystal Sea's, became the first established longline fishing company in the CNMI to begin its operation out of the island of Rota. However in 2008, Crystal Sea's moved their operation and office to Saipan. It currently has two licensed fishing vessels but only one is currently being utilized. Federal log book data is being collected and submit to NMFS. Data from this fishery is not included in this report.

Plan Team Recommendations

2008 Recommendations

1. Request for NMFS to provide funding for a longline sampling program.

Table 1.—CNMI Consumer Price Indices (CPIs)

Year	CPI	CPI Adjuste Factor	Data Adjuste Factor
1983	140.90	2.27	80
1984	153.20	2.09	80
1985	159.30	2.01	80
1986	163.50	1.96	80
1987	170.70	1.88	80
1988	179.60	1.78	80
1989	190.20	1.68	80
1990	199.33	1.61	80
1991	214.93	1.49	80
1992	232.90	1.38	80
1993	243.18	1.32	80
1994	250.00	1.28	80
1995	254.48	1.26	80
1996	261.98	1.22	80
1997	264.95	1.21	80
1998	264.18	1.21	80
1999	267.80	1.20	80
2000	273.23	1.17	80
2001	271.01	1.18	80
2002	271.55	1.18	80
2003	268.92	1.19	80
2004	271.28	1.18	55
2005	271.90	1.18	55
2006	285.96	1.12	55
2007	305.76	1.05	65
2008	**320.39**	**1.00**	60

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 2008 Commercial Pelagic Landings, Revenues and Price

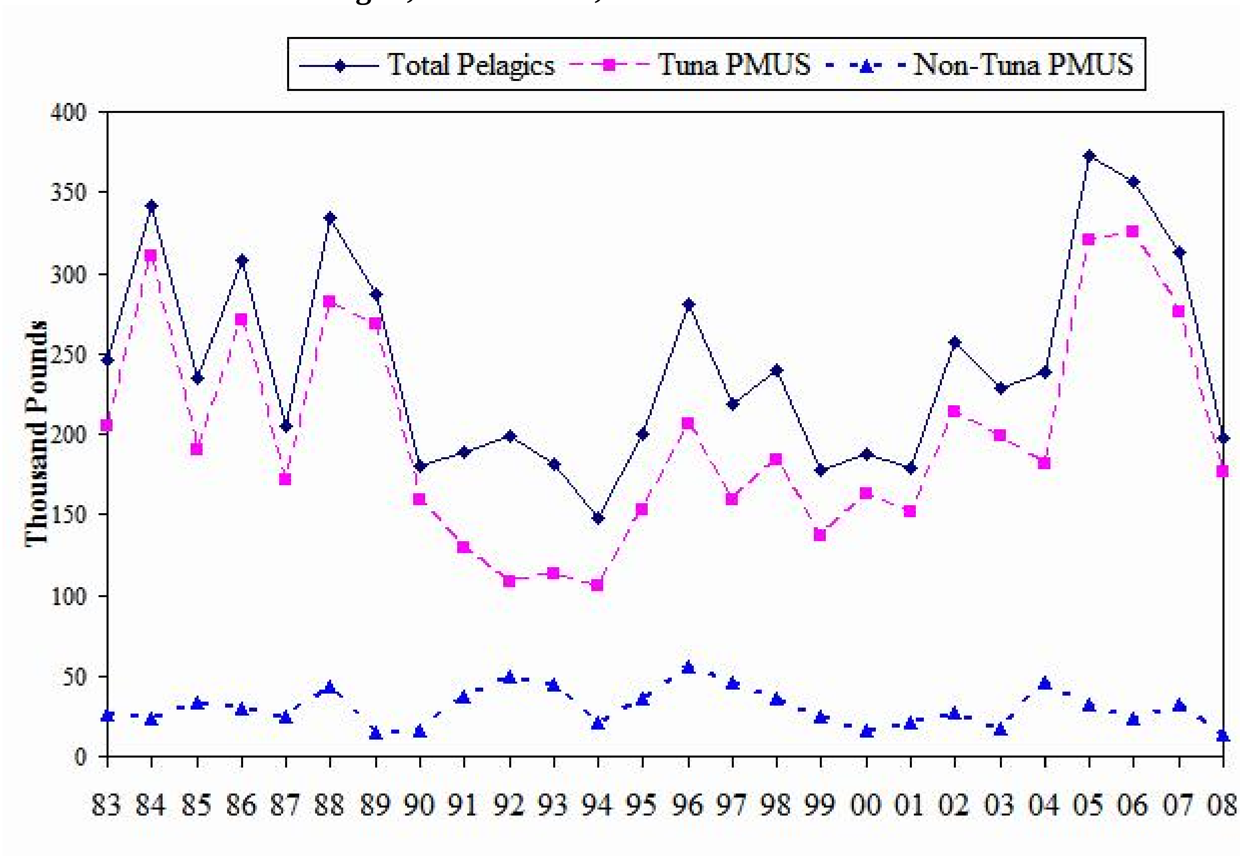
Species	Landing (Lbs)	Value ($)	Avg Price ($/Lb)
Skipjack Tuna	157,708	244,652	1.55
Yellowfin Tuna	16,344	32,149	1.97
Saba (kawakawa)	2,155	3,182	1.48
Tunas (misc.)	45	68	1.50
Tuna PMUS	**176,252**	**280,050**	**1.59**
Mahimahi	11,169	20,428	1.83
Wahoo	1,388	2,881	2.08
Blue Marlin	1,098	1,331	1.21
Sickle Pomfret (w/woman)	481	1,060	2.21
Non-tuna PMUS	**14,136**	**25,700**	**1.82**
Dogtooth Tuna	3,457	5,399	1.56
Rainbow Runner	3,095	6,056	1.96
Barracuda	58	88	1.50
Troll Fish (misc.)	15	38	2.50
Non-PMUS Pelagics	**6,625**	**11,580**	**1.75**
Total Pelagics	**197,013**	**317,330**	**1.61**

Interpretation: In 2008 Skipjack tuna continued to dominate the pelagic landings, comprising around 80% of the (commercially receipted) industry's pelagic catch. Though it is the majority of pelagic landings, skipjack landings decreased 39% in 2008. Total landings of Yellowfin tuna and mahimahi ranked second and third in 2008. Mahimahi landings decreased 58% in 2008. Yellowfin landings decreased 53%. 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 37% in 2008.

The highest average price of identified pelagic species was $2.21/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, increased 21% from $1.28/lb in 2007 to $1.55/lb in 2008.

Blue Marlin landing is rarely a target by commercial fishermen except during fishing tournaments and by Charter boats. Blue marlin is rarely sold to vendors participating in this Commercial Purchase Data Base invoices system and therefore will not be recorded in this report.

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.

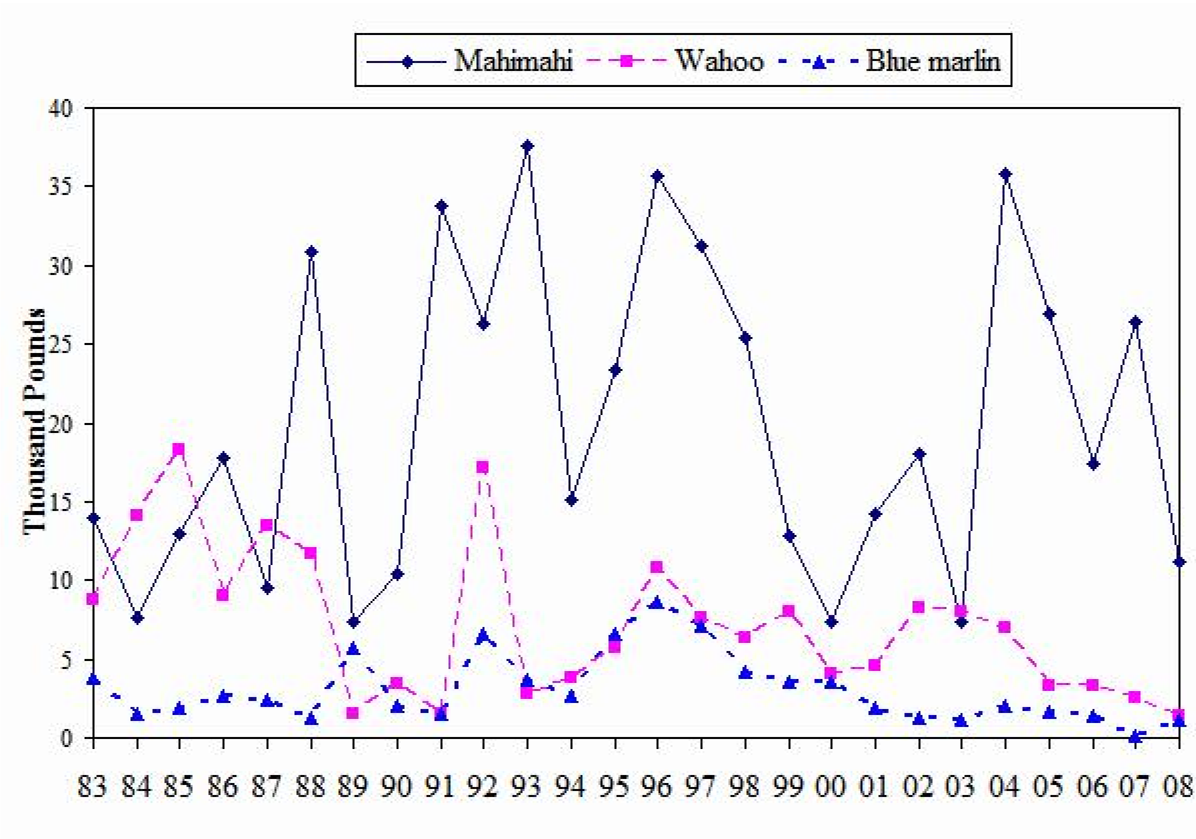
Interpretation: Total weight for pelagics landed in 2008 decreased significantly by 37% from 2007 and below the 25 year mean. This decreased is a result of both Tuna PMUS decreasing by 36% and Non-Tuna PMUS decreasing 57%.

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	356,706	325,728	23,410
2007	312,554	275,614	32,755
2008	**197,013**	**176,252**	**14,136**
Average	242,276	198,457	30,541
Standard Deviation	63,182	66,360	11,769

Figure 2. NMI Annual Commercial Landings: Mahimahi, Wahoo, and Blue Marlin.



Interpretation: 2008 mahimahi landings decreased 58% from 2007 landings. In previous years 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 lowest recording in the past 13 years. Wahoo landings continued to decline in 2007 by 18% and again in 2008 by 45% well below the 26 year mean.

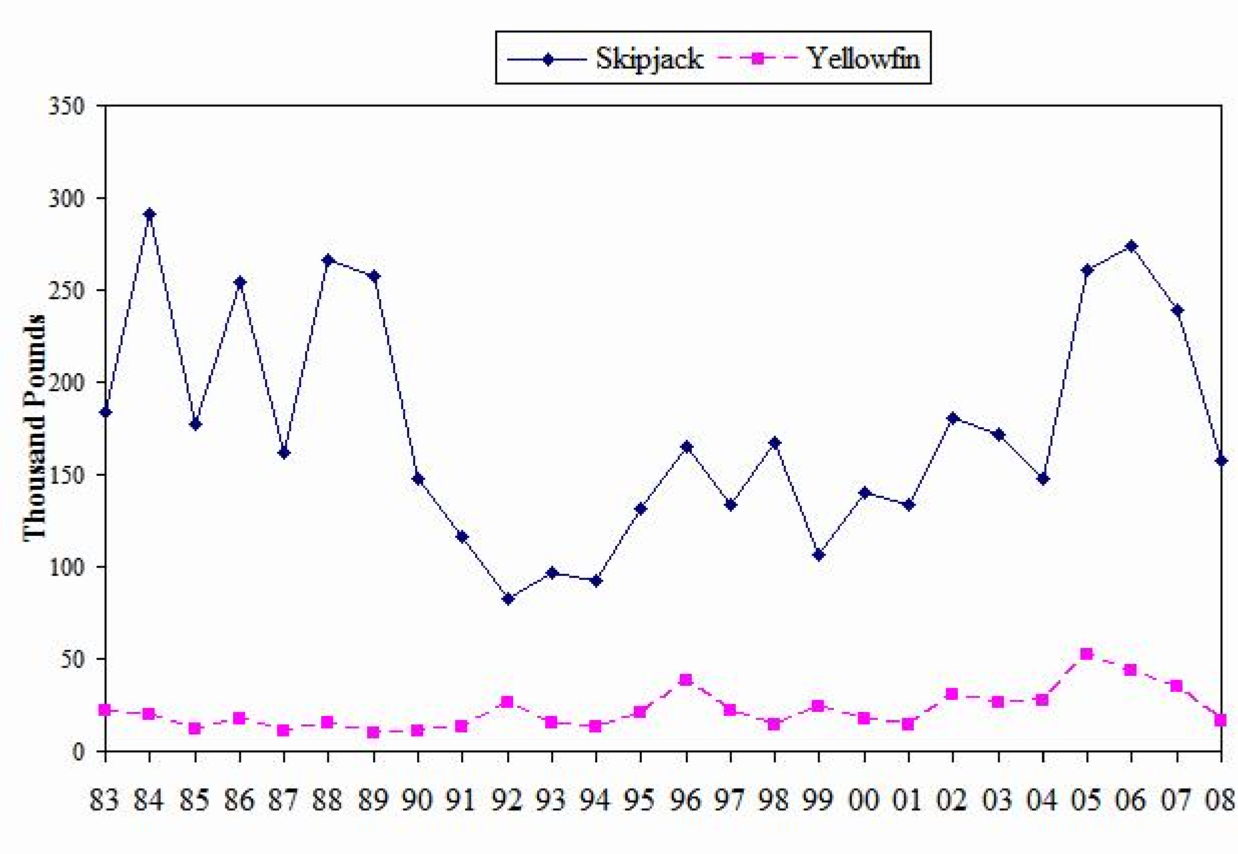
Data of blue marlin landings was rarely recorded in the Commercial Purchase Data Base for 2007 but some landings were recorded in 2008. Blue marlin is rarely a target by the commercial fishermen except for charter boats and during fishing tournaments. If blue marlins are landed, they are often kept by 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	17,360	3,267	1,402
2007	26,410	2,504	76
2008	**11,169**	**1,388**	**1,098**
Average	19,849	7,167	3,075
Standard Deviation	10,055	4,747	2,186

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. 2007 landings decreased slightly by 6% but this decline continued in 2008 by 34% and below the 26 year average.

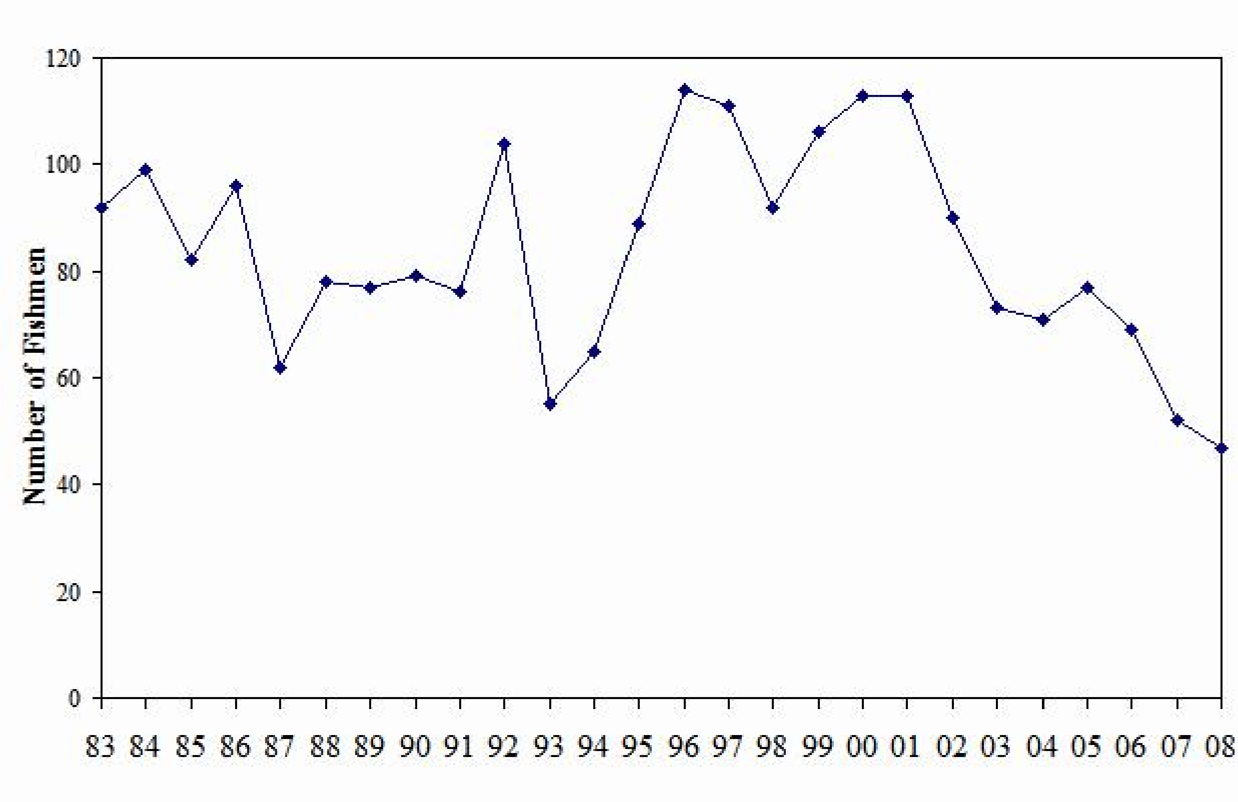
Although more highly prized than skipjack, yellowfin tuna are not as common, and therefore not landed as often. The average fish size tends to be smaller when compared with yellowfin tuna from other geographic areas. The total landings for yellowfin tuna increased in 2002 by 51% from the 2001 figures. 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 longlining, 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 figures. 2006

yellowfin landings decreased by 19% but still above the 24 year mean and 2007 landings decreased 13% over the previous year and decline another 53% in 2008.
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	273,715	43,220
2007	238,972	34,894
2008	**157,708**	**16,344**
Average	174,442	21,743
Standard Deviation	61,492	10,669

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.

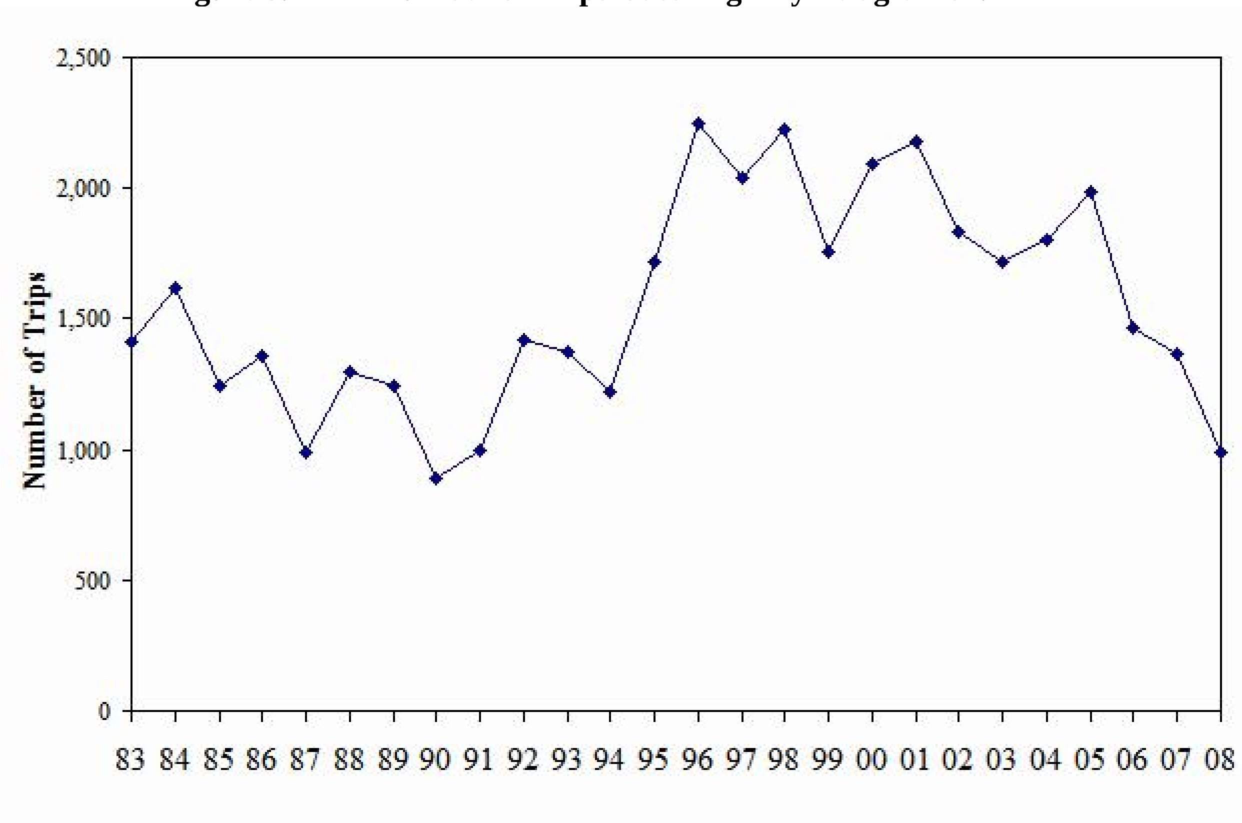
The number of fishermen making pelagic landings decreased 20% from 113 in 2001 to 90 in 2002. Data indicates a continued decline of 23% in 2003 and a 7% drop in 2004. The decrease is partly due to vendors whom own multiple fishing boats entering all their landings on a single receipt and at times combining 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% and continued to decline 26% in 2007 and 9% in 2008. This decrease is partly due to the increasing price of fuel, the continued decline in the average price per pound of Skipjack tuna and downward trend in the CNMI economy.

