Pelagic Fisheries of the Western Pacific Region

2003 Annual Report

June 2004
Western Pacific Regional Fishery Management Council
Honolulu, Hawaii

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Foreign longline fisheries on Guam grew from five vessels in late 1986 to 328 vessels in 1990. During 1996, longliners made more than 2,144 port calls to the island. Longline transshipment fisheries on Guam consist mainly of Japanese and Taiwanese vessels. Longline vessels, which fish mainly in the waters of the Federated States of Micronesia, offload their catch (which consists mainly of yellowfin and big-eye tuna) at the commercial port on Guam, where the fish is processed for transshipment by air to Japan for the sashimi markets. Tuna portions that do not meet the required standards are frozen for container transshipment to canneries or processed locally. Several spin-off industries have resulted from processing non-sashimi-grade tuna, including tuna jerky products, tuna loins and other value-added products.

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2003 Annual Report

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for the

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Table of Contents

Tables

Appendices

Appendix 1- American Samoa

Appendix 2-Guam

Tables

Figures

Appendix 3- Hawaii

Tables

Figures

Appendix 4- Northern Mariana Islands

Tables

Figures

Pelagic Fisheries of the Western Pacific Region — 2003 Annual Report

I. Introduction

A. Background

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).

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.

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

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.

B. Report Content

This report contains fishery performance data from each of the four island groups through 2003, 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

* NMFS Pacific Islands Region was created in April 2003. Before that date, the Western Pacific region was part of the NMFS Southwest Region. The new Pacific Islands Region created a new Pacific Island Regional Office (formerly Pacific Islands Area Office), and a new Pacific Islands Fisheries Science Center (formerly known as the Honolulu Laboratory).

C. Report Appraisal

The report content has changed over the years. More recently, in addition to the four main modules (American Samoa, Guam, Hawaii, Northern Mariana Islands), the report now contains and international module, a recreational fisheries appendix, a synopsis of landings data for the US West Coast, and a section on the value of the Western Pacific Region fisheries.

D. Plan Team Members

The FMP requires the Council’s Pelagic Plan Team (Team) to prepare an annual report on the status of the pelagic fisheries taking place in each of the island areas served by the Council (American Samoa, Guam, Hawaii and Northern Mariana Islands), to evaluate the effectiveness of the FMP in meeting its goals and objectives, and make recommendations for future management and administrative action.

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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).

A summary of the total pelagic landings during 2003 in the Western Pacific and the percentage change between 2002 and 2003 is shown in Table 2.

Table 2. Total pelagic landings in lbs in the Western Pacific Region in 2003

Species	**Am Samoa**	**% change**	**Guam**	**% change**	**Hawaii**	**% change**	**CNMI**	**% change**
Swordfish	16,441	-55.7			320,000	-55.6		
Blue marlin	24,661	-66.8	66,058	+23.4	1,160,000	+11.5	1,130	-10.4
Striped marlin	8,910	+131.4			1,370,000	+124.6		
Other billfish	16,447	+33.2			580,000	+48.7	137	+661.1
Mahimahi	82,406	-4.7	83,730	-51.5	1,340,000	-5.6	7,173	-60
Wahoo	434,837	+21.4	63,285	-11.9	1,000,000	+44.9	7,803	-4.4
Opah (moonfish)	9,283	+37.3			1,090,000	+18.5		
Sharks (whole wgt)	8,851	+35.3			340,000	-2.9		
Albacore	8,821,199	-32.7			1,340,000	-19.8		
Bigeye tuna	557,557	-29.2			8,350,000	-23.9		
Bluefin tuna					1,000	-50.0		
Skipjack tuna	277,170	-46.7	187,726	+3.9	1,580,000	+36.2	171,312	-3.5
Yellowfin tuna	1,145,417	+6.1	67,690	+50.6	3,420,000	+27.6	25,500	-13.2
Other pelagics	11,564	+6.1	42,821	+235.5	770,000	+5.5	14,146	-25.6
Total	**11,414,743**	**-27.4**	**506,310**	**-5.2**	**22,600,000**	**-3.4**	**227,203**	**-10.3**

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)