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	69
2007	52
2008	**47**
Average	84
Standard Deviation	20

Figure 5. NMI Number of Trips Catching Any Pelagic Fish.



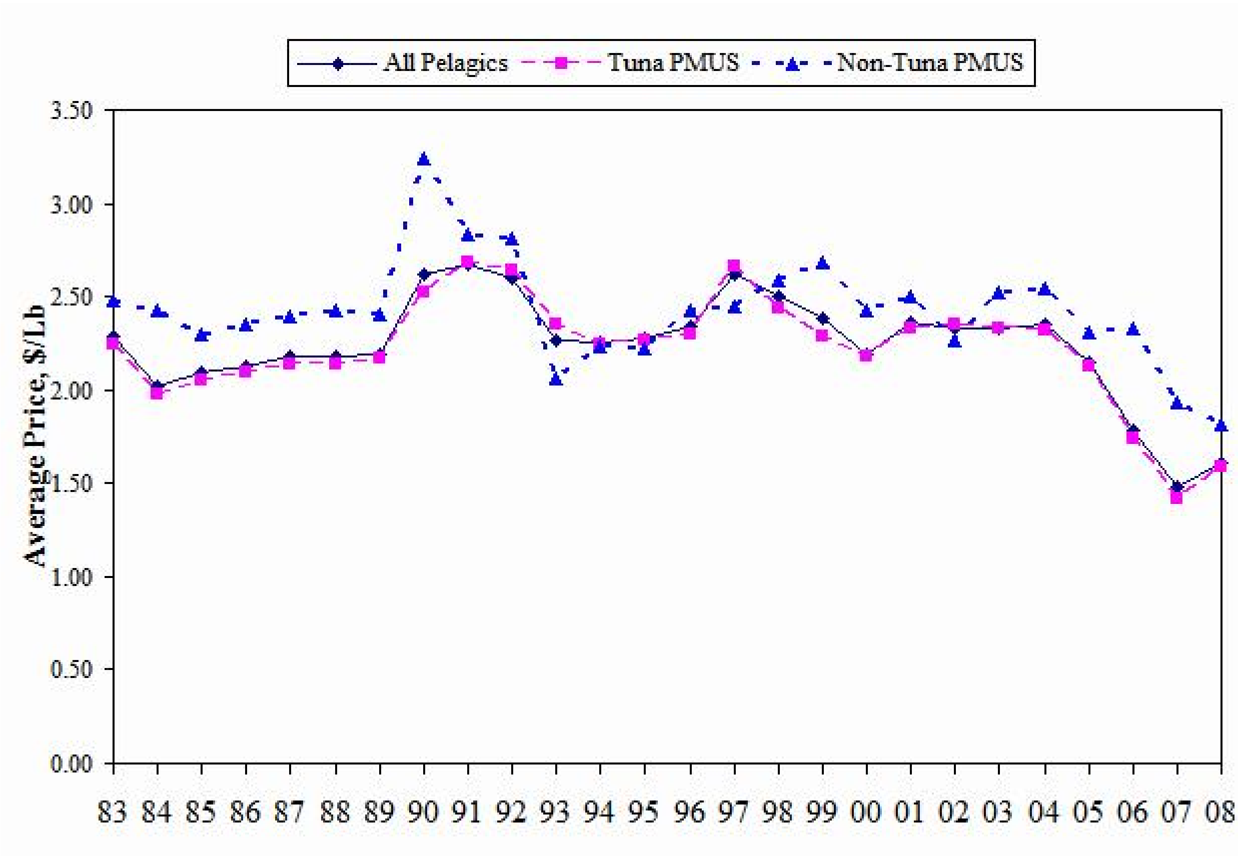
Interpretation: The number of pelagic trips rose in 1998, the decrease in 1999 figures may be caused by the refusal of vendors to participate in the Ticket System. The number of pelagic trips decreased in 2002 by 16% from 2,179 to 1835 and continued to decline in 2003 by 6% and remained near that level 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 price of gasoline at $3.58 per gallon and prices continued to rise to about $4.33 per gallon in 2007 and well into 2008. The number of trips made during 2008 decreased 28%.

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	1,463
2007	1,366
2008	**989**
Average	1,557
Standard Deviation	410

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. Since then from 2003 to 2007 the inflation adjusted average price for tuna has decreased. There was a decline of 2% in 2004, 8% in 2005, 17% in 2006 and 18% in 2007. A slight increase occurred in 2008 of 12%.

Decline in price per pound for Skipjack Tuna is a direct result from strong competition among fishermen. Fishermen would land large amounts of Skipjack Tuna flooding markets causing prices to drop as low as $.75 per pound. This saturation of the local markets directly affects not only the Inflation-Adjusted Average prices but also the Inflation-Adjusted Revenues.

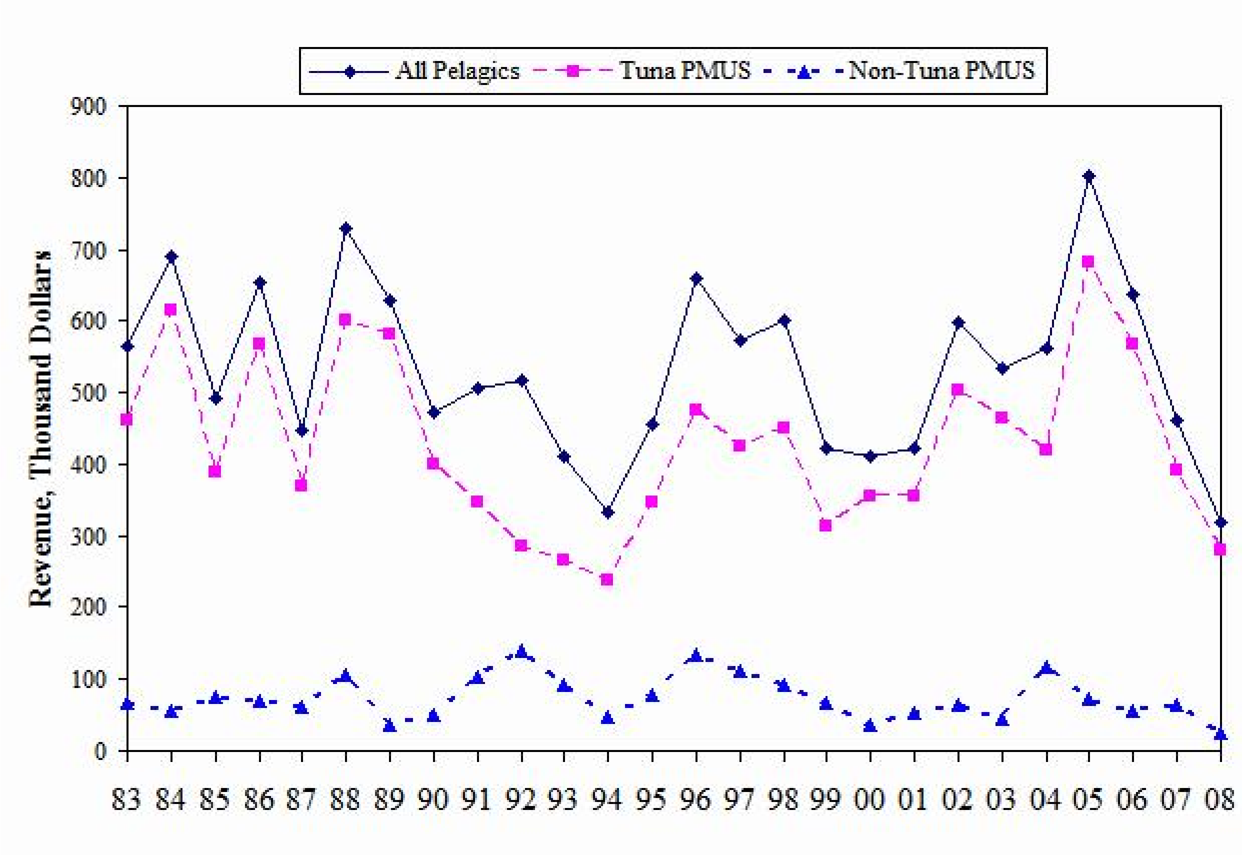
The average for the inflation-adjusted price of "Non-Tuna PMUS" increased to $2.14 or 11% in 2003 and remained at near that level for 2004. In 2005, there was a 9% decrease and continued to decline 1% in 2006, 18% decrease in 2007 and decline further by 6% in 2008.

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	2.29	0.99	2.25	1.09	2.49
1984	0.97	2.02	0.95	1.98	1.16	2.43
1985	1.04	2.10	1.02	2.05	1.14	2.30
1986	1.09	2.13	1.07	2.09	1.20	2.35
1987	1.16	2.18	1.14	2.14	1.27	2.39
1988	1.22	2.18	1.20	2.14	1.36	2.43
1989	1.30	2.19	1.29	2.17	1.43	2.41
1990	1.63	2.62	1.57	2.52	2.01	3.24
1991	1.80	2.68	1.80	2.68	1.90	2.83
1992	1.88	2.60	1.91	2.64	2.04	2.81
1993	1.72	2.27	1.78	2.35	1.56	2.06
1994	1.76	2.25	1.75	2.24	1.75	2.24
1995	1.81	2.28	1.80	2.27	1.76	2.22
1996	1.92	2.34	1.88	2.30	1.99	2.43
1997	2.17	2.62	2.20	2.66	2.03	2.45
1998	2.07	2.50	2.02	2.44	2.14	2.59
1999	1.98	2.38	1.91	2.29	2.24	2.68
2000	1.87	2.19	1.86	2.17	2.07	2.42
2001	2.00	2.36	1.97	2.33	2.12	2.50
2002	1.97	2.32	1.99	2.35	1.92	2.26
2003	1.96	2.33	1.96	2.33	2.12	2.52
2004	1.99	2.35	1.96	2.32	2.15	2.54
2005	1.82	2.15	1.80	2.13	1.95	2.30
2006	1.59	1.79	1.55	1.74	2.08	2.33
2007	1.41	1.48	1.35	1.42	1.84	1.93
2008	**1.61**	**1.61**	**1.59**	**1.59**	**1.82**	**1.82**
Average	1.64	2.24	1.63	2.22	1.77	2.42
Standard Deviation	0.37	0.29	0.38	0.30	0.37	0.28

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 Pelagics" category.

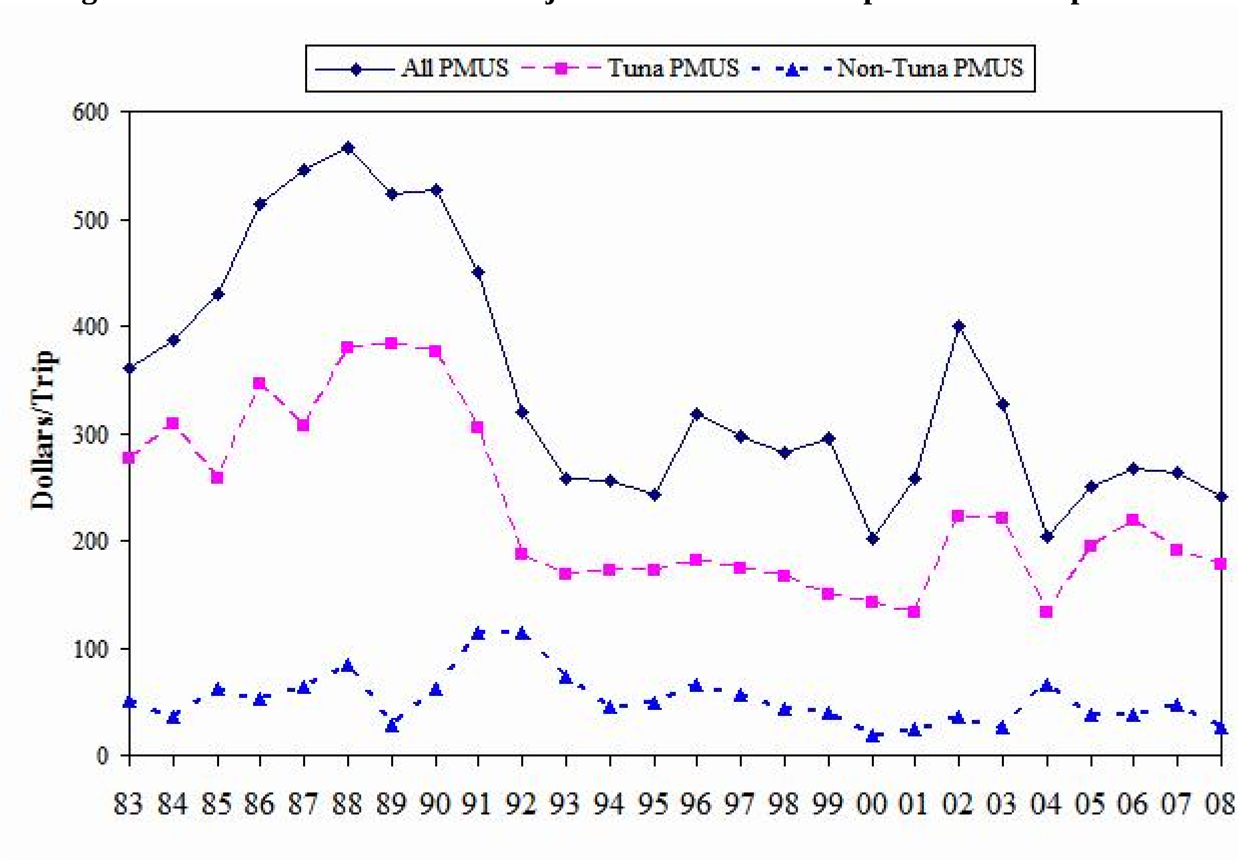
In 2003 the tunas' inflation-adjusted revenues decreased 8% from the 2002 figures and continued to decline to 11% for 2004. This is due to the decrease in landings of Skipjack tuna, which in 2004 comprised only of 67% of the total pelagic landings compared to 2003 where it comprised 87% of the total pelagic landings. The Tunas' Inflation-Adjusted Revenues increase significantly by 38% in 2005 but drop 19% in 2006 and again declined 26% in 2007 and 28% in 2008. 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%. Since 2006 the Inflation Adjusted Revenues started to decrease with the most recent decline of 59% in 2008.

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	563,838	202,800	460,356	29,059	65,964
1984	330,254	690,231	294,077	614,621	27,044	56,522
1985	244,171	490,784	193,920	389,779	37,882	76,143
1986	333,766	654,181	289,681	567,775	35,488	69,556
1987	237,687	446,852	195,793	368,091	32,344	60,807
1988	409,075	728,154	338,348	602,259	59,701	106,268
1989	373,927	628,197	345,839	581,010	20,917	35,141
1990	293,993	473,329	248,144	399,512	32,102	51,684
1991	338,643	504,578	232,077	345,795	70,235	104,650
1992	374,977	517,468	206,950	285,591	102,133	140,944
1993	311,342	410,971	201,350	265,782	69,592	91,861
1994	259,470	332,122	185,381	237,288	37,818	48,407
1995	361,511	455,504	275,080	346,601	62,920	79,279
1996	539,628	658,346	388,691	474,203	110,939	135,346
1997	474,509	574,156	351,492	425,305	93,306	112,900
1998	496,652	600,949	372,142	450,292	77,011	93,183
1999	351,062	421,274	261,394	313,673	55,404	66,485
2000	350,468	410,048	302,473	353,893	32,186	37,658
2001	358,656	423,214	300,154	354,182	44,987	53,085
2002	506,302	597,436	425,961	502,634	53,468	63,092
2003	447,647	532,700	390,100	464,219	36,764	43,749
2004	476,543	562,321	356,110	420,210	98,417	116,132
2005	678,773	800,952	578,914	683,119	62,759	74,056
2006	568,872	637,137	506,194	566,937	48,675	54,516
2007	439,953	461,951	372,573	391,202	60,137	63,144
2008	**317,330**	**317,330**	**280,050**	**280,050**	**25,700**	**25,700**
Average	389,369	534,385	311,373	428,630	54,500	74,087
Standard Deviation	109,626	120,567	98,323	118,763	25,514	30,423

Figure 8. NMI Annual Inflation-Adjusted Revenue Per Trip for PMUS trips



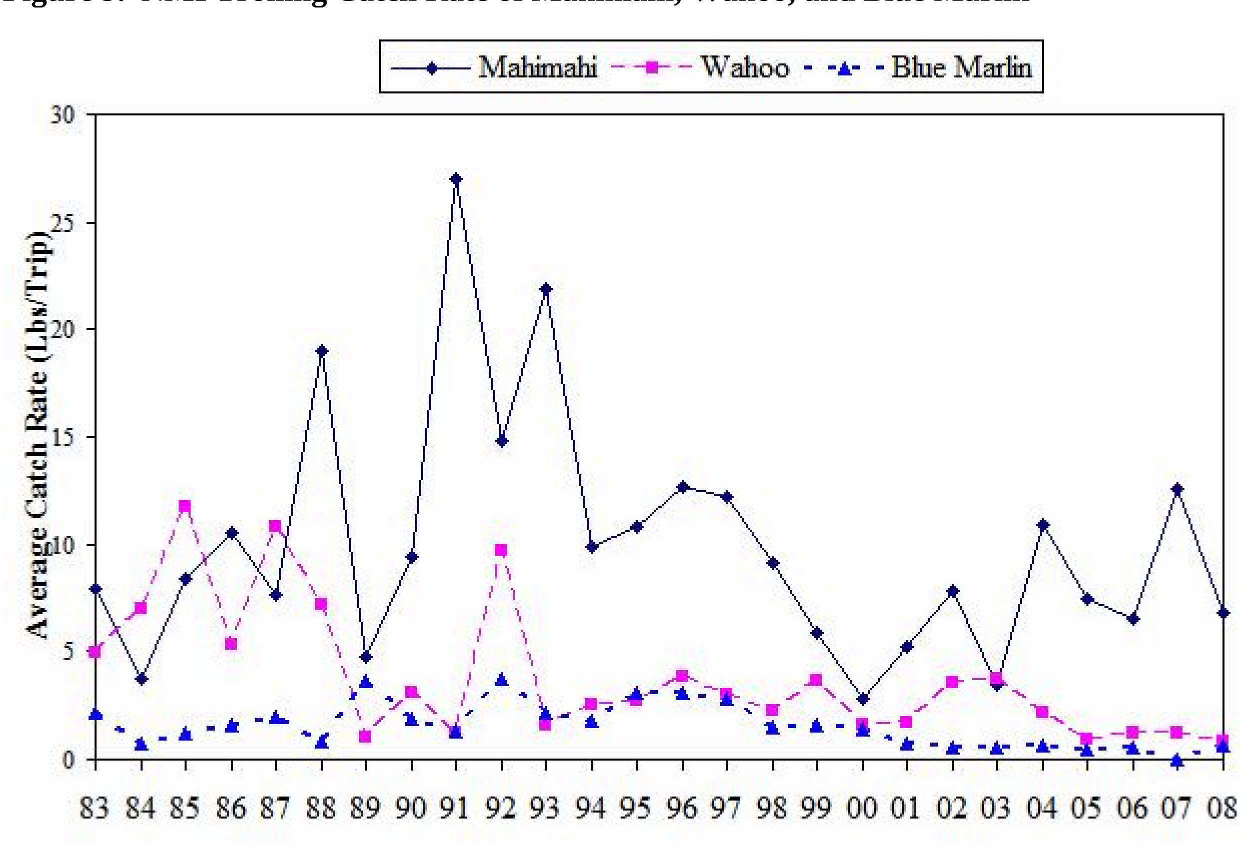
Interpretation: The inflation-adjusted revenue per trip for "All Species" decreased 4% in 2003 and 29% for 2004. Inflation-adjusted revenue per trip for "All Species" increased 19% in 2005, 6% in 2006 but decreased slightly 1% in 2007. "Non-Tuna PMUS" decreased 26% in 2003 however 2004 revenue increased significantly to 157% or 57$/per trip. In 2005 this declined by 43% but increased 4% in 2006 and continued to increase 35% in 2007. However in 2008 revenues per trip for Non-Tuna PMUS declined by 43%. "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. In 2007 Tuna PMUS decreased by 13% partly due to a drop in price per pound for Tuna. In 2008 Tuna PMUS declined slightly by 7%.

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	360.93	122.00	276.94	22.00	49.94
1984	185.00	386.65	148.00	309.32	17.00	35.53
1985	214.00	430.14	128.00	257.28	31.00	62.31
1986	262.00	513.52	176.00	344.96	27.00	52.92
1987	290.00	545.20	163.00	306.44	34.00	63.92
1988	318.00	566.04	213.00	379.14	47.00	83.66
1989	312.00	524.16	228.00	383.04	17.00	28.56
1990	327.00	526.47	233.00	375.13	38.00	61.18
1991	302.00	449.98	204.00	303.96	77.00	114.73
1992	231.00	318.78	135.00	186.30	83.00	114.54
1993	195.00	257.40	128.00	168.96	55.00	72.60
1994	200.00	256.00	135.00	172.80	35.00	44.80
1995	193.00	243.18	136.00	171.36	39.00	49.14
1996	261.00	318.42	148.00	180.56	53.00	64.66
1997	245.00	296.45	143.00	173.03	47.00	56.87
1998	234.00	283.14	138.00	166.98	36.00	43.56
1999	246.00	295.20	125.00	150.00	33.00	39.60
2000	172.00	201.24	121.00	141.57	16.00	18.72
2001	219.00	258.42	113.00	133.34	21.00	24.78
2002	339.00	400.02	189.00	223.02	30.00	35.40
2003	275.00	327.25	185.00	220.15	22.00	26.18
2004	172.00	202.96	112.00	132.16	56.00	66.08
2005	213.00	251.34	165.00	194.70	32.00	37.76
2006	239.00	267.68	196.00	219.52	34.00	38.08
2007	251.00	263.55	182.00	191.10	45.00	47.25
2008	**242.00**	**242.00**	**178.00**	**178.00**	**27.00**	**27.00**
Average	242.15	345.62	159.38	228.45	37.46	52.30
Standard Deviation	50.53	113.54	35.88	80.32	16.99	24.44

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 declined 11% from the 2004 figures but still above the 24 year mean. Mahi catch rates declined 11% in 2006 and then increased significantly 93% in 2007. Mahimahi catch rates however declined 46% in 2008.

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 but dropped 4% in 2007 and continued to decline 29% in 2008.

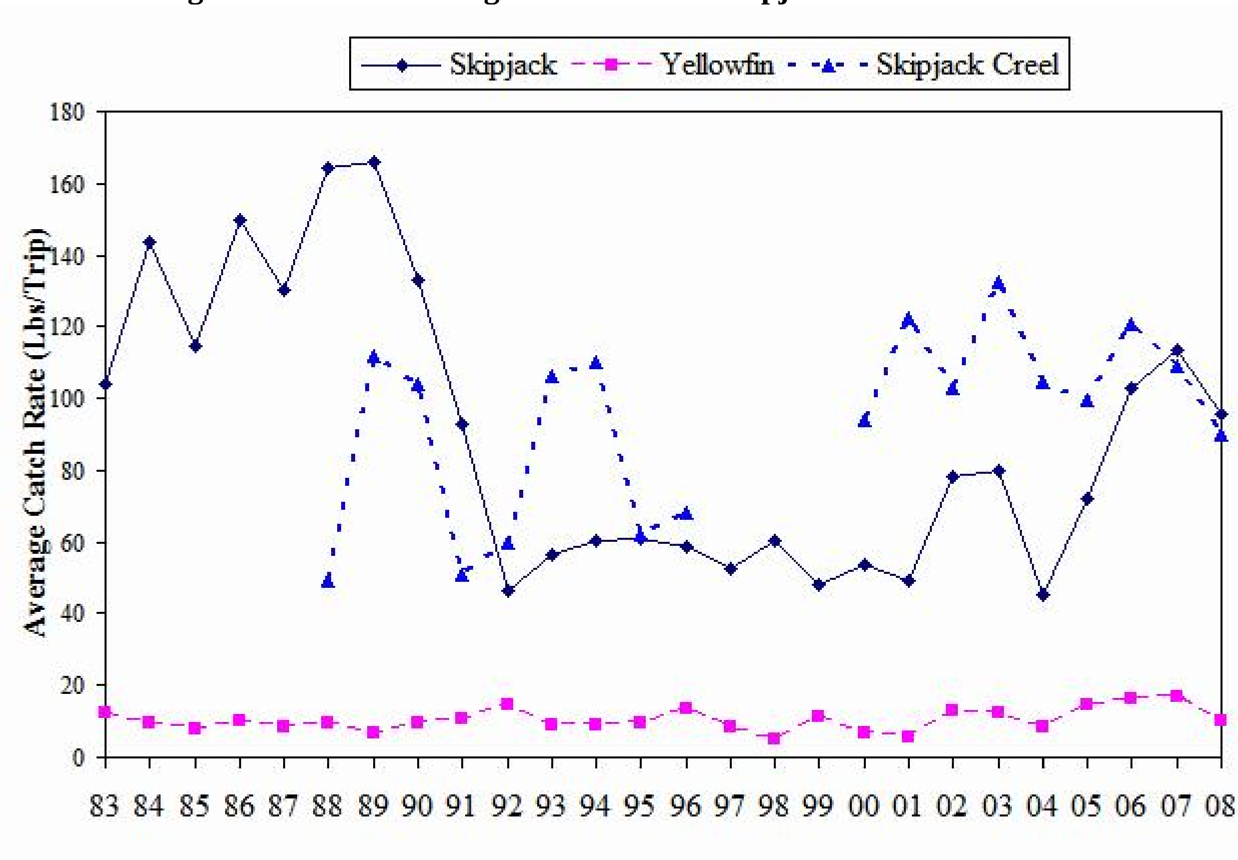
Blue marlins are not a marketable species and are rarely a target by fishermen except during fishing tournaments. When landed, it is rarely sold to vendors participating in the Commercial Purchase Data Collection Program; therefore it would not be recorded in the Commercial Purchase Data Base used to generate these reports. During the 2000 Saipan International Fishing Derby a 996-pound blue marlin was landed.

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	6.53	1.23	0.53
2007	12.57	1.19	0.04
2008	**6.78**	**0.84**	**0.67**
Average	9.97	3.79	1.55
Standard Deviation	5.67	3.10	1.03

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 103 lbs/trip and increased another 11% in 2007. In 2008 Skipjack catch rates declined slightly by 16%. 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. In 2007, yellowfin catch rates increased slightly by 6% or 17 lbs/trip but declined in 2008 by 41% or 10 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	94
2001	49	5	122
2002	78	13	103
2003	80	12	133
2004	45	8	105
2005	72	14	100
2006	103	16	121
2007	114	17	109
2008	**96**	**10**	**90**
Average	90	10	94
Standard Deviation	39	3	25

Offshore Daytime Creel Survey Bycatch Summary
Based on the Interview Catch Data in Year 2000-2008
Method: Trolling

		Number Caught					Trip		
	Species	Released	Dead/Injd	Both	All	BC%	With BC	All	BC%
Non Charter							3	1,585	0.19
	Mahimahi	4		4	2,402	0.17			
	Yellowfin Tuna		1	1	1,637	0.06			
	Skipjack Tuna	1		1	34,772				
	Total			6	38,811	0.02			
	Compared With All Species			6	41,263	0.01			
Charter							0	140	0.00
	Compared With All Species			0	720	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 2008 by both non-charter and charter boats indicate less than 1% or 6 out of 35,677 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 2,402 Mahimahi or .17% landed was released. And 1 out of 1,637 Yellowfin Tuna or .06% landed was released. There was 1 out of 34,772 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 (Boat Based) 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 (Boat Based) 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 2008 for the purse seine fishery and 2004 for longline and pole-and-line fisheries. Fishery trends in the entire Pacific Ocean are illustrated for the purse seine, longline and pole-and-line fisheries.

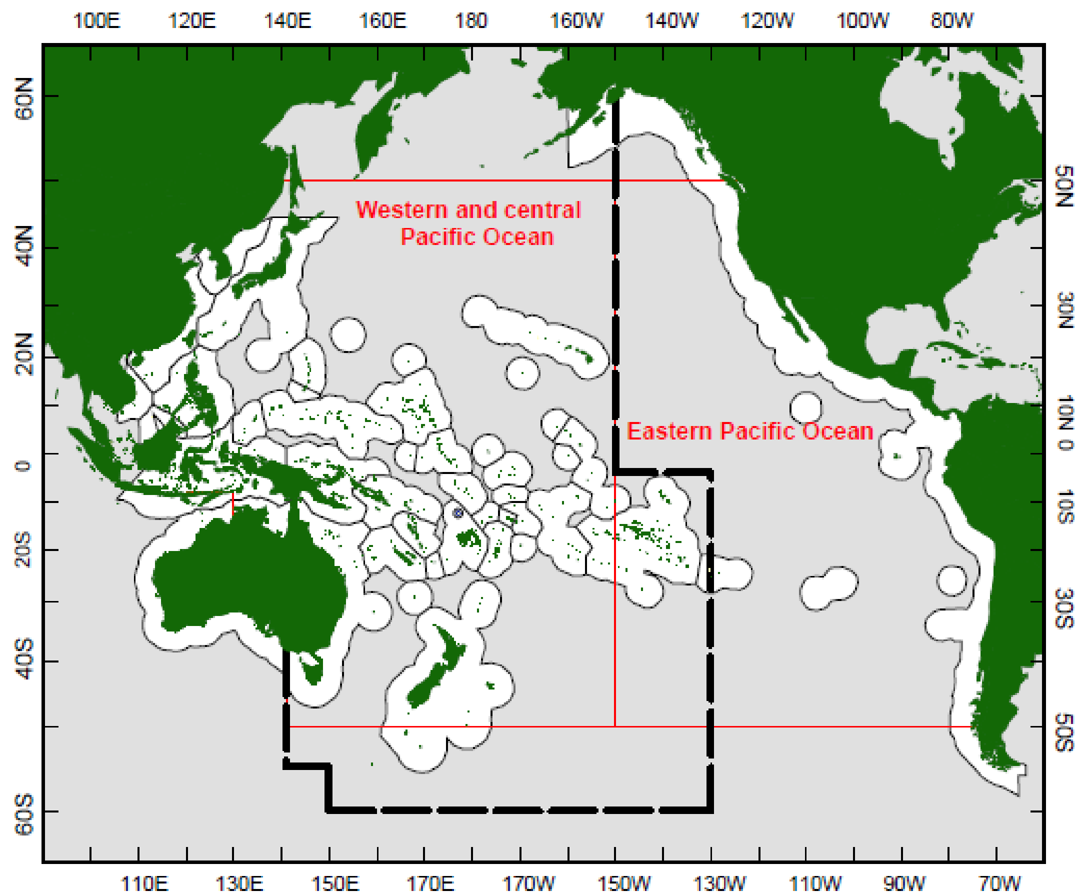


Figure 1. The western and central Pacific Ocean (WCPO), the eastern Pacific Ocean (EPO) and the WCPFC Convention Area (WCP–CA in dashed lines).

The 2008 purse-seine fishery in the WCPFC Convention Area (WCP-CA). Source: WCPFC-SC5-2009 GN-WP-1

Vessels	The combined 2008 catch and effort for these fleets was the highest ever. 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; from 2006-2007, the Korean and FSM Arrangement fleets were the highest producers, but there has been a notable decline in the FSM Arrangement fleet catch and effort due to a reduction in the number of vessels (some vessels reflagged to the US purse-seine fleet). 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 corresponded to an increase in vessel numbers, and coincidently, mirrors the decline in US purse seine catch, vessel numbers and effort over this period. However, as noted above, the US purse-seine fleet commenced a significant rebuilding phase in late 2008, with vessels numbers in mid-2008 close to double that of recent years. The increase in vessel numbers in the US purse seine fleet is reflected in the sharp increase in their catch and effort during 2008, which is now in line with the other major purse seine fleets. The total number of Pacific-island domestic vessels has now dropped back to 59 vessels after a period of sustained growth over more than a decade – at its' peak, there were 75 vessels (2005) in this category.
Catch	The provisional 2008 purse-seine catch of 1,783,669 mt was the fifth consecutive record for this fishery but only 23,000 mt higher than the previous record in 2007. The 2008 purse-seine skipjack catch (1,409,921 mt –79% of the total catch) was clearly lower than the record catch of 2007, although the purse-seine skipjack catch has now increased by more than 500,000 mt (or 59%) since 2001 (919,410 mt), at an average of about 70,000 mt per year. The 2008 purse-seine catch of yellowfin tuna (325,904 mt – 18%) was clearly the highest on record –the 2008 yellowfin catch was more than 95,000 mt (40%) higher than in 2007, and 65,000 mt (25%) higher than the previous record taken in 1998. The provisional catch estimate for bigeye tuna for 2008 (46,811 mt –3%) was also the highest on record but may be revised once all observer data for 2008 have been received and processed
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. 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. During the first half of 2007, the WCP–CA was in an ENSO-neutral state, but then moved into a well-established La Nina state, which persisted throughout the rest of 2007 and the most of 2008. As was the case in 2007, fishing activity during 2008 remained concentrated in the PNG, FSM and Solomon Islands area and was restricted from extending east beyond the 175°E longitude (compared to activity in recent years) due to cooler surface water flowing in from the east, in line with the prevailing ENSO conditions. The extension of the warmer pool of water in the eastern areas just north of the equator during 2002-2004 is clearly absent during 2008.

Table 1. Total reported purse seine catch (metric tonnes) of skipjack, yellowfin and bigeye tuna in the Pacific Ocean. Source: SPC.

Year	Skipjack	Yellowfin	Bigeye	Total
1968	67,229	93,648	4,801	165,678
1969	51,077	117,522	1,141	169,740
1970	55,000	147,196	2,971	205,167
1971	108,271	114,013	5,049	227,333
1972	47,883	174,299	4,643	226,825
1973	58,518	208,998	4,189	271,705
1974	90,554	208,756	2,675	301,985
1975	133,937	195,921	7,628	337,486
1976	148,561	230,084	18,293	396,938
1977	120,635	200,453	12,421	333,509
1978	208,818	172,151	19,590	400,559
1979	193,818	198,824	13,777	406,419
1980	210,261	174,891	23,675	408,827
1981	209,469	227,697	18,809	455,975
1982	270,319	188,493	12,053	470,865
1983	377,541	190,289	13,684	581,514
1984	388,792	250,746	18,054	657,592
1985	345,483	312,195	12,385	670,063
1986	415,429	366,413	9,908	791,750
1987	427,411	417,627	12,103	857,141
1988	575,159	372,829	9,356	957,344
1989	567,310	437,346	14,224	1,018,880
1990	658,671	438,688	17,919	1,115,278
1991	824,966	445,753	18,133	1,288,852
1992	790,696	465,036	26,061	1,281,793
1993	673,908	458,397	23,431	1,155,736
1994	818,410	425,279	45,368	1,289,057
1995	866,948	401,367	57,058	1,325,373
1996	863,205	354,252	82,976	1,300,433
1997	835,879	500,813	105,643	1,442,335
1998	1,147,216	515,151	70,901	1,733,268
1999	1,144,205	486,527	87,985	1,718,717
2000	1,153,508	456,035	131,958	1,741,501
2001	1,062,971	598,066	89,646	1,750,683
2002	1,256,325	595,513	83,754	1,935,592
2003	1,349,893	589,082	79,865	2,018,840
2004	1,403,408	448,414	97,218	1,949,040
2005	1,550,490	522,819	107,735	2,181,044
2006	1,661,107	397,843	121,884	2,180,834
2007	1,705,085	407,759	99,720	2,212,564
2008	1,705,579	512,313	121,812	2,339,704
Average	620,959	337,680	39,717	998,356
STD Deviation	504,227	149,535	40,222	669,817

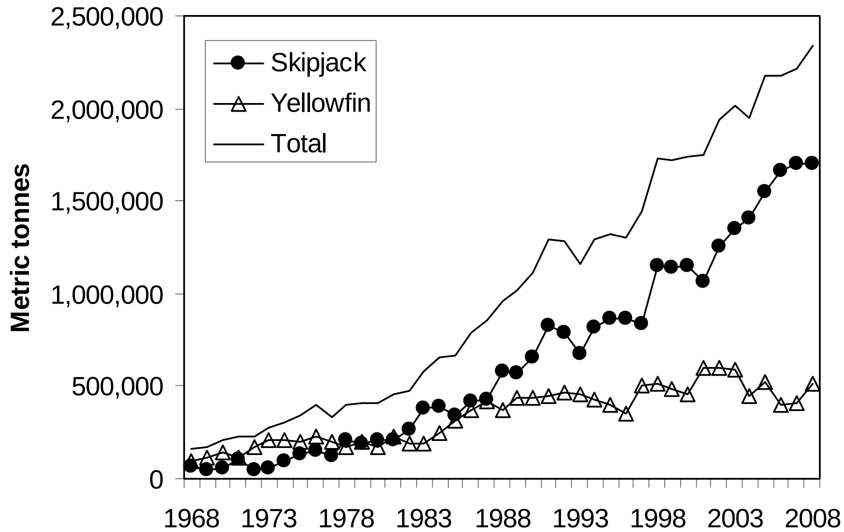


Figure 2. Total purse seine catch of skipjack and yellowfin tuna in the Pacific Ocean, 1968–2008. Source: SPC.

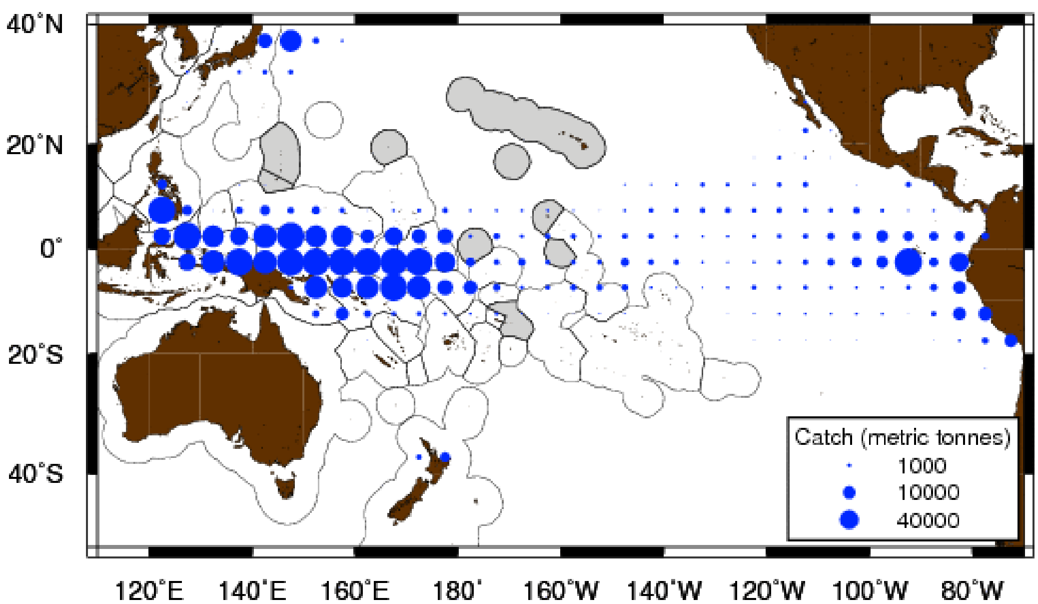


Figure 3. Distribution of purse seine skipjack catch in 2008. Source: SPC and I-ATTC.