II. Summary [2]

A. Plan Administration

NOAA Fisheries approved a supplement to FMP Amendment 8 (68 FR 46112, August 5, 2003). The supplement addresses portions of the original amendment that were disapproved by NOAA Fisheries in 1999 because of inconsistency with the Magnuson-Stevens Act, as amended by the Sustainable Fisheries Act. The supplemental amendment does not revise the existing regulations so rulemaking was not required. NOAA Fisheries first published a Notice of Intent to prepare a Supplemental Environmental Impact Statement (SEIS) for pelagic fishery issues generally (68 FR 59771, October 17, 2003). A supplement to the Notice of Intent was published December 3, 2003 (68 FR 67640) to explain that the NEPA process would be split into two phases. In December 2003 NOAA Fisheries initiated consultation under section 7 of the Endangered Species Act with the NOAA Fisheries Office of Protected Resources. The consultation would consider the Council's "new technologies" regulatory amendment and would ultimately result in the issuance in a new biological opinion.

B. Island Areas

In **American Samoa,** total landings of all pelagic species decreased 27 %, down from last year's 92% increase in landings. An estimated 11, 414, 743 lb (-27.4%) of pelagic fish were landed in 2003, of which 11,158,092 lb were commercial landings valued at $10,496,968 (-27.1%). The average price for all pelagics was $0.94/lb (+4.4%).

Sixty-eight vessels reported landing pelagic species in 2003, which was the same number of vessels as in 2002. Of these, 50 reported fishing with longline gear (-13.8%), and 20 reported fishing as trollers (+25%).

Trolling vessels made 307 trips an increase of 6.2% from 2002 and 47% of the long term average. Longline data are derived from both creel survey extrapolations and through submitted logbooks. Logbook data reported a total 6,220 sets for 2003, or a decrease of 9.5% from 2002. Creel survey extrapolation reported 6,662 longline sets, a 10.3 % decrease on the 2002 creel survey estimate of sets. The average duration for trolling trips in 2003 was 3.4 hr/trip, an 28% decrease from 2002. The average longline set duration by calculated via logbooks was 19.0 hr/set (+2.7%) and by creel survey was 17.4 hr/set (+4.8%). Data from the troll fishery suggests that the catch per unit effort (CPUE) in 2003 increased by 60.6% and about 27.6% above the long term average. The average size of albacore has dramatically decreased from 2002 to 2003 from 45.5 to 38.6 lb/fish. Albacore accounts for about 78% of the total longline catch. Overall longline albacore catch rates increased between 2002 and 2003 (+20.3%).

In **Guam** landings of all pelagics amounted to 506,310 lbs, a decrease of 5.2%. The total revenues decreased to $399,899, or a decrease of 20.9%. Tuna landings increased to 258,340 lbs (+16.7%), with a 12.4% decrease in revenues to $163,243. The overall tuna landings have fluctuated around a relatively constant average for the past decade. Non-Tuna PPMUS landings

[2] Percentages in parentheses indicate percent change from previous year

decreased to 213,324 lbs (-29.1%), and adjusted revenues also decreased to $214,143 (-22.9%). Landings in 2003 followed the 1997 trend in Guam's pelagic fisheries towards targeting other PPMUS, principally mahimahi and wahoo, rather than tuna. Tunas comprised about 51% of the 2003 pelagic landings, between the previous three years where they formed between 41 and 54% of pelagic landings. Mahimahi comprised 16.5% of the total pelagic landings, yellowfin tuna 13.3%, skipjack 36% blue marlin 13% and wahoo 12.5%.

Guam's adjusted prices for pelagic fish remained fairly stable in 2003, following a general decline since 1980. The adjusted price ($/lb) of tuna has declined since 1996, and non-tuna PPMUS has started to decline in the past few years.

Virtually all the landings of pelagic fish are made by trolling vessels. The fleet size in 2003 was an estimated 371 vessels. The fleet size has declined in 2003 from 2002 (-1.1%), but is still above the long term average (+8.2%). The number of trips (6,962) was down in 2003 (-22%), and hours fished (31,834) were also down 22%, but hours per trip (4.6) was the same as 2002.

Foreign longline landing activity in Guam decreased (-9.1%) overall in Guam during 2003, with yellowfin tuna landings decreasing by 7.4% and bigeye by 12.9%.

The **Hawaii** fisheries for PPMUS produced total pelagic landings in excess of 22 million lb in 2003, down 3% (-800 thousand pounds) from 2002. Tunas represented 65% of the total catch. Although bigeye tuna catch was down 24% from a record catch observed in the previous year, it was still the largest component representing about 37% of the total catch, with Yellowfin tuna was the next largest component. Striped marlin was the largest component of the billfish catch, while mahimahi, opah, and ono were the largest components of the other PMUS category in 2003.