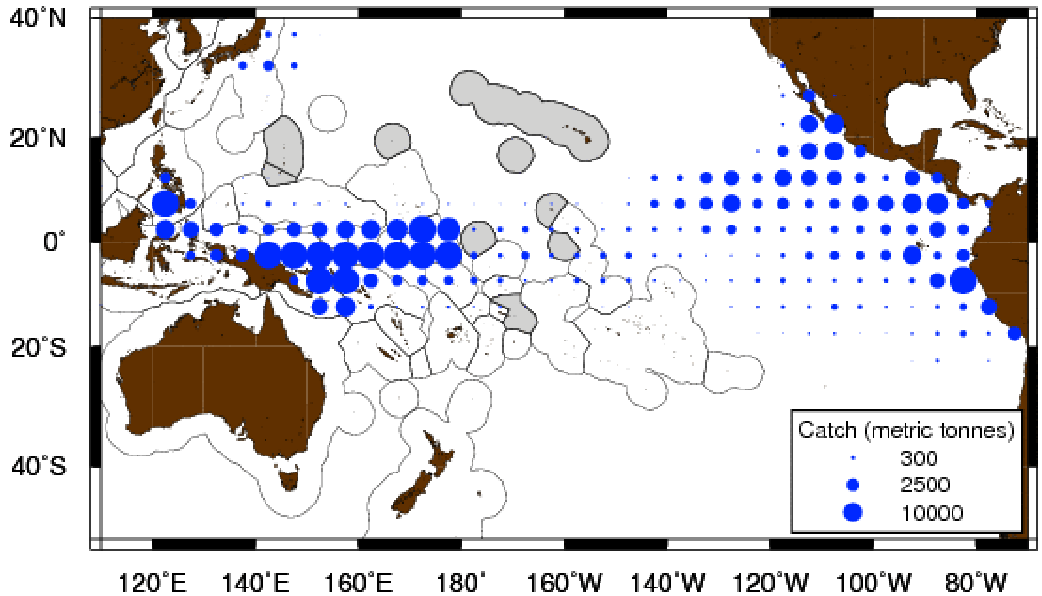


Figure 4. Distribution of purse seine yellowfin catch in 2008. Source: SPC and I-ATTC

The 2008 longline fishery in the WCP-CA. Source: WCPFC-SC5-2009 GN-WP-1

Vessels

The total number of vessels involved in the fishery has generally fluctuated between 3,500 and 5,500 for the last 30 years. The fishery involves two main types of operation –

• large (typically >250 GRT) distant-water freezer vessels which undertake long voyages (months) and operate over large areas of the region. These vessels may target either tropical (yellowfin, bigeye tuna) or subtropical (albacore tuna) species.

• smaller (typically <100 GRT) offshore vessels 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.

The following broad categories of longline fishery, based on type of operation, area fished and target species, are currently active in the WCP–CA :

• South Pacific offshore albacore fishery comprises Pacific-Islands domestic "offshore" vessels, such as those from American Samoa, Cook Islands, Fiji, French Polynesia, New Caledonia, Samoa, Solomon Islands, Tonga and Vanuatu; these fleets mainly operate in subtropical waters, with albacore the main species taken.

• Tropical offshore bigeye/yellowfin-target fishery includes "offshore" sashimi longliners from Chinese-Taipei, based in Micronesia, Guam, Philippines and Chinese-Taipei, mainland Chinese vessels based in Micronesia, and domestic fleets based in Indonesia, Micronesian countries, Philippines, PNG, the Solomon Islands and Vietnam.

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, targetting 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.

• Tropical distant-water bigeye/yellowfin-target fishery comprises "distant-water" vessels from Japan, Korea, Chinese-Taipei, mainland China and Vanuatu. These vessels primarily operate in the eastern tropical waters of the WCP–CA (and into the EPO), targeting bigeye and yellowfin tuna for the frozen sashimi market.

• South Pacific distant-water albacore fishery comprises "distant-water" vessels from Chinese-Taipei, mainland China and Vanuatu operating in the south Pacific, generally below 20°S, targeting albacore tuna destined for canneries.

• Domestic fisheries in the sub-tropical and temperate WCP–CA comprise vessels targeting different species within the same fleet depending on market, season and/or area. These fleets include the domestic fisheries of Australia, Japan, New Zealand and Hawaii. For example, the Hawaiian longline fleet has a component that targets swordfish and another that targets bigeye tuna.

• South Pacific distant-water swordfish fishery is a relatively new fishery and comprises "distant-water" vessels from Spain.

• North Pacific distant-water albacore and swordfish fisheries mainly comprise "distant-water" vessels from Japan (swordfish and albacore), Chinese-Taipei (albacore only) and Vanuatu (albacore only).

Catch

The provisional WCP–CA longline catch (231,003 mt) for 2008 was the lowest since 2000 and around 12% lower than the highest on record which was attained in 2004 (262,584 mt). The WCP–CA albacore longline catch (69,920 mt – 30%) for 2008 was the lowest since 2000. The provisional bigeye catch (87,504 mt – 38%) for 2008 was higher than the average for the period 2000–2008, and the yellowfin catch (69,516 mt – 30%) was similar to the 2007 catch, but the lowest since 1999. 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 around 50-60% of the catch in recent years. 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. The bigeye catch by the Chinese-Taipei distant-water longline fleet has since declined to 8,777 mt (in 2008), related to a significant drop in vessel numbers (142 vessels in 2003 down to 84 vessels in 2008). The Korean distant-water longline fleet has also experienced a large decline in bigeye and yellowfin catches in recent years, with a corresponding drop in vessel numbers – from 184 vessels active in 2002 down to 108 vessels in 2008 (41% decline), although their bigeye catch for 2008 was relatively high (17,001 mt) for this number of vessels.

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, targetting 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.

Table 2. Total reported longline catch (metric tonnes) of PMUS in the Pacific Ocean. Source: SPC and I-ATTC (Report 80-05), 2008 data are preliminary.

Year	Albacore	Yellowfin	Bigeye	Striped Marlin	Black Marlin	Blue Marlin	Swordfish	Total
1962	37,413	65,758	80,945	26,639	2,229	18,169	11,216	242,369
1963	26,613	72,158	109,157	29,733	2,342	18,341	11,414	269,759
1964	26,248	62,216	77,257	41,462	1,876	13,055	8,615	230,729
1965	28,614	61,107	59,008	34,712	2,375	10,068	9,665	205,549
1966	51,560	70,720	66,749	29,485	2,172	9,462	11,615	241,763
1967	55,043	45,005	68,669	32,841	1,825	8,804	12,041	224,227
1968	43,760	60,558	62,432	40,280	1,883	8,026	11,477	228,416
1969	38,026	66,701	84,442	26,463	2,073	9,118	14,358	241,180
1970	46,606	68,124	67,689	37,376	1,605	11,301	10,329	243,029
1971	41,739	64,940	66,602	33,168	2,127	6,727	9,410	224,712
1972	45,295	77,110	85,462	22,663	1,884	8,129	9,102	249,645
1973	58,934	73,515	91,062	20,333	1,935	8,313	9,604	263,696
1974	37,166	64,680	78,748	19,930	1,620	7,634	8,693	218,472
1975	30,611	79,056	99,356	16,308	1,845	5,797	9,434	242,407
1976	43,922	91,995	122,804	16,903	1,056	7,244	11,259	295,182
1977	55,632	105,035	140,335	9,623	936	7,244	10,892	329,697
1978	48,809	118,743	121,034	10,309	1,624	8,196	10,887	319,603
1979	40,749	116,538	112,621	9,196	2,727	13,942	13,836	309,609
1980	46,629	133,850	120,888	9,650	1,887	14,261	12,486	339,651
1981	52,837	101,124	94,980	9,649	2,256	14,808	13,181	288,835
1982	49,634	94,975	98,569	9,247	2,236	15,143	11,818	281,622
1983	42,341	94,557	101,455	7,948	1,981	13,464	13,449	275,195
1984	36,901	80,603	92,823	7,498	1,565	17,394	12,727	249,511
1985	44,254	87,164	117,651	7,108	1,228	13,255	14,300	284,960
1986	47,440	85,422	149,166	9,715	1,418	15,626	14,759	323,546
1987	40,372	93,003	159,478	13,205	1,891	21,685	17,606	347,240
1988	46,194	99,462	122,421	12,896	2,582	20,215	17,720	321,490
1989	33,582	82,555	124,136	10,119	1,400	17,285	15,897	284,974
1990	36,059	105,657	164,110	8,161	1,389	15,894	17,362	348,632
1991	41,714	87,068	151,439	8,268	1,810	17,820	23,489	331,608
1992	50,897	88,474	146,779	8,429	1,992	20,044	28,177	344,792
1993	61,839	88,040	128,864	14,184	1,753	22,578	25,850	343,108
1994	65,489	100,466	137,464	9,600	2,196	24,812	22,091	362,118
1995	64,909	99,249	114,758	10,452	1,591	25,504	20,250	336,713
1996	67,091	92,007	93,012	9,066	1,146	18,280	22,289	302,891
1997	79,368	91,754	111,041	9,513	1,264	18,655	28,840	340,435
1998	87,752	79,661	119,071	10,675	1,871	21,844	29,202	350,076
1999	77,082	69,916	101,631	8,545	2,199	18,685	28,225	306,283
2000	74,717	97,383	107,442	6,282	1,531	17,888	30,241	335,484
2001	97,529	101,226	130,757	6,830	1,717	20,054	34,271	392,384
2002	97,645	98,676	153,183	6,594	1,916	19,161	36,362	413,537
2003	92,473	100,415	130,056	7,262	2,061	27,989	38,080	398,336
2004	87,707	98,833	130,241	6,739	2,529	26,038	36,911	388,998
2005	84,232	81,024	113,820	6,030	2,869	23,576	28,343	339,894
2006	89,419	79,533	113,230	5,966	2,746	21,238	31,716	343,848
2007	83,468	74,593	110,499	5,265	2,045	18,619	29,486	323,975
2008	83,912	79,221	99,399	4,064	2,063	16,107	24,924	309,690
Average	55,749	85,742	109,207	15,029	1,899	15,691	18,594	301,912
STD deviation	20,573	17,354	27,180	10,550	439	5,898	8,979	53,078

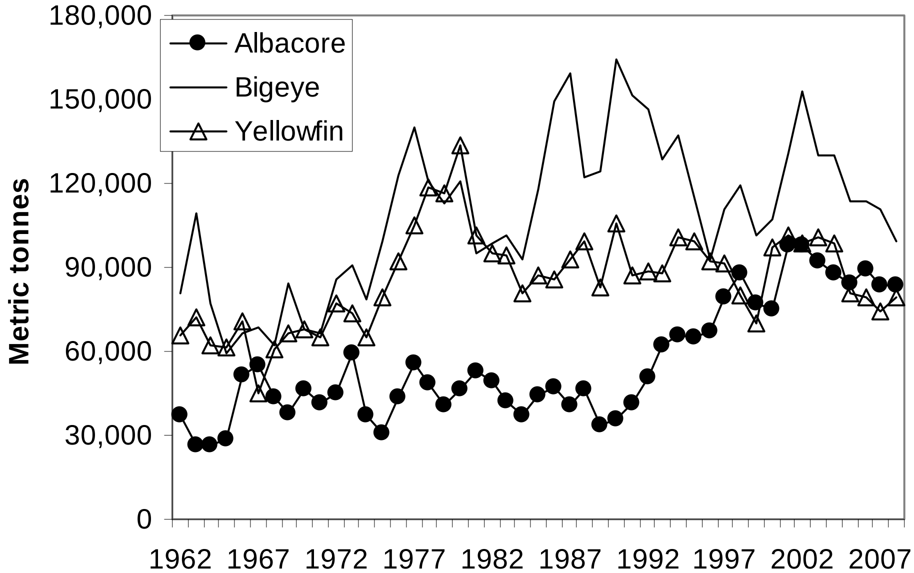


Figure 5. Reported longline tuna catches in the Pacific Ocean. 2008 data are preliminary. Source: SPC.

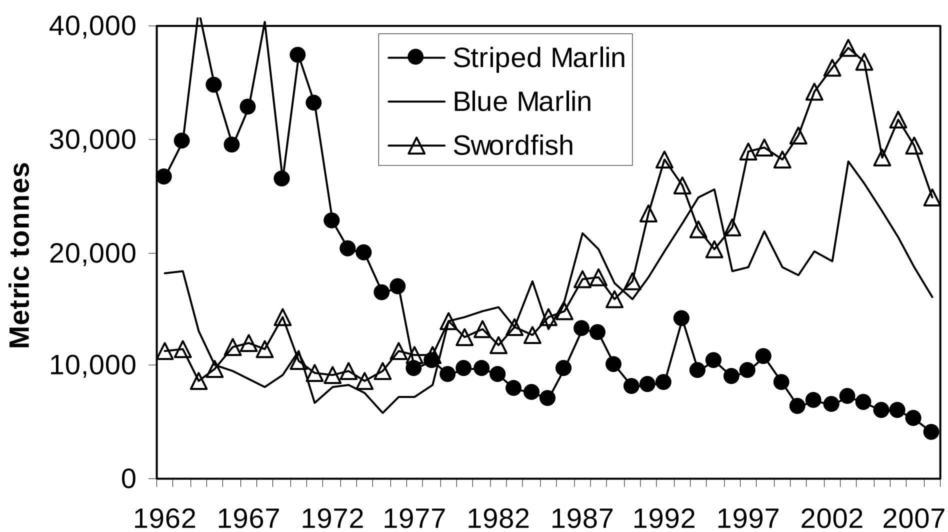


Figure 6. Reported longline billfish catches in the Pacific Ocean. 2008 data are preliminary. Source: SPC and I-ATTC (Report 80-05).

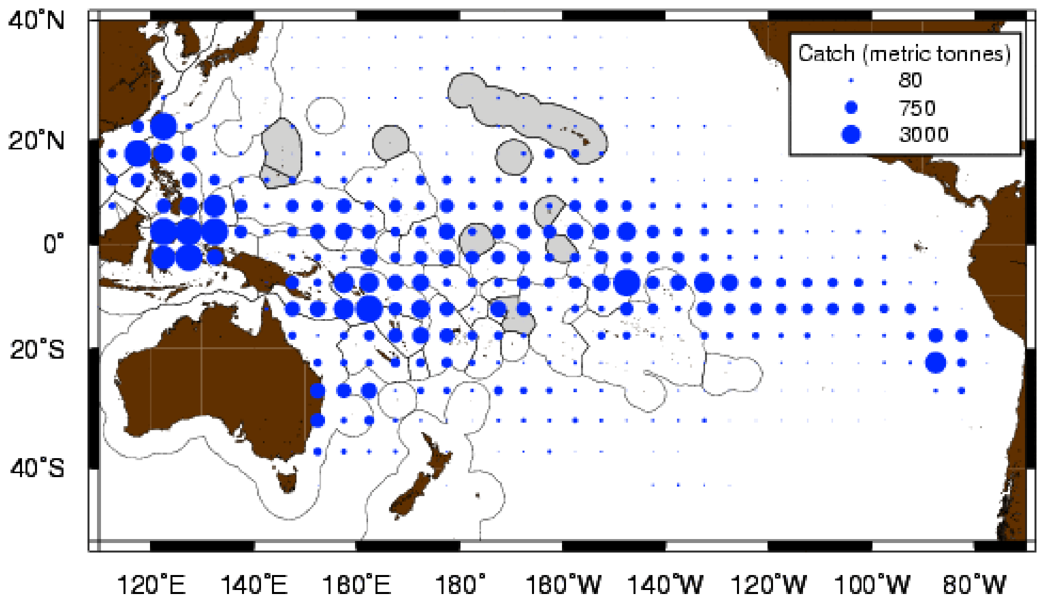


Figure 7. Distribution of longline catches of yellowfin tuna reported in 2004. Source: SPC public domain data.

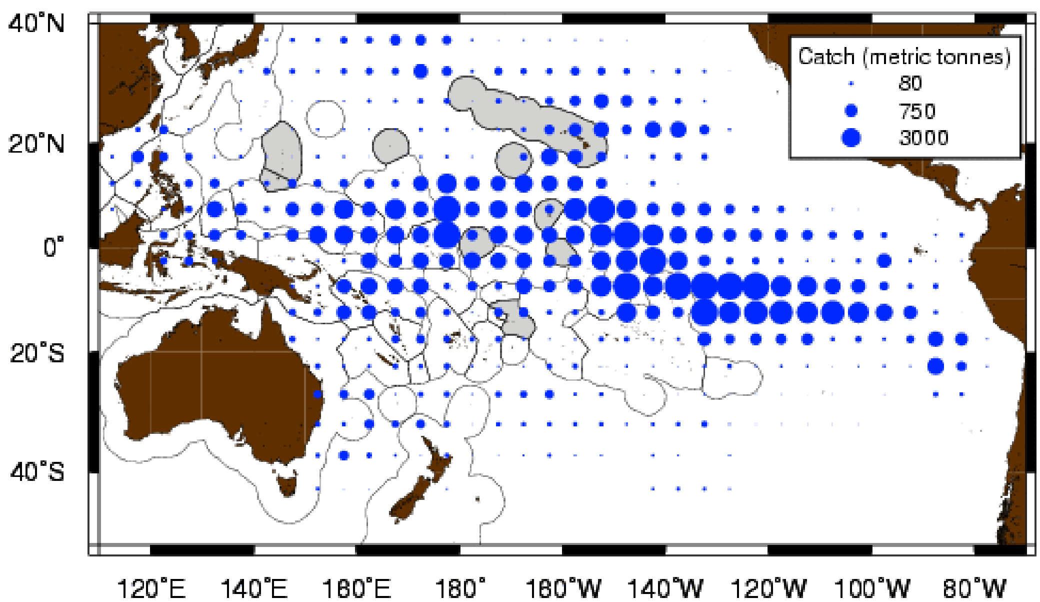


Figure 8. Distribution of longline catches of bigeye tuna reported in 2004. Source: SPC public domain data.

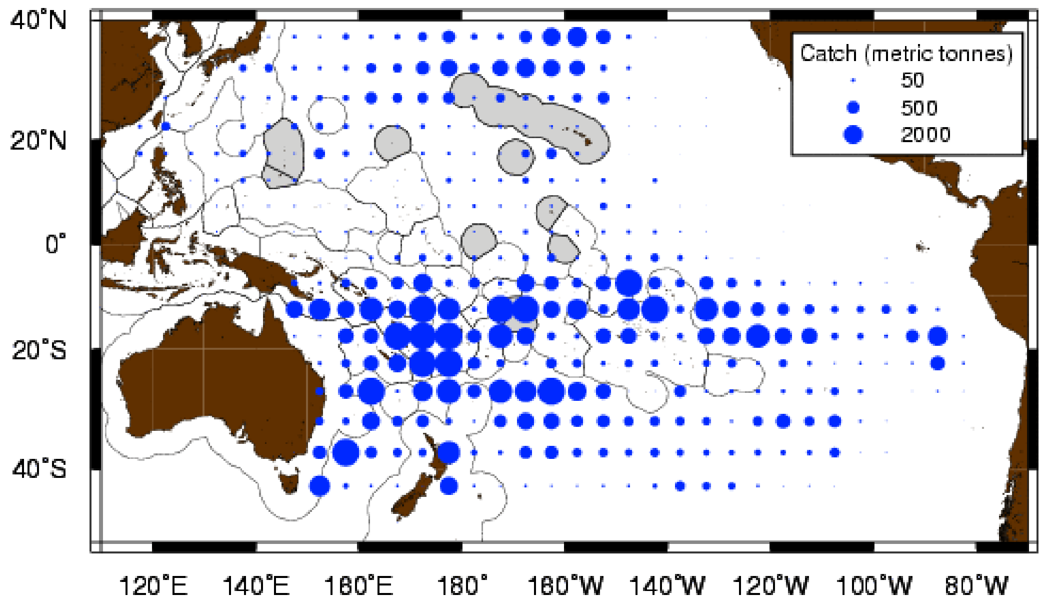


Figure 9. Distribution of longline catches of albacore tuna reported in 2004. Source: SPC public domain data.