Total Hawaii pelagics ex-vessel revenue and average price was about the same in 2003 ($47.9 million and $2.18, respectively) as 2002. In 2003 the inflation adjusted ex-vessel revenue for the longline fishery increased by about 3 % to $38.6 million, while the combined MHI handline/offshore handline fishery revenues decreased by 41.7%, the troll fishery increased by about 21.2% and the aku baitboats increased by 13.6%.

The Hawaii longline fleet landed 17.44 million lb of fish in 2003, a 0.2% decrease from 2002 landings. Of the billfish landed in Hawaii, longlining accounted for most of the swordfish (94%), striped marlin (95%) and blue marlin (66%). About 17% of the longline landings (2.932 million lb) were billfish, and 10% of billfish landings were swordfish. The longline fleet also accounted for all of the bluefin tuna (100%) and moonfish (100%), and most of the bigeye tuna (93%), sharks (98.5%) and albacore (86%) landed in Hawaii.

Fishing effort for the combined pelagic fisheries in Hawaii remained at a high level in 2003. The number of Hawaii-based longline vessels increased to 110 vessels in 2003 after a 12-year low in 2002. The total number of longline trips out of Hawaii has remained relatively stable over the past ten years, but experienced its highest number of total trips since 1992. However, there has been a significant change with a shift of longline effort from swordfish to tunas. The number of swordfish-directed trips has declined from 319 in 1993 to 0 in 2003. In contrast, tuna-directed effort has increased during this period, from 458 trips in 1992 to 1,215 trips in 2003. Pelagic landings of the main Hawaiian Islands (MHI) troll and handline fisheries were relatively stable throughout the late 1980s to 2000, but MHI troll landings in 2003 have increased (+12.6%) from 2002 while MHI handline has decreased significantly (-35%). Catch by the aku boat fleet (pole-and-line for skipjack tuna) had been on a declining trend down to a historic low in 2002, but rebounded to land over 1 million pounds in 2003. The offshore handline fishery has grown into a fishey with catches that rivals and often exceeds catches of the established aku boat fishery, but in 2003 showed a 67.7% decrease in landings and saw its lowest landings since 1990.

Landings of all pelagics in the **Northern Mariana Islands** (NMI) decreased (-10.3%) between 2002 and 2003 to 227,203 lb and was only 1% below the long term average. Skipjack landings of 171,312 lb were down (-3.5%) from 2002, and was above (+4.1%) the long term average. Yellowfin tuna also declined from 2002 (-13.2%) and was also above the long term average (+37%). Landings of mahimahi was at its lowest landings in the 21-year period, down 60% from 2002 and dramatically lower (-62.2%) than the long term average. Wahoo landings decreased (-4.4%) from 2002 and was nearly 3% below the long term average. Blue marlin landings decreased (-10.4%), and continued to be significantly below the long term average (-67.8%). The decrease in landings during 2003 were matched by a small (-11%) decrease in total adjusted revenues ($444,625) over those in 2002.
The number of fishers making commercial pelagic landings decreased in 2003 (-18.9%), from 90 to 73, and below the long term average (-18%). The number of trips landing any pelagic fish also decreased (-7.1%) in 2003 and was higher (+8.9%) than the long term average. Thus the average number of trips per fisher in 2003 increased to 23.3 from 20.4 trips per fisher in 2002.

The inflation adjusted price of tunas and non-tuna PPMUS increased in 2003. The average adjusted price of tunas decreased to $1.96/lb (-1.5%) and other PPMUS increased to $2.11/lb (-9.9%). Tuna prices were above the long term average (+0.5%), and prices for other PPMUS were also slightly below the long term average (+0.5%).

C. Species

Mahimahi landings (82,406 lbs) in American Samoa during 2003 were the third highest since the fishery began, but decreased for the second year in a row, 4.7% from 2002, with 98% of the landings coming from the longline fishery. Guam's 2003 mahimahi landings (83,730 lbs) increased substantially (-51.5%) from 2002, and the lowest recording landings since 1987. Year 2003 landings were 51.8% below the long term average. Mahimahi landings in Guam have displayed wide, unexplained annual fluctuations since 1987. The trolling catch rate for mahimahi in 2003 was at its lowest since 1992 with a CPUE of 2.6 lbs/hr. Mahimahi landings (1,335,000 lbs) made up 29.8% of the 2003 non-tuna PMUS landings in Hawaii, a decrease of 13.9%. The troll catch rate in Hawaii in 2003 was 5.4% lower than the 2002 rate, but still 50.9% above the long-term average. Northern Marianas mahimahi landings (7,173 lb) decreased in 2003 ending an upward trend that started in 2001. As with Guam, NMI experiences annual fluctuations in the catch of mahimahi. Mahimahi accounted for 42% of the total non-tuna PPMUS landings. The trolling catch rate in 2003 in the NMI was down (-57.2%) from 2002.

Blue marlin catches in American Samoa decreased (-67%) after an upward trend as a result of the expansion of the longline fishery, which took 78.2% of the total blue marlin catch. Guam's landings of blue marlin (66,058 lbs) was at its highest in three years, and continues an upward trend after an 18-year low in 2001. The 2003 trolling catch rate was nearly 50% higher than the long-term average. Blue marlin landings (1.160 million lb) in 2003 in Hawaii were 11.5% higher than in 2002. Longliners accounted for 66% of the total Hawaii blue marlin landings. Blue marlin landings in the Northern Marianas (1,130 lbs) declined in 2003 by 10% from 2002 landings. This drop in landings is similar with most species caught in the fishery.

The catch rate of blue marlin in the American Samoa troll fishery increased to 1.35 lb/troll-hr and was at its highest since 1997, while the longline fishery had a CPUE of 0.26 from the logbooks, and 0.13 from the creel surveys. In Guam, blue marlin troll catch rate in 2003 (2.1 lb/troll-hr) increased 61.5% from 2002 (1.3 lb/troll-hr). In the Hawaii longline fishery, blue marlin tends to be caught incidentally at higher rates on mixed trips than in either tuna trips or swordfish trips. Court-ordered regulations limiting swordfish-directed effort implemented in 2000 either forced vessels to convert to target tunas or leave Hawaii and fish elsewhere. Therefore, only data on tuna trips for blue marlin is available. The catch rate of blue marlin stayed the same as in 2002 at 0.2 fish per 1000 hooks in 2003. The catch rate of blue marlin in the Hawaii commercial troll fishery decreased 4.3% and was 20.6% lower than the long-term average. In the Northern Marianas, the 2003 catch rate decreased by about 3.6% from 2002, and was 70.7% below the long-term average.

Striped marlin landings normally ranks third among the billfish in Hawaii (after swordfish and blue marlin), and in 2003 it accounted for 17% of the commercial landings of non-tuna PPMUS. The 2003 landings of 1,370,000 lbs were up from 610,000 lbs in 2002, an increase of over 124%. Striped marlin is regarded as a secondary target species (after bigeye tuna) in the winter longline fishery. Landings in the Hawaii commercial troll and handline fisheries during 2003 (63,000 lb, -1.6%) were down from 2002 and over 14% below the long-term average. The species rarely appears in the domestic landings from other areas, but increasing amounts of striped are being caught in American Samoa's developing longline fishery, with 8,910 lb landed in 2003, up 131% from 2002.

Sailfish landings were insignificant in most areas. American Samoa reported landings of 6,858 lbs of sailfish in 2003 were an almost 3% decrease on 2002 landings (7,064 lb) with 100% of the catch coming from longlining.

Estimated domestic landings of Hawaii **Sharks** decreased by 2.9% between 2002 and 2003, the result of regulations banning shark finning. Shark landings from other areas were relatively minor, if landed at all. In American Samoa, 8,851 lbs of sharks were caught with over 97% of the catch from longlining. Virtually the entire shark landings for Hawaii come from longline vessels. However, the Bottomfish Plan Team has also noted that Northwestern Hawaiian Islands bottom fishery also lands fins of coastal and reef sharks taken incidentally [3], although the quantity has not been estimated.

[3]. WPRFMC Bottomfish Plan Team meeting, March 27-28, 1996, Executive Centre Hotel, Honolulu, HI.

Shortbill spearfish landings were reported for the first time in American Samoa at 5102 in 2003, a 68.2% increase over 2002 landings. No catches were reported in Guam, Hawaii, or NMI during 2003.