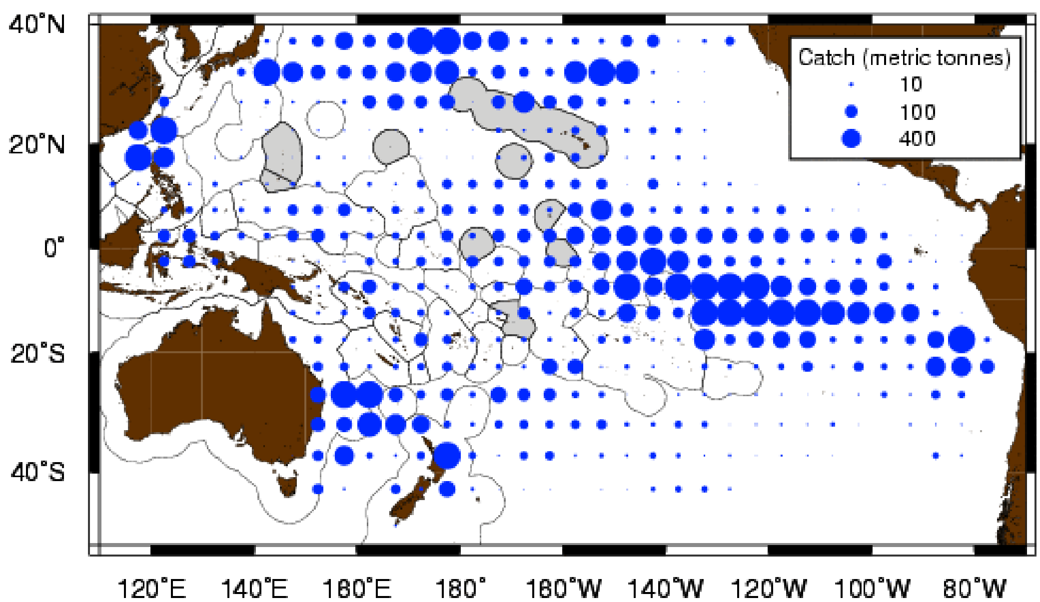


Figure 10. Distribution of longline catches of swordfish reported in 2004. Source: SPC public domain data.

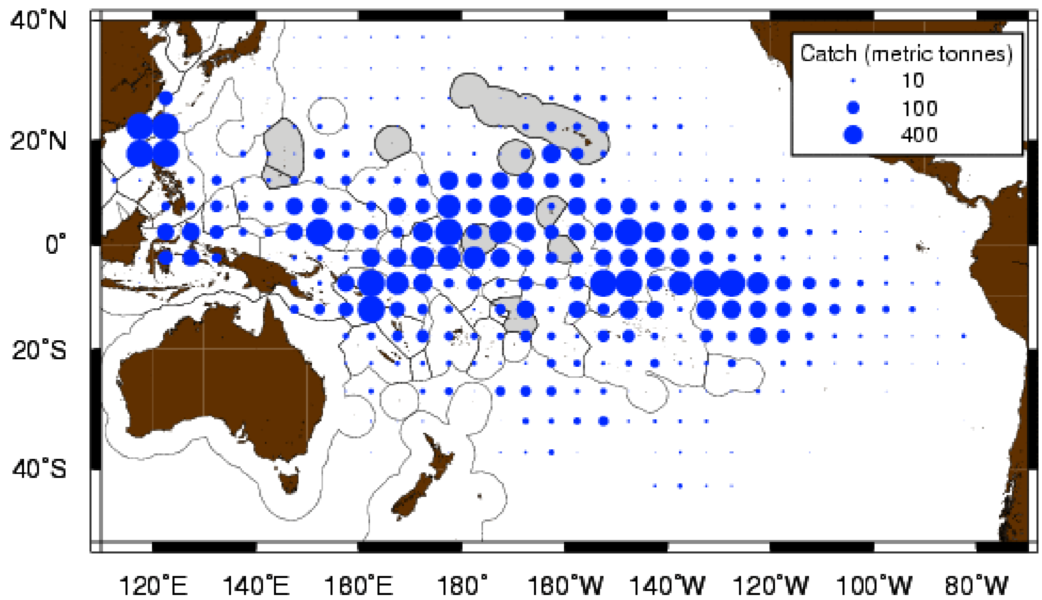


Figure 11. Distribution of longline catches of blue marlin reported in 2004. Source: SPC public domain data.

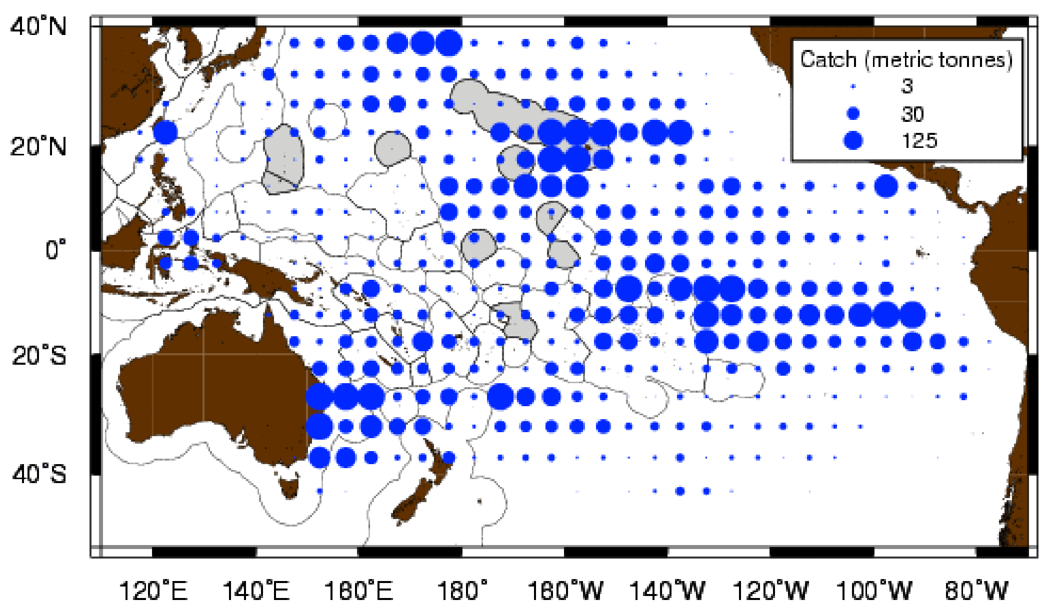


Figure 12. Distribution of longline catches of striped marlin reported in 2004. Source: SPC public domain data.

The 2008 pole-and-line fishery in the WCP-CA. Source: WCPFC-SC4-2008 GN-WP-1

Vessels	The pole-and-line fleet was composed of approximately 500 vessels in the 2007 fishery which excludes vessels in the Indonesia domestic fishery.
Catch	The 2008 catch estimates for the key pole-and-line fleets operating in the WCP–CA have yet to be provided, although the total catch estimate is expected to show a further decline on levels in recent years. – carrying over the 2007 catch estimates for these key fleets provides a provisional catch for 2008 at 170,805 mt, which is the lowest annual catch for this fishery since the mid-1960s. Skipjack tends to account for the majority of the catch (~70-80% in recent years, but typically more than 85% of the total catch in tropical areas) and albacore (8–20% in recent years) is taken by the Japanese coastal and offshore fleets in the temperate waters of the north Pacific; Yellowfin tuna (5–10%) and a small component of bigeye tuna (1–6%) make up the remainder of the catch. The Japanese distant-water and offshore (118,907 mt in 2007) and the Indonesian fleets (60,415 mt in 2007) account for most of the WCP–CA pole-and-line catch. The catches by the Japanese distant-water and offshore fleet in recent years have been the lowest for several decades and is no doubt related to the continued reduction in vessels numbers (which for 2008 was down to only 105 vessels, the lowest on record). The Solomon Islands fleet recovered from low catch levels experienced in the early 2000s (only 2,773 mt in 2000 due to civil unrest), but vessel numbers are now dwindling (only 3 vessels were active in 2008), and the future of this fishery is now in the balance.
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).

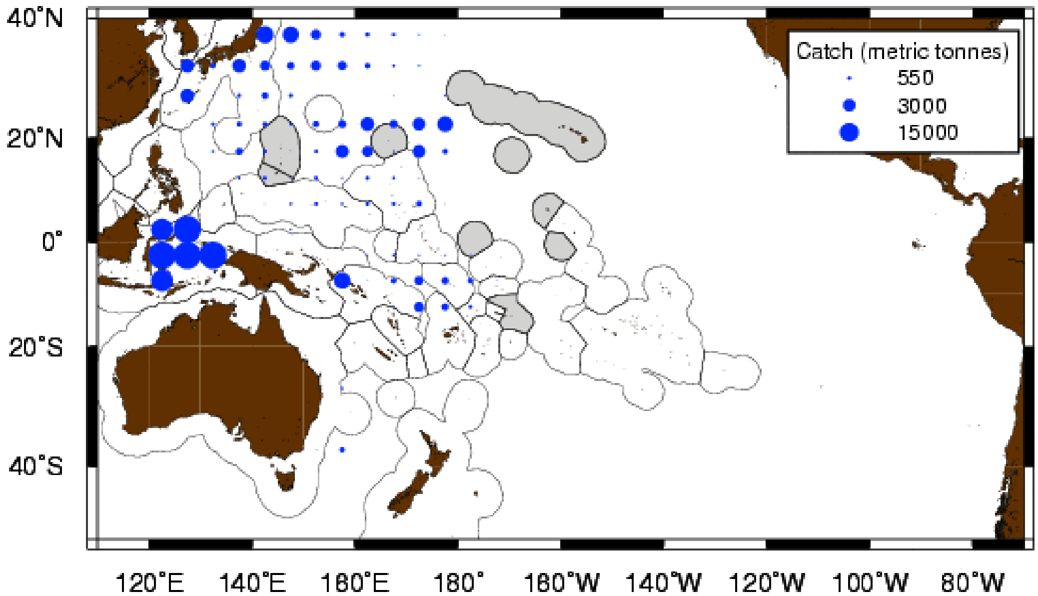


Figure 13. Distribution of pole-and-line catch of skipjack reported in 2004. Source: SPC public domain data.

Table 3. Total reported pole-and-line catch (metric tonnes) of skipjack in the Pacific Ocean. Source: SPC.

Year	Skipjack
1970	379,074
1971	333,284
1972	172,827
1973	253,217
1974	289,202
1975	218,271
1976	276,582
1977	294,641
1978	331,401
1979	285,859
1980	333,457
1981	294,292
1982	262,244
1983	299,762
1984	379,474
1985	250,010
1986	336,695
1987	262,467
1988	301,031
1989	289,706
1990	224,592
1991	292,950
1992	251,717
1993	280,066
1994	227,921
1995	257,147
1996	211,408
1997	225,612
1998	244,447
1999	235,739
2000	223,552
2001	163,328
2002	152,311
2003	171,796
2004	147,276
2005	175,247
2006	146,380
2007	127,590
2008	125,367
Average	249,434
STD deviation	66,963

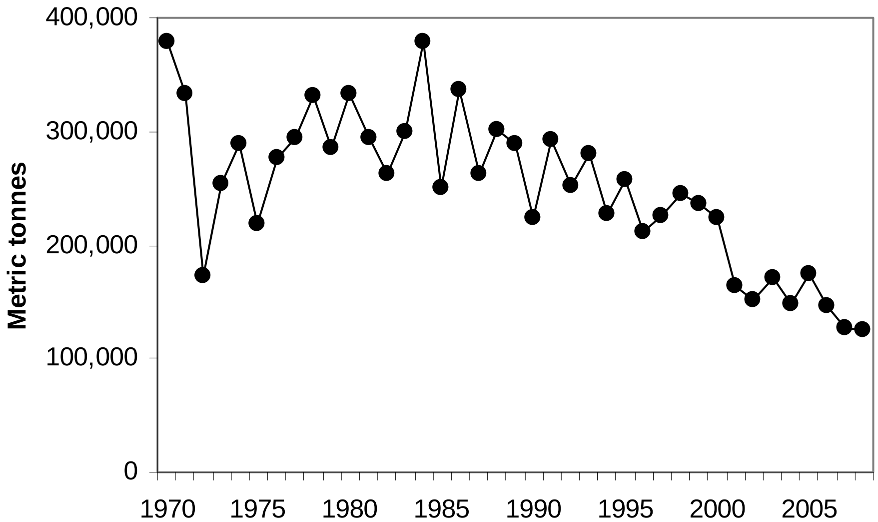


Figure 14. Reported pole-and-line catch (metric tonnes) of skipjack in the Pacific Ocean. Source: SPC.

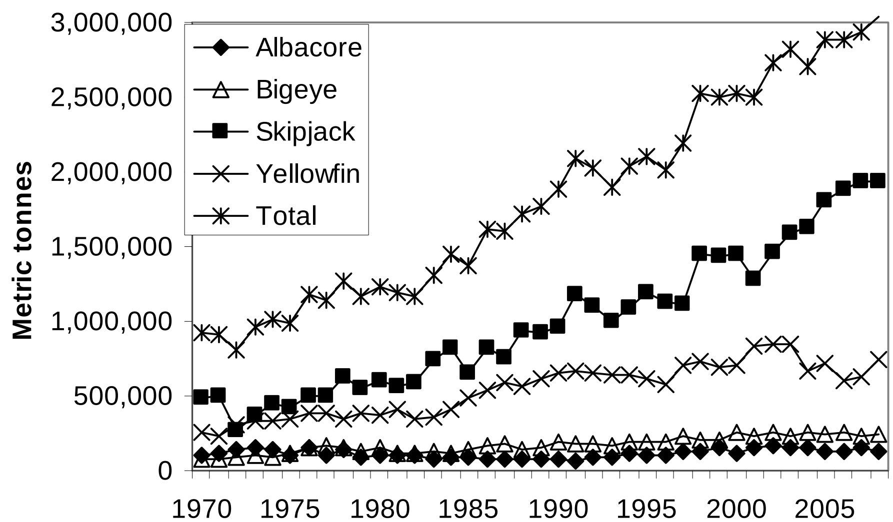


Figure 15. Estimated total annual catch of tuna species in the Pacific Ocean. Source: SPC.

Table 4. Estimated annual catch (metric tonnes) of tuna species in the Pacific Ocean. Source: SPC.

Year	Albacore	Bigeye	Skipjack	Yellowfin	Total
1970	98,305	75,217	485,253	259,969	918,744
1971	120,642	75,918	493,805	224,877	915,242
1972	136,245	95,683	275,302	303,500	810,730
1973	148,301	101,194	377,781	338,393	965,669
1974	138,084	87,449	444,005	338,877	1,008,415
1975	106,915	113,566	423,494	340,003	983,978
1976	152,197	148,956	495,267	385,669	1,182,089
1977	103,460	162,037	499,105	380,904	1,145,506
1978	136,879	148,292	632,038	348,053	1,265,262
1979	95,831	133,905	555,802	381,566	1,167,104
1980	105,692	151,536	597,708	372,010	1,226,946
1981	106,668	121,690	564,260	404,449	1,197,067
1982	99,369	119,650	594,911	348,598	1,162,528
1983	79,841	124,590	745,659	356,840	1,306,930
1984	95,309	119,948	825,701	405,779	1,446,737
1985	90,875	141,104	655,626	485,483	1,373,088
1986	82,329	168,962	823,147	536,794	1,611,232
1987	73,602	180,616	754,346	589,777	1,598,341
1988	78,050	142,760	941,281	559,536	1,721,627
1989	79,450	150,231	922,389	613,302	1,765,372
1990	71,893	195,269	967,252	655,082	1,889,496
1991	67,990	182,888	1,183,736	660,733	2,095,347
1992	85,596	183,062	1,101,867	653,520	2,024,045
1993	87,367	161,858	1,006,390	638,212	1,893,827
1994	112,372	196,737	1,093,516	639,202	2,041,827
1995	103,987	187,841	1,185,902	621,251	2,098,981
1996	105,066	192,801	1,130,078	578,947	2,006,892
1997	127,146	230,215	1,121,722	710,034	2,189,117
1998	133,316	204,747	1,453,221	733,748	2,525,032
1999	153,915	203,999	1,441,128	698,287	2,497,329
2000	119,656	255,982	1,448,101	707,100	2,530,839
2001	147,935	234,775	1,283,914	838,204	2,504,828
2002	170,364	253,009	1,467,586	844,827	2,735,786
2003	157,344	225,352	1,594,607	846,770	2,824,073
2004	155,463	257,497	1,628,344	667,520	2,708,824
2005	121,909	246,327	1,804,636	718,090	2,890,962
2006	128,219	259,697	1,887,728	604,311	2,879,955
2007	148,963	233,501	1,931,348	622,248	2,936,060
2008	127,902	243,994	1,930,778	737,274	3,039,948
Average	114,217	172,124	994,070	542,301	1,822,712
STD deviation	28,046	54,584	477,949	175,702	692,241

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 2009, the SC reviewed an assessment for bigeye and yellowfin tuna in the WCPO and south Pacific albacore. In addition, recent assessments are available for North Pacific blue shark (Tables 5 and 6). Stock status for the four tuna species are summarized from the SC species summary statements http://www.wcpfc.int/doc/summary-report-edited-version and http://www.wcpfc.int/doc/gn-wp-01/williams-p-and-p-terawasi-overview-tuna-fisheries-western-and-central-pacific-ocean-inc 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 2009, the 9th meeting of the ISC reviewed assessments for North Pacific swordfish and Pacific bluefin tuna and summary statements from the meeting are available (http://isc.ac.affrc.go.jp/reports/plenary_reports.html).

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 16). 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)	2009	Swordfish (N. Pacific)	2004
Albacore Tuna (N. Pacific)	2006	Wahoo	
Other tuna relatives (*Auxis* sp.)		Yellowfin Tuna (WCPO)	2009
(*allothunnus* sp., *Scomber* sp.)		Kawakawa	
Bigeye Tuna (WCPO)	2009	Bluefin Tuna (Pacific)	2008
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)	2009
Sailfish		Silky Shark	
Shortbill Spearfish		Oceanic Whitetip Shark	
Skipjack Tuna (WCPO)	2008	Salmon Shark	
Striped Marlin (N. Pacifc)	2006		

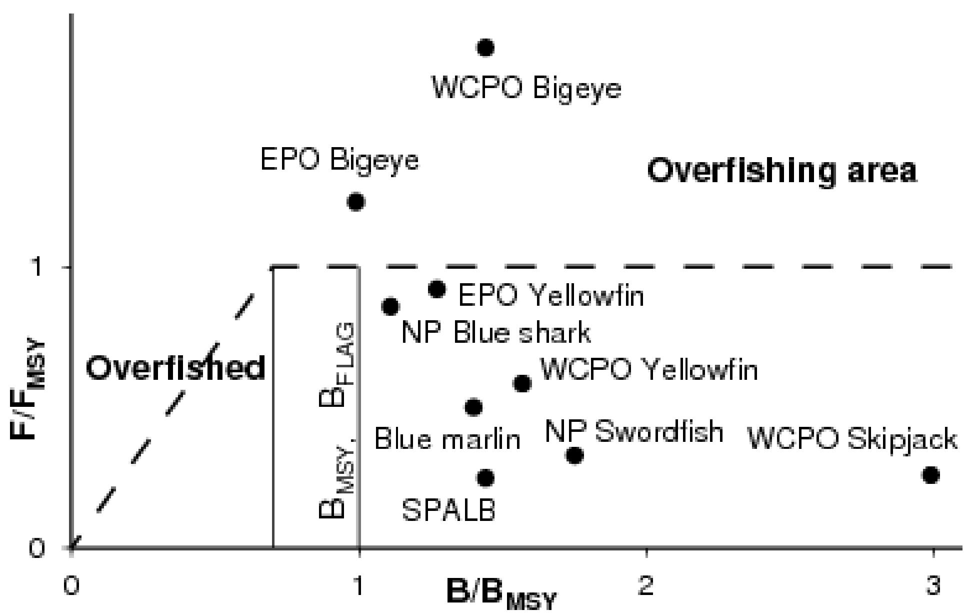


Figure 16. Specification of fishing mortality and biomass reference points in the WPRFMC Pelagics FMP and current stock status in the western-central (WCPO) and eastern Pacific Ocean (EPO).

Skipjack tuna in the WCP-CA

Stock status: A stock assessment was undertaken for skipjack during 2008. The major conclusions of the skipjack assessment are essentially unchanged from the last three assessments (2002, 2003, and 2005). The 2008 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 17, Table 6).

Management advice and implications: The WCPFC Scientific Committee acknowledged that skipjack catches in 2007 increased to a historical high of ~1.7 million mt. The SC noted the increasing trend in estimated recruitment throughout the entire time series of the fishery. This trend may reflect skipjack's high productivity relative to other tuna species and its position in the ecosystem. These high recent catches are considered to be 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 bigeye and yellowfin tunas.

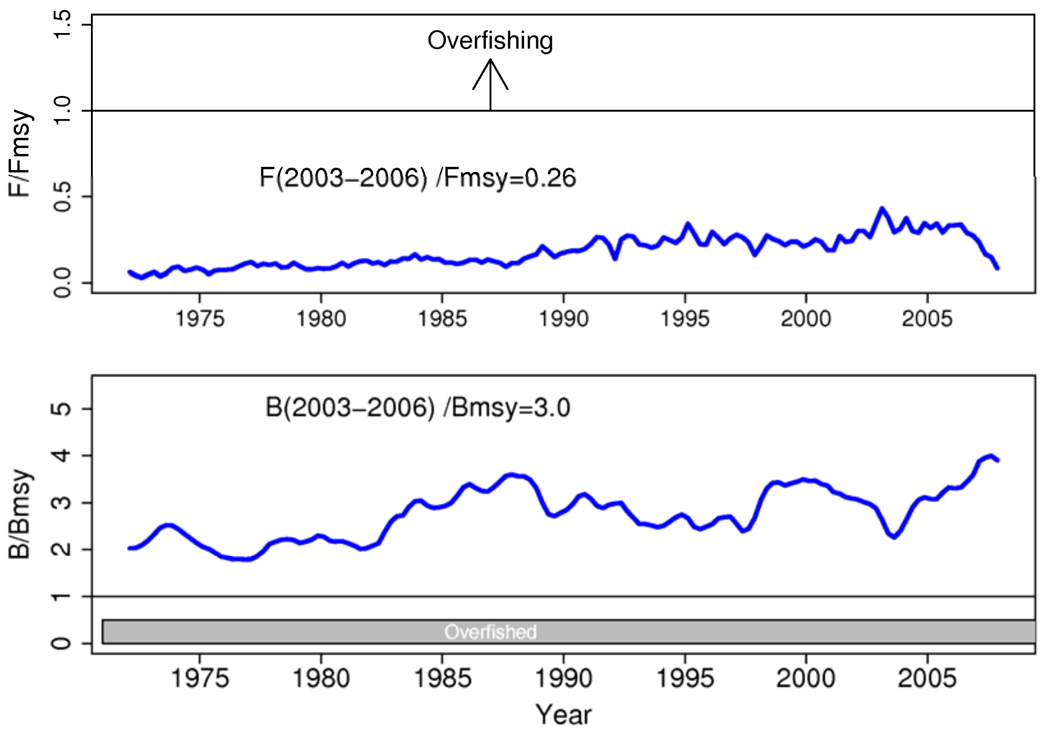


Figure 17. Ratios of F/FMSY (top) and B/BMSY (bottom) for skipjack tuna in the WCP-CA. The horizontal line at 1.0 in the F/FMSY figure indicates an overfishing reference point. The shaded area in the B/BMSY figure indicates an overfished reference point.

Yellowfin tuna in the WCP-CA

Stock status: Three specific issues were raised in discussions about stock assessment results at the WCPFC Scientific Committee.

1) It was generally agreed that stock assessment results from the 2009 model are more optimistic than those in 2007, meaning that the general nature of advice required from SC5 may need to be different from previous years. However, a comparison of 2007 and 2009 stock assessments with similar steepness values indicate only a slight improvement.

2) In noting this generally more optimistic state, the SC also noted advice from the SA-SWG, that Region 3, which supports approximately 95% of the catch, has significantly higher fishery impacts than other regions. This means that the more optimistic status may be "buffered" by biomass in other regions. SPC-OFP reminded the meeting that spatial heterogeneity exists throughout the regions, and it is unlikely that mixing is rapid enough to transfer fishery impacts in the short term, if at all. For some CCMs, this highlighted the importance of having a specific recommendation for Region 3, noting that specific information was provided in the SA-SWG report.

3) It was also noted that this year, the SA-SWG provided advice on a range of model runs with different values of assigned steepness, each of which could be as feasible as the others. It would, therefore, be very difficult to provide the level of prescription in the recommendation that was provided in 2007, due to the sheer number of results that would need to be presented.

Management advice and implications: The range of estimates of Fcurrent/FMSY ratios (0.41–0.85) in the 2009 assessment was lower than the base-case estimate (0.95) in the 2007 assessment. This change is largely due to the addition of fisheries data, assumptions of steepness, and because the period for computing the MSY-based reference points was advanced two years (from 2002–2005 to 2004–2007). Estimates of Fcurrent/FMSY indicate that the entire WCPO yellowfin stock is not experiencing overfishing and the entire stock appears to be capable of producing MSY. Estimates of SBcurrent/SBMSY indicate that the WCPO yellowfin stock is not in an overfished state.

The SC noted a slightly improved status for the WCPO yellowfin stock compared with the 2007 stock assessment. However, the SC also noted that levels of fishing mortality, exploitation rates and depletion differ between regions, and that exploitation rates were highest in the western equatorial region, which accounts for ~95% of the total yellowfin tuna catch, and that the spawning biomass in this region is estimated to have declined to about 30% of the unexploited level. The SC reiterated SC3's advice that exploitation rates differ between regions, and that exploitation rates continue to be highest in the western equatorial region. The SC recommended that there be no increase in fishing mortality in the western equatorial region.

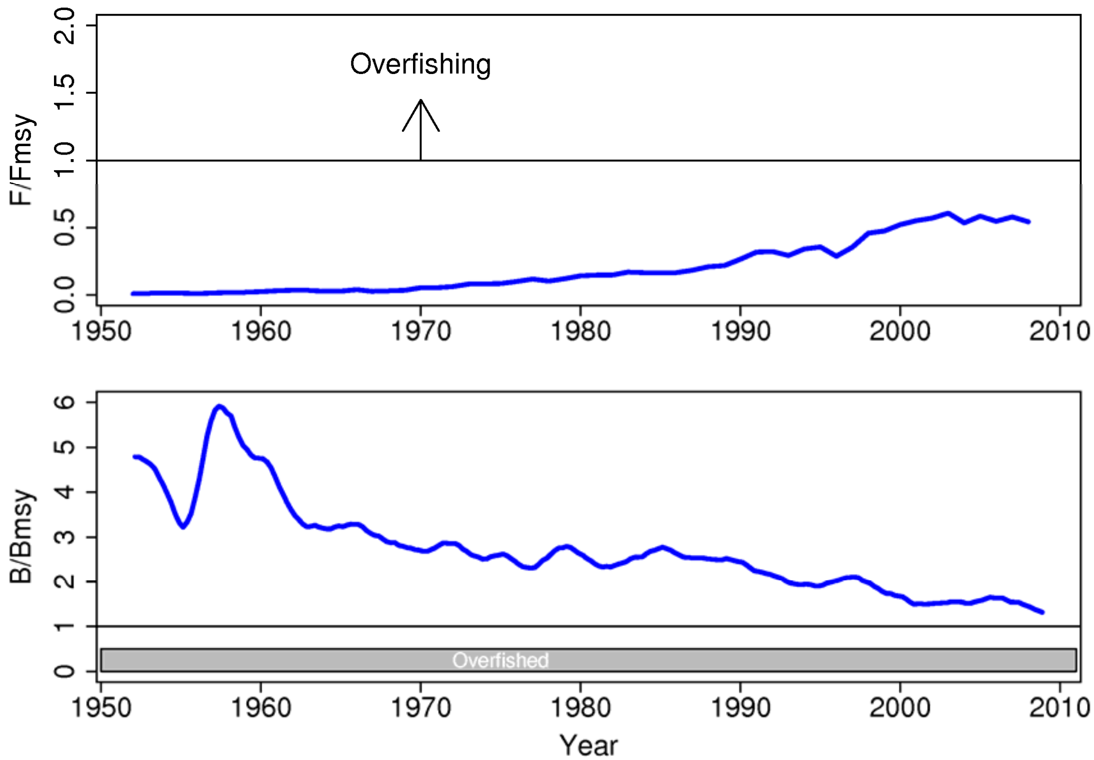


Figure 18. Ratios of F/FMSY (top) and B/BMSY (bottom) for yellowfin tuna in the WCP-CA. The horizontal line at 1.0 in the F/FMSY figure indicates an overfishing reference point. The shaded area in the B/BMSY figure indicates an overfished reference point (MSST).

Bigeye tuna in the WCP-CA

Stock status: The WCPFC Scientific Committee selected six assessment runs to represent the stock status of bigeye tuna. For all six model runs, Fcurrent/FMSY is considerably greater than 1, ranging from 1.51–2.01 for a variety of assumptions with similar steepness (~0.98). The range of Fcurrent/FMSY ratios indicate that a 34–50% reduction in fishing mortality is required from the 2004–2007 level to reduce fishing mortality to sustainable levels at a steepness of ~0.98. The results indicate a 61% reduction in fishing mortality if a lower value (0.75) of steepness is assumed. All of the results conclude that overfishing is occurring on the WCPO bigeye tuna stock.

Current spawning biomass exceeds the estimated spawning biomass at MSY (>1.0) for five of the six assessment runs chosen (SBcurrent/SBMSY), indicating that the WCPO bigeye stock is not in an overfished state if the spawning biomass reference period is 2004–2007. However, if the spawning biomass period is considered as 2008 (SBlatest/SBMSY), then only one of the six runs indicates that the bigeye stock is not in an overfished state. The bigeye stock status is concluded to be in a slightly overfished state, or will be in the near future. The calculated MSY, based on recent recruitment (average of the last 10 years), was almost double long-term MSY estimates, but still 20% below recent catches.

Management advice and implications: The WCPFC Scientific Committee provides management advice for bigeye tuna with regard to: i) the 2009 stock assessment; ii) evaluation of the effectiveness of conservation and management measure (CMM)-2008-01 to obtain the objective of a 30% reduction in fishing mortality from 2001–2004 levels; and iii) the frequency and necessity of consistent advice from the SC.

The SC concluded that the 2009 assessment indicates a continued decline of the WCPO bigeye stock as noted in previous assessments. Fishing mortality in relation to MSY (Fcurrent/FMSY) is considerably greater than 1, ranging from 1.51–2.01 for a variety of assumptions with similar steepness (~0.98) in the stock recruitment relationship. The range of Fcurrent/FMSY ratios indicates that a 34–50% (average of 43% when steepness is assumed as 0.98) reduction in fishing mortality is required from the 2004–2007 level in order to reduce fishing mortality to sustainable levels. Current spawning biomass in relation to MSY indicates that the WCPO bigeye stock is not in an overfished state if the spawning biomass reference period is 2004–2007. However, if the spawning biomass period is 2008, then the bigeye stock is overfished. The bigeye stock status is concluded to be in a slightly overfished state, or will be in the near future with high levels of overfishing occurring. The SC also noted the continued high fishing mortality on juvenile bigeye due to associated purse-seine sets and the fisheries of Indonesia and the Philippines.

The SC supported an evaluation of CMM-2008-01 (WCPFC-SC5-2009/GN-WP-17), which indicates that the objective of a 30% reduction in fishing mortality on bigeye by 2011 will not be achieved. The lack of effectiveness of CMM-2008-01 is broadly related to: i) reductions in longline catches that do not result in the required reduction in fishing mortality; ii) increases in both purse-seine effort allowed under the measure, and purse-seine efficiency since 2001–2004; and iii) exclusion of archipelagic waters, which encompasses most of the fishing activity of the Indonesian domestic fisheries and some activity by the Philippines' domestic fleets.

The 2009 stock assessment concludes that a 34–50% reduction in fishing mortality from 2004–2007 levels is required to keep the biomass above MSY levels. This is an increase from a 30% reduction recommended by SC4 and the 25% reduction recommended by SC2. While Members agreed that consistent advice should be provided to WCPFC on necessary reductions of fishing mortality, some Members indicated that the evaluation of the newly introduced measure (CMM-2008-01) is based on a variety of assumptions, and the actual behavior of the fisheries and consequent effects on stocks have not yet been evaluated.

A significant time lag exists between implementing a management measure and detecting a stock response from an assessment. Results of management implemented in 2009 will only be detected in assessments undertaken in 2011 and 2012 due to delays in providing data and significant uncertainty in estimates of fishing mortality and biomass in the last year of the assessment.

While acknowledging the delay between management actions and quantifying a stock response, the SC noted that the combination of increased fishing mortality on bigeye tuna to levels well above FMSY (as documented in the 2009 assessment and the inadequacy of

CMM-2008-01 in reducing fishing mortality by 30%) implies that stock biomass will continue to decline if the longer effective action is delayed. The SC views the identification and implementation of effective management measures to address the inadequacy of CMM-2008-01 as the most urgent issue facing the Commission with regard to maintaining the sustainability of target tuna stocks.

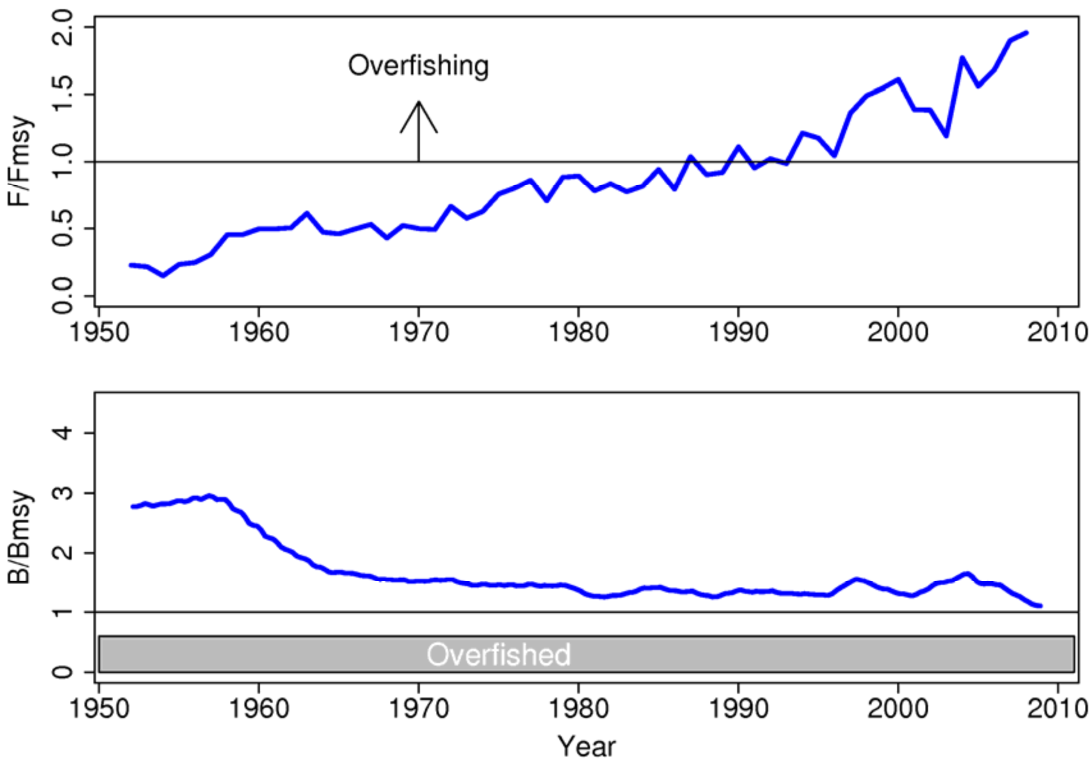


Figure 19. Ratios of F/FMSY (top) and B/BMSY (bottom) for bigeye tuna in the WCP-CA. The horizontal line at 1.0 in the F/FMSY figure indicates an overfishing reference point. The shaded area in the B/BMSY figure indicates an overfished reference point.

South Pacific albacore

Stock status: The 2009 assessment results differ moderately from results from the 2008 assessment due to changes in relative abundance indices, splits in selectivity, assumed values of steepness and changes in growth modeling. These changes have resulted in a more realistic and credible model which fits the data better.

Management implications: The current assessment resulted in more realistic levels of stock size and MSY with a credible model with many sources of potential bias being removed. There is considerable uncertainty about the early trend in biomass, though the trend has a negligible effect on management advice. Estimates indicate that overfishing is not occurring and that the fishery is not in an overfished state. There is no indication that current levels of catch are not sustainable with regard to recruitment overfishing; however, current levels of fishing mortality may be affecting longline catch rates on adult albacore.

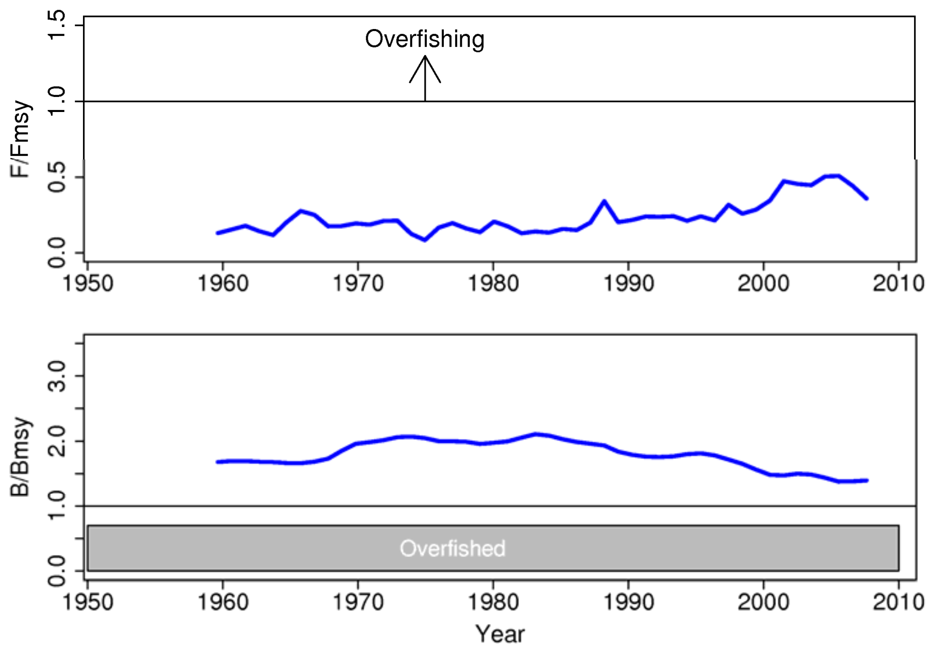


Figure 20. Ratios of F/FMSY (top) and B/BMSY (bottom) for South Pacific albacore. The horizontal line at 1.0 in the F/FMSY figure indicates an overfishing reference point. The shaded area in the B/BMSY figure indicates an overfished reference point.

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.

Pacific bluefin tuna

Stock status: Spawning stock biomass (SSB) in 2005, estimated with the value for natural mortality (M) used in the 2008 stock assessment, was 20,000 mt based on the SS2 model and 23,000 mt based on the SS3 model. Applying the revised estimate of M from the 2009 workshops and the SS3 model, SSB was estimated at 73,000 mt. These SSB estimates for 2005 are above the median level over the assessment period (1952–2006). If the future fishing mortality rate (F) continues at the current F level, short-term projections (2009–2010) indicate that SSB will decline. In the longer term, SSB is expected to attain levels comparable to median SSB levels over the assessment period.

Current F (2002–2004) is greater than commonly used BRPs that may serve, in principle, as potential target reference points. This includes FMAX — a BRP that, given the assessment structure and assumptions, is theoretically equivalent to FMSY. But the magnitude by which Fcurrent exceeds target BRPs is variable. If current F is reduced to FMAX, spawning potential (%SPR) is expected to increase in absolute terms by 10%, and yield per recruit is expected to increase by 4% relative to current levels. Conversely, current F is less than commonly used BRPs that may serve, in principle, as potential recruitment overfishing threshold BRPs (e.g. FMED); that is, Fs above which the likelihood of recruitment failure is high.

Fs on recruits (age 0) and on juveniles (ages 1–3) have been generally increasing for more than a decade (1990–2005). The catch (in weight) is dominated by recruits and juveniles (ages 0–3). Total catch has fluctuated widely in the range of 9,000–40,000 mt during the assessment period (1952–2006). Recent catches are near the average for the assessment period (~22,000 mt).

Management implications: The ISC provided the following conservation advice:

1. If F remains at the current level and environmental conditions remain favourable, the recruitment should be sufficient to maintain current yields well into the future.
2. A reduction in F in combination with favourable environmental conditions, should lead to greater SPR.
3. Increases in F above the current level, and/or unfavourable changes in environmental conditions, may result in recruitment levels which are insufficient to sustain the current productivity of the stock.
4. Given the conclusions of the May–June 2008 stock assessment with regard to the current level of F relative to potential target and limit reference points, and residual uncertainties associated with key model parameters, it is important that the current level of F is not increased.
5. Given the conclusions of the July 2009 PBFWG, the current level of F relative to potential biological reference points, and increasing trend of juvenile F, it is important that the current [sic] level of F is decreased below the 2002–2004 levels on juvenile age classes.

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)	$F/F_{MSY}=0.26$	No	No	$B/B_{MSY}=2.99$	No	No	Langley and Hampton 2008	>0.5 yr^{-1}	0.5 B_{MSY}
Yellowfin Tuna (WCPO)	$F/F_{MSY}=0.58$	No	No	$B/B_{MSY}=1.57$	No	No	Langley et al. 2009	0.8-1.6 yr^{-1}	0.5 B_{MSY}
Albacore Tuna (S. Pacific)	$F/F_{MSY}=0.25$	No	No	$B/B_{MSY}=1.40$	No	No	Hoyle and Davies 2009	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)	$F/F_{MSY}=1.78$	Yes	Not applicable	$B/B_{MSY}=1.44$	No	No	Harley et al. 2009	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)[3]	$F/F_{MSY}=0.86$	No	Unknown	$B/B_{MSY}=1.11$	No	Unknown	Kleiber et al. 2009	0.2 yr^{-1}	0.8 B_{MSY}
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}
[3] Assssment results based on run - A

Literature cited

Boggs, C., Dalzell, P., Essington, T., Labelle, M., Mason, D., Skillman, R., and J. Wetherall. 2000. Recommended overfishing definitions and control rules for the western Pacific regional fishery management council's pelagic fishery management plan. Administrative Report H-00-05, Honolulu Laboratory, SWFSC, NMFS, NOAA.

Harley, S., Hoyle, S., Langley, A., Hampton, J., and P. Kleiber. 2009. Stock assessment of bigeye tuna in the western and central Pacific Ocean. WCPFC-SC5-2009/SA-WP-04, Port Vila, Vanuatu, 10−21 August 2009.

Hoyle, S. and N. Davies. 2009. Stock assessment of albacore tuna in the South Pacific Ocean. WCPFC-SC5-2009/SA-06, Port Vila, Vanuatu, 10−21 August 2009.

Langley, A. and J. Hampton. 2008. Stock assessment of skipjack tuna in the western and central Pacific Ocean. WCPFC-SC4-2008/SA-4, Port Moresby, Papua New Guinea, 11−22 August 2008.

Langley, A., Harley, S., Hoyle, S., Davies, N., Hampton, J. and P. Kleiber. 2009. Stock assessment of yellowfin tuna in the western and central Pacific Ocean. WCPFC-SC5-2009/SA-03, Port Vila, Vanuatu, 10−21 August 2009.

Kleiber, P., Hampton, J., Hinton, M., and Y. Uozumi. 2002. Update on blue marlin stock assessment. WP BBRG–10, SCTB 15, Honolulu, Hawaii, 22–27 July 2002.

Kleiber, P., Clarke, S., Bigelow, K., Nakano, H., McAllister, M. and Y. Takeuchi. 2009. North Pacific Blue Shark Stock Assessment. NOAA Tech. Memo. NMFS PIFSC−17. 74 p.

Kleiber, P., and K. Yokawa. 2004. MULTIFAN-CL assessment of swordfish in the North Pacific. SWO-WG WP–7, ISC4, Honolulu, Hawaii, 26 January – 4 February 2004.

F. Recreational Pelagic Fisheries in the Western Pacific

Introduction

Fishing, either for subsistence or recreation continues to be an extremely important activity throughout the Western Pacific Region in the four major populated island areas of the Western Pacific Region, Hawaii, American Samoa, Guam and the Commonwealth of the Northern Mariana Islands (CNMI). Fish consumption in Micronesia and Polynesia typically averages about 130 lb/per capita/yr (Dalzell et al 1996) and even in more culturally diverse Hawaii, fish consumption is almost three times the US national average at about 42 lb/person/yr (Dalzell & Paty 1996).

Recreational fisheries in the Western Pacific Region

In Hawaii, recreational shoreline fishing was more popular than boat fishing up to and after WW II. Boat fishing during this period referred primarily to fishing from traditional canoes (Glazier 1999). All fishing was greatly constrained during WW II through time and area restrictions, which effectively stopped commercial fishing and confined recreational fishing to inshore areas (Brock 1947). Following WWII, the advent of better fishing equipment and new small boat hulls and marine inboard and outboard engines led to a growth in small vessel-based recreational fishing.

A major period of expansion of small vessel recreational fishing occurred between the late 1950s and early 1970s, through the introduction of fiberglass technology to Hawaii and the further refinement of marine inboard and outboard engines (Figure 1). By the early 1960s there were an estimated 5,300 small boats in the territory being used for recreational fishing. By the 1980s the number of recreational or pleasure craft had risen to almost 13,000 vessels and to about 15,000 vessels in the 1990s. There are presently some 26 fishing clubs in Hawaii, and a variety of different recreational fishing tournaments organized both by clubs and independent tournament organizers. Hawaii also hosts between 150 to 200 boat based fishing tournaments, about 30 of which are considered major competitions, with over 20 boats and entry fees of ≥$100. This level of interest in recreational fishing is sufficient to support a local fishing magazine, Hawaii Fishing News, which besides articles of interest to recreational fishermen, includes a monthly roundup of the fishing activity and conditions at the major small boat harbors in the State. Further, a directory of the State's small boat harbors and launching ramps is published annually by Hawaii Ocean Industry and Shipping news (see December 2002/January 2003 issue).

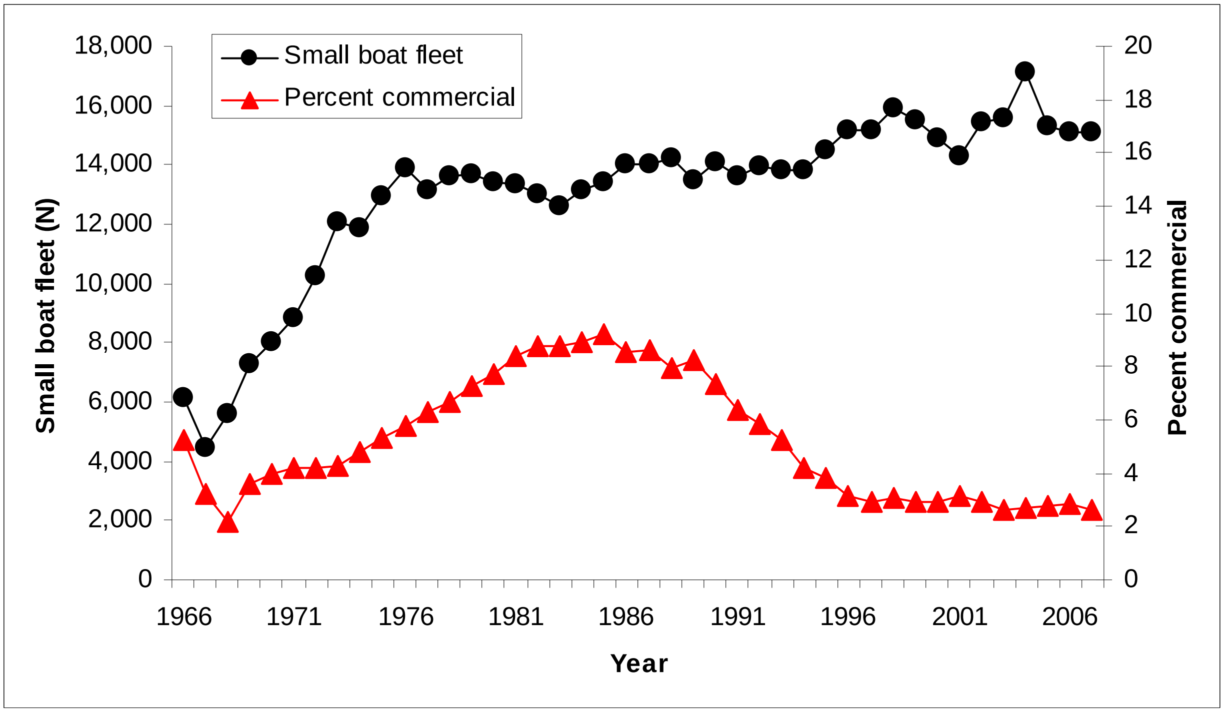


Figure 1 Annual number of small vessel fleet registrations in Hawaii, 1966-2008. Figure shows total fleet size, and percentage of vessels being registered for commercial fishing (Source: Hawaii Division of Boating and Ocean Resources)

Elsewhere in the region, recreational fishing is less structured. In Guam fishing clubs have been founded along ethnic lines by Japanese and Korean residents. These clubs had memberships of 10-15 people, along with their families. Four such clubs were founded in Guam during the past 20 years, but none lasted for more than a 2-3 years (Gerry Davis, Guam DAWR pers. comm.). There was also a Guam Boating Association comprising mostly fishermen, with several hundred members. This organization functioned as a fishing club for about 10 years and then disbanded. Some school groups and the boy scouts have formed fishing clubs focused on rod and reel fishing, and there is still one spear-fishing club that has only a handful of members, but appears to be still be active. There are also some limited fishing tournaments on Guam, including a fishing derby for children organized by the local Aquatic and Wildlife Resources Division. There are few fishing clubs in the in the Northern Mariana Islands. The Saipan Sportfishing Association (SSA) has been in existence for at least 16 years, and is the sponsor of the annual Saipan International Fishing Tournament, which is usually held in August or September. In 1997, the SSA listed approximately 40 members. There is also a Tinian Sportfishing Association, but the status of this club is unknown at this time.

A recent innovation in the Mariana Island is the publication of a free quarterly magazine, Mariana Fishing Magazine, which covers recreational fishing in both Guam and the CNMI.

The founding of the American Samoa Game Fishing Association in 1974 in Pago Pago led to fishing tournaments being held on a regular basis in the territory (Tulafono 2001). A total of 64 tournaments, averaging two to three tournaments per year and 10 to 20 vessels in each competition, were conducted in Pago Pago between 1974 and 1998. However interest in fishing tournaments waned during the late 1990s, with only three vessels participating in the last tournament held in 1998. The reason for this decline was not entirely clear, but may be related to the expansion of the longline fishery in American Samoa and the shift from commercial trolling to longlining. According to Tulafono, fishermen were more interested in earning income and it was time consuming to switch from longline to troll gear for a weekend of tournament fishing. Tulafono (2001) noted that tag and release programs, which are gaining popularity with recreational and charter-vessel fishermen elsewhere in the U.S., would not be popular in American Samoa. In common with many Pacific islands, fish were caught to keep for food in American Samoa, and fish landings and their distribution through the community were important in order to meet social obligations. Releasing fish would be considered a failure to meet these obligations (Tulafono 2001). More recently, however, fishing tournaments

There is also some recreational fishing activity at some of the Pacific Remote Island Areas (PRIAs), namely at Midway, Wake, Johnston and Palmyra Islands. There are no resident populations at Howland & Baker and Jarvis Islands and fishing activity at these locations is likely minimal. There was a tourist facility at Midway until 2002, which operated a charter boat fishery targeting primarily pelagic fish at Midway Atoll. The company operated five vessels using for charter fishing at Midway: three 22-26 ft catamarans for lagoon and nearshore fishing operations and two 38 ft sportfishing vessels used for blue water trolling. In addition there were approximately seven small vessels maintained and used by Midway residents for recreational fishing. Of this total, three vessels engaged primarily in offshore trolling for PMUS including yellowfin tuna, whaoo and marlin. All vessels fishing at Midway were required to file a float plan prior to a fishing trip and complete the "Midway Sports Fishing Boat Trip Log" upon completion of each trip. The US Fish and Wildlife Service was responsible for compiling these catch data.

At Palmyra Atoll, an island privately owned by The Nature Conservancy, a 22 ft catamaran is used for offshore trolling and four small boats operated within the lagoon used for bonefish angling. There are several craft used for recreational fishing at the two military bases on Johnson and Wake Islands. These include eight Boston whalers, two cabin cruisers and a landing craft at Johnson, and two landing craft and two small vessels at Wake.

Recreational fisheries in the Western Pacific Region

Estimates of recreational catch for the Western Pacific are given in Table 1. The data for Guam, Northern Mariana Islands and American Samoa are based on the proportion of catches landed for sale and catches retained and not sold, in all landings sampled by creel surveys in each area. The ratio of unsold to sold catch in the samples was used in conjunction with the total catch estimate expanded from the creel survey data. This was adjusted downwards based on the creel surveys by the ratio of landings by vessels retaining 100 % of their catch to the total unsold catch. This accounts for that fraction of the catch not sold by commercial fishing vessels. The volume of fish landed by vessels retaining all their catch was labeled the nominal recreational catch.

The recreational catch for Hawaii is generated from the Hawaii Marine Recreational Fisheries Statistical Survey, which is a collaborative effort between the State of Hawaii's Division of Aquatic Resources and the National Marine Fisheries Service (NMFS) Office of Science and Technology. This survey is part of the NMFS Marine Fisheries Recreational Statistical Survey (MRFSS) which is being modified following a review by the National Academy of Science in 2006, under the auspices of the Marine Recreational Improvement Program (MRIP).

Table 1. Estimated recreational fish catches in the four principal island groups of the Western Pacific Region in 2008

Location	Year	Total catch (lbs)	Unsold catch (lb)	Nominal recreational catch (lb)	Recr. catch as % of total catch	Recr. fishing trips
American Samoa	2008	9,680,177	2305	2119	0.02	55
Guam	2008	1,293,882	600,691	534,359	41.30	7,824
Hawaii	2008	58,564,449	NA	30,669,732	52.40	564,478
NMI	2008	443,459	55,033	48,297	12.40	4,212

Charter vessel sportsfishing

Tables 2-6 present summaries of the charter vessel sportsfishing in the Western Pacific. Charter fishing in Hawaii is more focused on catching blue marlin, which in 2004 formed about 50 % of the total annual charter vessel catch by weight, but in 2008 only formed about a quarter of the charter vessel catch and was superseded by yellowfin. Although commercial troll vessels also take blue marlin, these only form about a ten percent of their catch, with the majority of the target species being yellowfin, mahimahi, and wahoo (Table 3). Unlike other parts of the US, there is little recreational fishery interest in catching sharks in Hawaii.

Guam has a charter fishing sector, which unlike Hawaii caters for both pelagic and bottomfish fishing. Until recently the troll charter fishery was expanding, but, over the past three years the number of vessels involved, and level of fishing, has decreased in response to lower tourist volume from Japan due to the Asian economic recession in the late 1990s. Nonetheless, although compromising only 5 % of Guam's commercial troll fleet, the Guam troll charter industry accounts for 9.3 % of the troll catch and 30% and 20% of the Guam blue marlin and wahoo catch respectively. (See Guam module in this volume).

Charter fishing in NMI is limited, with about ten boats operating on Saipan, and a few vessels on Tinian conducting occasional fishing charters. Tourism is not a significant component of the American Samoa economy, and hence there is little charter fishing activity. There are few vessels suitable for charter-type operations and the American Samoa government does not actively promote tourism and sportsfishing as the local infrastructure for this is limited (Tulafono 2001).

Table 2. Estimated catches by pelagic charter fishing vessels in Guam, Hawaii and Northern Mariana Islands in 2008

Location	Catch (lb)	Effort (trips)	Principal species
Guam	50,945	1,891	Wahoo, Skipjack, Mahimahi, Blue marlin
Hawaii	624,340	10,232	Yellowfin, Blue marlin, Mahimahi, Wahoo
Northern Mariana Islands	4,691	94	Wahoo, Skipjack, Mahimahi, Blue marlin

Charter vessel fishing in the Western Pacific Region has elements of both recreational and commercial fishing. The primary motivation for charter patrons is recreational fishing, with the possibility of catching large game fish such as blue marlin. The charter vessel skipper and crew receive compensation in the form of the patron's fee, but are also able to dispose of fish on local markets, as is the case in Hawaii. The catch composition of charter vessel catch versus conventional commercial trolling in Hawaii reflects the different targeting in the two fisheries. Blue marlins are the dominant feature of charter vessels in Hawaii, while in Guam (Tables 3 & 4), composition of the charter catch is being broadly similar to the mix of species in the commercial troll catches

Table 3. Comparison of species composition of landings made by Hawaii pelagic charter vessels versus commercial troll vessels, 2008

Species	Charter vessels		Commercial vessels	
	Landings (lb)	Percent	Landings (lb)	Percent
Yellowfin tuna	198,924	31.86%	707,011	31.66%
Blue marlin	151,336	24.24%	226,703	10.15%
Mahimahi	139,132	22.28%	387,303	17.34%
Wahoo	58,374	9.35%	430,064	19.26%
Skipjack	41,592	6.66%	265,751	11.90%
Short-nose spearfish	13,767	2.21%	8,922	0.40%
Striped marlin	9,740	1.56%	16,460	0.74%
Bigeye tuna	5,729	0.92%	152,454	6.83%
Others	5,747	0.92%	38,606	1.73%
Total	624,340	100.00%	2,233,273	100.00%

Table 4. Comparison of species composition of landings made by Guam pelagic charter vessels versus commercial troll vessels, 2008

Species	Charter		Commercial	
	Landings (lb)	Percent	Landings (lb)	Percent
Wahoo	20,071	39.40%	78,274	15.68%
Skipjack Tuna	13,423	26.35%	281,827	56.46%
Mahimahi	12,480	24.50%	99,331	19.90%
Blue Marlin	2,898	5.69%	6,807	1.36%
Yellowfin Tuna	987	1.94%	18,900	3.79%
Others	1,086	2.13%	13,996	2.80%
Total	50,945	100.00%	499,135	100.00%

In Hawaii there is considerable variation in charter vessel catches between the various islands (Table 5), with the largest charter vessel fishery based on the island of Hawaii. In 2008, charter vessel catches on the island of Hawaii accounted for nearly 40% of the total charter vessel landings within the state, with Oahu, Kauai, and Maui County charter vessels forming the remaining charter vessel catch.

Table 5. Charter vessel catches in Hawaii by island, 2008

Island	Catch	Percent	Trips	Percent	CPUE (lb/trip)
Hawaii	189,693	30.38%	4,794	46.85%	39.5688
Kauai	100,734	16.13%	1,344	13.14%	74.9509
Maui County*	91,275	14.62%	2,068	20.21%	44.1368
Oahu	242,639	38.86%	2,026	19.80%	119.762
Total	624,340	100.00%	10,232	100.00%	61.0184

* DAR confidentiality protocols prevent reporting 2008 charter vessel activity for Molokai and Lanai separately, and these are aggregated with data for Maui, reported collectively as Maui County

Most charter vessel fishing on the island of Hawaii is conducted from Kona's small boat harbor at Honokohau, and about one thirds of the charter vessel catch comprises blue marlin (Table 6). Blue marlin used to amount to about two-thirds of the catch, but this number has fallen considerably with the spread of a stronger catch and release ethic for billfish by charter vessel operators at Honokohau. Elsewhere, yellowfin and mahimahi dominate charter vessel landings, with blue marlin comprising between 12% and 24% of catches. Other important species in the charter vessel catches, depending on location, comprise wahoo, spearfish and skipjack.

Table 6. Composition of charter vessel catches in the Main Hawaiian Islands, 2008

Hawaii	Landings (lb)	Percent	Kauai	Landings (lb)	Percent
Yellowfin tuna	67,479	35.57%	Yellowfin tuna	32,040	31.81%
Blue marlin	57,368	30.24%	Skipjack	23,362	23.19%
Wahoo	26,003	13.71%	Mahimahi	17,116	16.99%
Mahimahi	21,634	11.40%	Blue marlin	12,514	12.42%
Short-nose spearfish	6,621	3.49%	Wahoo	10,413	10.34%
Skipjack	4,717	2.49%	Striped marlin	2,049	2.03%
Striped marlin	2,629	1.39%	Bigeye tuna	1,489	1.48%
Bigeye tuna	2,212	1.17%	Short-nose spearfish	1,006	1.00%
Other	1,031	0.54%	Other	746	0.74%
Total	189,693	100.00%	Total	100,734	100.00%

Maui	Landings (lb)	Percent	Oahu	Landings (lb)	Percent
Mahimahi	40,286	44.14%	Yellowfin tuna	91,535	37.72%
Blue marlin	21,094	23.11%	Blue marlin	60,360	24.88%
Wahoo	13,397	14.68%	Mahimahi	60,096	24.77%
Yellowfin tuna	7,870	8.62%	Skipjack	12,692	5.23%
Short-nose spearfish	2,504	2.74%	Wahoo	8,561	3.53%
Striped marlin	1,774	1.94%	Short-nose spearfish	3,636	1.50%
White ulua	1,230	1.35%	Striped marlin	3,289	1.36%
Skipjack	822	0.90%	Bigeye tuna	1,306	0.54%
Bigeye tuna	722	0.79%	Other	1,164	0.48%
Other	1,576	1.73%			0.00%
Total	91,275	100.00%	Total	242,639	100.00%

Recreational Fishing Data Collection in Hawaii

Recreational fish catches in Hawaii are monitored through the Hawaii Marine Recreational Fishing Survey (HMRFS), a collaborative project of the NMFS Office of Science and Technology and the Hawaii Division of Aquatic Resources. This project is a segment of the nationwide Marine Recreational Fisheries Statistical Survey (MRFSS), which has been used by NMFS to estimate recreational catches in most of the coastal states of the US.

The MRFSS program uses a triple survey approach that has been developed over the 20+ years of its history. For each two-month survey period (wave) a random sample of households is called by telephone to determine how many have done any fishing in the ocean, their mode of fishing (private boat, rental boat, charter boat, or shoreline), what methods were used, and how much effort (number of trips and hours) was expended. Concurrently, surveyors are sent out to boat launch ramps, small boat harbors, and shoreline fishing sites to interview fishermen to fill out intercept survey forms. The intercept survey collects data on fishing area, fishing methods, trip/effort, species caught, and lengths and weights of fish. The sites are randomly selected, but stratified by fishing pressure so that the sites with the highest pressures are likely to be surveyed more often. In addition the charter boat operators are surveyed by a separate survey. This additional survey of the charter fleet serves the same function as the random digit dialing household survey and is necessary because out of town fishers that charter vessels wouldn't be covered by randomly calling the Hawaiian populace. The telephone and charter survey data are used to estimate total statewide fishing effort and the intercept surveys provide detailed catch and trip information. Data from the three surveys are combined and expanded by computer to yield statewide estimates of total effort and catch by species, mode, and county.

NMFS and HDAR contributed joint funding for intercept surveys and charter boat surveys on the islands of Oahu, Hawaii, and Maui. NMFS also funded the Random Digit Dialing household telephone survey via a national contractor beginning in January 2001. The HMRFS project commenced in July 2001 but took until 2003 until annual results were first reported from this initiative.

In 2006, the MRFSS survey was reviewed by the National Research Council of the National Academy of Sciences (NRC 2006). The reviewers were critical of the statistical methods employed to generate expansions of the survey data to annual recreational catch estimates for each state. Consequently, NMFS is conducting an overhaul of the MRFSS survey to respond to the NRC criticisms. As such, readers of this report should understand that there is uncertainty surrounding the various expansions from the HMRFS survey and figures reported here may change as new methods are developed to conduct the expansions from survey data. However, Table 7 provides summaries of the recreational boat and shoreline fish catch between 2003 and 2008 for pelagic and other species of fish.

Table 7. Recreational fish catches in Hawaii between 2003 and 2008. Source: HMFRS

	Fish type	Boat	Shore	Total
2003	Pelagic	18,185,310	515,370	18,700,680
	Others	630,885	1,744,157	2,375,042
	Total	18,816,195	2,259,527	21,075,722
2004	Pelagic	14,897,035	147,351	15,044,386
	Others	1,456,678	1,400,808	2,857,486
	Total	16,353,713	1,548,159	17,901,872
2005	Pelagic	15,622,076	279,453	15,901,529
	Others	970,948	1,239,093	2,210,041
	Total	16,593,024	1,518,546	18,111,570
2006	Pelagic	14,433,639	315,738	14,749,377
	Others	1,044,617	1,853,533	2,898,150
	Total	15,478,256	2,169,271	17,647,527
2007	Pelagic	17,027,109	140,094	17,167,203
	Others	493,227	422,677	915,904
	Total	17,520,336	562,771	18,083,107
2008	Pelagic	26,598,916	69,463	26,668,379
	Others	282,532	943,806	1,226,338
	Total	26,881,448	1,013,269	27,894,717

Figures 2-5 summarize aspects of the boat-based recreational fishery landings for six major pelagic fish species in Hawaii (blue marlin, striped marlin, mahimahi, skipjack, yellowfin and wahoo) between 2003 and 2008, while Figure 6 shows the bimonthly distribution of boat-based fishing effort over the same time period. Skipjack tuna are the most commonly recreationally caught pelagic fish (Figure 2) followed by yellowfin tuna, mahimahi and wahoo. In terms of weight, however, yellowfin tuna dominates recreational pelagic fish catches (Figure 3).

Although blue marlin numbers in the catch are small compared to other species, the much greater average weight (Figure 4) means that it can comprise a significant fraction of the recreational catch by weight, compared to the catch by numbers. Average weights for most species tended to be relatively similar between years for mahimahi, skipjack and wahoo, but may vary considerable between years for blue marlin, striped marlin and yellowfin tuna. This is also reflected in the nominal catch rate (lbs/trip) in Figure 5, where yellowfin catch rate was much higher in 2003 than in 2004 and 2005, and increased to a new maximum in 2008. The distribution of fishing recreational fishing effort shows that boat based activity is highest in the summer and fall when the weather is at its most clement in Hawaii.

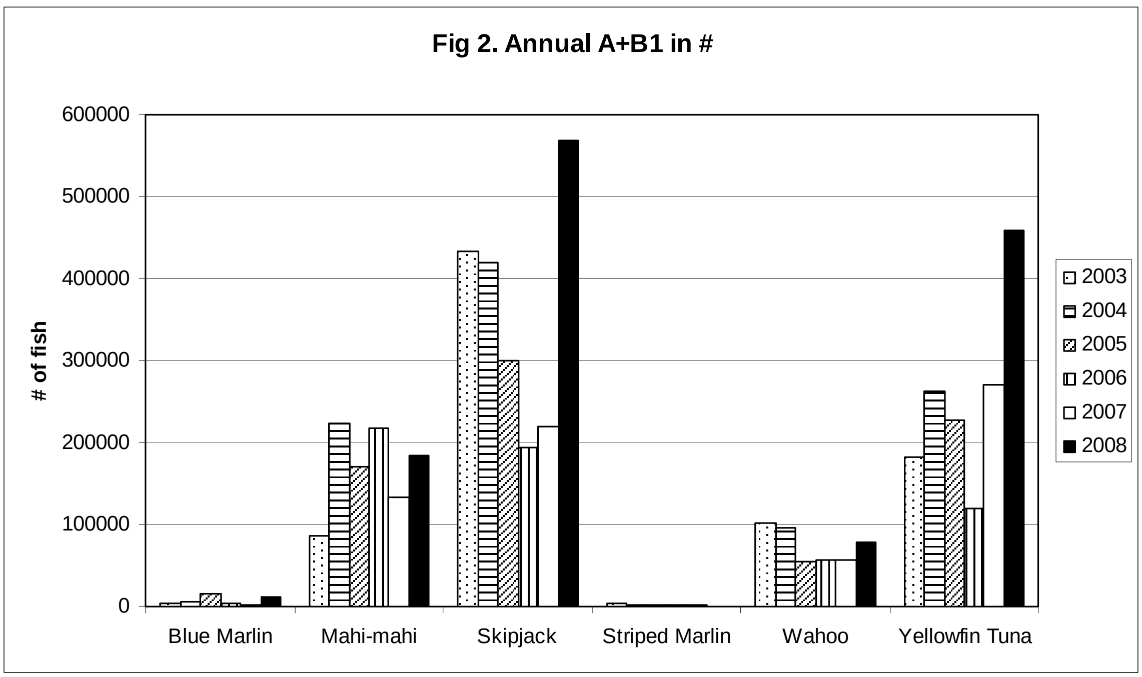


Figure 2. Annual recreational fishery landings by number of six major pelagic fish species in Hawaii between 2003 and 2008

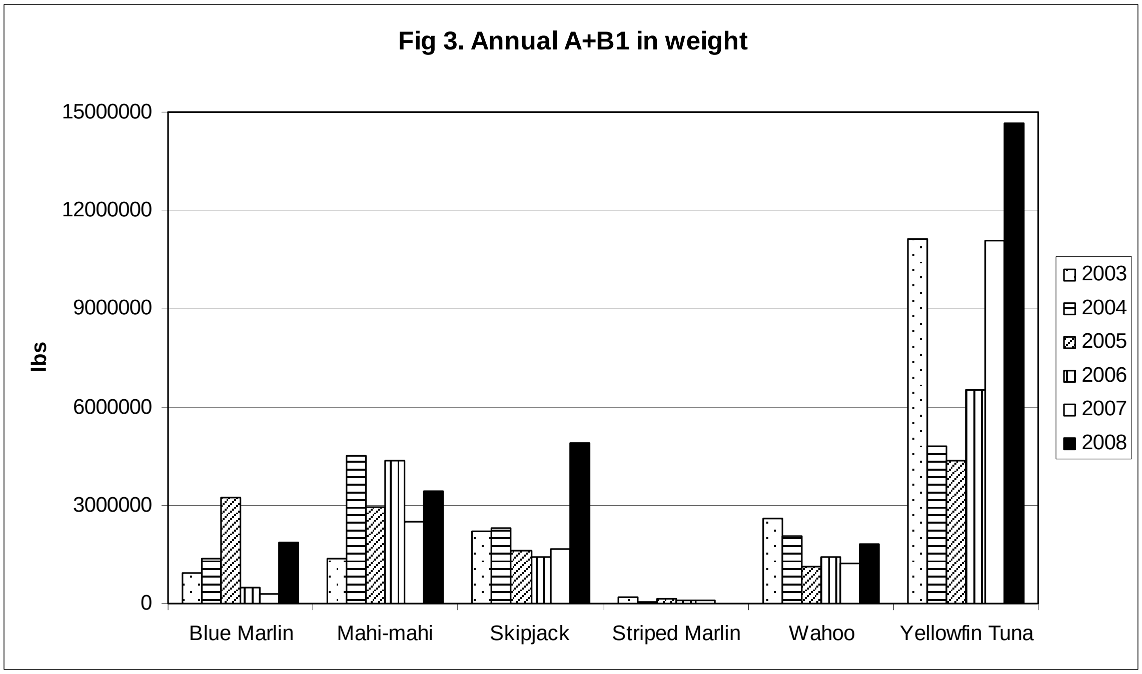


Figure 3. Annual recreational fishery landings by weight of six major pelagic fish species in Hawaii between 2003 and 2008

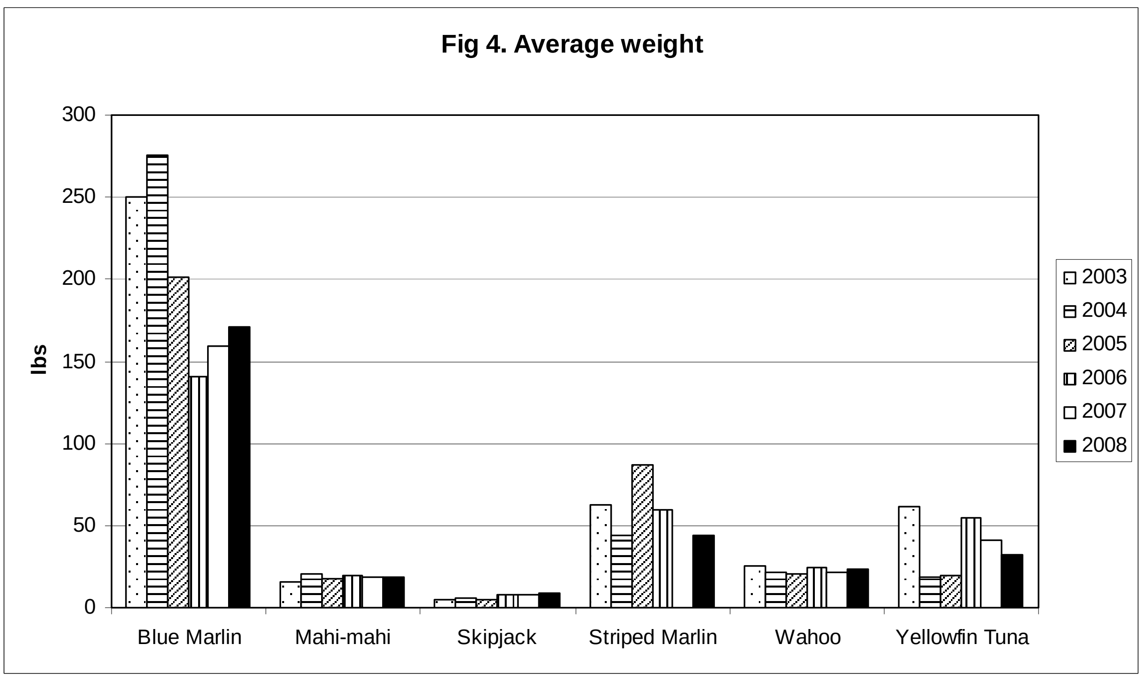


Figure 4. Average weight of six major pelagic fish species caught by recreational fishing in Hawaii between 2003 and 2008

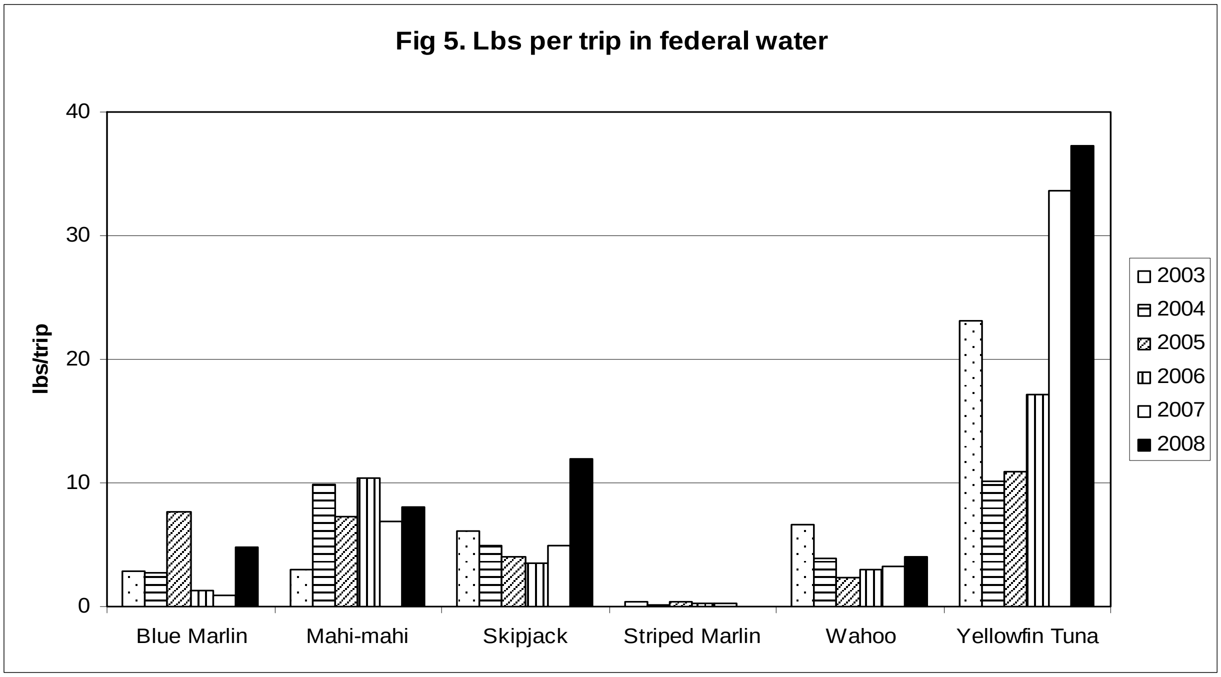


Figure 5. Annual recreational catch per unit effort (lbs per trip) for six major pelagic species in Hawaii between 2003 and 2008

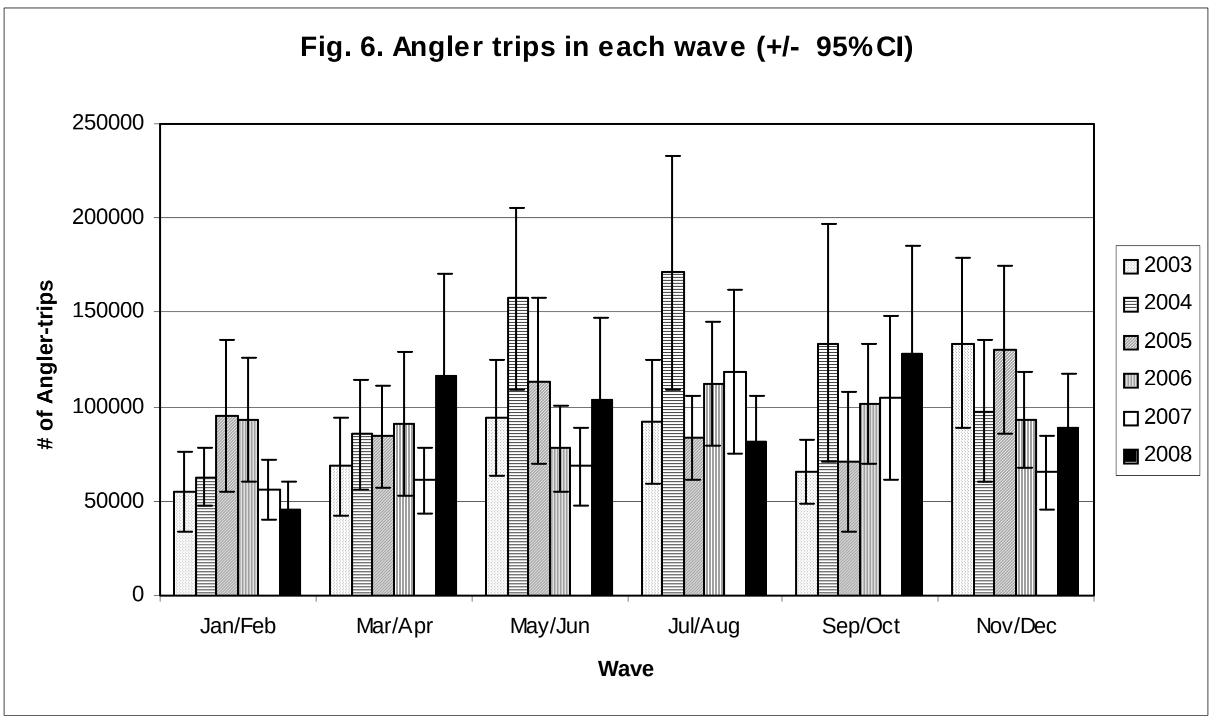


Figure 6. Annual private vessel recreational fishing effort in Hawaii between 2003 and 2008

References

Brock, V.E. Report of the Director, Division of Fish and Game. Report of the Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii. Honolulu.

Dalzell, P., T. Adams,& N. Polunin, 1996. Coastal fisheries in the South Pacific. Oceanography and Marine Biology Annual Review 33, 395-531.

Dalzell, P. & W. Paty, 1996. The importance and uniqueness of fisheries in the Western Pacific Region. Paper presented at the 91st Western Pacific Fishery Council Meeting, 18-21 November 1996, Honolulu, 10 p.

Glazier, E.W. 1999. Social aspects of Hawaii's small vessel troll fishery. Phase II of the Social Aspects of Pacific Pelagic Fisheries Program, Univ. Hawaii, JIMAR, 287 pp.

Tulafono, R. 2001. Gamefishing and tournaments in American Samoa. In, Proceedings of the 1998 Pacific Island Gamefish Symposium: Facing the Challenges of Resource Conservation, Sustainable Development, and the Sportfishing Ethic, 29 July-1 August, 1998, Kailua-Kona, Hawaii, Western Pacific Regional Fishery Management Council.

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 2008 (1988-2008 for time series by State). 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
2007	11,586	104	5.1	0	45	550	204	5	2	45	10
2008	11,131	65	3	28	<1	531	148	7	0	35	<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
2007	21,663,546	149,568	4,361	0	58,106	3,131,178	337,770	2,903	4,334	78,569	1,984
2008	28,853,123	125,508	3,675	205,536	3,340	2,372,762	280,885	0	5,459	67,255	177

[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, 1986-2008

Landings (mt)

Year	Albacore	Yellowfin	Skipjack	Bigeye	Bluefin	Swordfish	Common Thresher	Pelagic Thresher	Bigeye Thresher	Shortfin Mako	Blue Shark
Washington											
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	8,677	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	0
2007	5,980	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
2008	6,725	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Oregon											
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
2007	4,781	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	<1
2008	4,026	N.A.	N.A.	N.A.	N.A.	N.A.	<1	N.A.	N.A.	N.A.	<1
California											
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
2007	858	104	5	N.A.	45	550	203	2	5	45	N.A.
2008	379	65	3	22	<1	531	147	0	7	35	N.A.

Table 4. Pacific coast real commercial ex-vessel revenues (1999)[1] from highly migratory species by state

Year	Albacore	Yellowfin	Skipjack	Bigeye	Bluefin	Swordfish	Common Thresher	Pelagic Thresher	Bigeye Thresher	Shortfin Mako	Blue Shark
	Revenues ($)										
Washington											
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
2007	10,481,053	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
2008	17,225,272	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Oregon											
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
2007	9,467,854	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	520
2008	10,666,183	N.A.	N.A.	N.A.	N.A.	N.A.	168	N.A.	N.A.	N.A.	177
California											
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
2007	1,714,639	149,568	4,361	N.A.	58,106	3,131,178	337,145	2,903	4,334	78,569	N.A.
2008	961,669	125,508	3,675	159,240	3,340	2,371,562	280,717	0	5,459	67,054	N.A.