The **Swordfish** longline fishery in Hawaii began in 1989 with landings of 0.6 million lb, increasing to 3.4 million lb in 1990, and peaking at 13.1 million lb in 1993. Swordfish landings declined in 1994 and 1995 but may be leveling out and stabilizing at about 6-7 million lb. Landings in 2003 amounted to 0.32 million lbs a decline of about 55% from 2002. The estimated average weight of longline-caught swordfish was 141 lb in 2002 the fifth-smallest average size since 1987. Swordfish comprised only 9% of the total billfish PMUS landings by all fisheries in Hawaii. The longline catch rate of swordfish has remained steady since 1998, and about 4% slightly below the long-term average between 1991 and 2003, at 0.1 fish per 1000 hooks in the tuna trip fishery. Other areas did not report landings of swordfish, apart from the American Samoa longline fishery, which landed 16,441 lb in 2003, down (-55.7%) from 2002.

American Samoa reported landings of 8,821,199 lbs of **Albacore** during 2003, a 32.7% decrease on 2002 landings. This was the second highest albacore landings recorded by the American Samoa fleet. Hawaii total landing of albacore (1.340 million lb) in 2003 was a 19.8% decrease from 2002. Landings of albacore by longline vessels increased slightly by 0.4% in 2003. Other areas did not report landings of albacore.

Hawaii landings of **Bigeye** tuna (8.350 million lb) were lower in 2003 than in 2002 (-23.9%), and almost all (93%) caught by longline. No other areas reported bigeye landings apart from American Samoa, where the expanding longline fishery in 2003 caught 557,557 lbs, or an increase of 29.2% on 2002 landings.

Skipjack tuna landings in American Samoa in 2003 (277,170 lbs) decreased (-46.7%) following a 257% increase in 2002. The 2003 landings for longline fishing were almost 247% higher than the long-term average between 1982 and 2003. Skipjack landings in the troll fishery increased (+79%), compared with the dramatic decrease in the longline fishery (-49%). Due to the focus on longlining, troll landings continued to be significantly below the long term average, representing only 30% of the average of troll landings between 1982 and 2003. However, trolling catch rate was 128% lower than the 2002 value and 33% lower than the long-term average. Guam skipjack landings in 2003 (182,728 lbs) increased following a dip in 2002 landings. This represented a one year increase of about 4% on the 2002 landings, and 12% higher than the long-term average. Catch rates increased from 4.3 lb/trolling hour to 5.7 lb/trolling hour, an increase of 32.6%. Hawaii skipjack landings in 2003 of 1,580,000 lbs represented an increase of about 36.2%. The skipjack were caught principally by baitboats, which landed 960,000 lb of skipjack in 2003, which was an increase of 42.9% over its 2002 total landings. Northern Marianas Islands skipjack landings decreased by about 3.5% from 177,487 1b in 2002 to 171,312 lb in 2003. The catch rate in 2003 slightly increased (+2.6)% from 2002, but was 12.1% below the long-term average.

Yellowfin tuna landings in American Samoa (1,145,417 lbs) increased by 6%; the longline fleet catching 99.4% of the yellowfin which had a 17.2% increase in catch rates from 2003 logbook data, but was about 34.5% higher in 2003 from creel survey data. Catch rates decreased 25% in the troll fishery and was below the long term average. Guam yellowfin landings (67,691 lbs) increased 50.7% in 2003 from 2002. Catch rates were 91% higher in 2003 and at its highest since 1999. The 2003 total Hawaii commercial landings of yellowfin (3.42 million lb) were 27.6% higher than 2002. Landings of yellowfin by commercial trollers decreased (+60%) in 2003, while landings by longliners increased between 2002 and 2003 (+44.7%). The 2003 longline CPUE of yellowfin by directed tuna trips was 12.5% higher than the 2002 CPUE. Northern Mariana Islands yellowfin landings declined in 2003 to 25,500 lb, a 13.2% decrease from 2002. Catch rates decreased in 2003 (12 lb/hr) 7.7% and was 20% above the long-term average.

Wahoo landings in American Samoa increased in 2002, following a large increase in 2002. This increase in landings was generated from the longline fishery as catch from trolling was about 0.14% of the total. The trolling catch rate continued a decline starting after 1996 and was at its highest catch rate since 1997, at 0.58 lb/hr. Guam's wahoo landings continue to show extreme interannual variability. Landings of wahoo in Guam (63,287 lbs) decreased by about 12% in 2003 and was 25.7% lower than the long term average. Troll catch rates for in Guam in 2003 increased to 2.0 lb/hr, an increase of 17.6 from 2002. Wahoo landings in Hawaii increased (+44.9%) from 690,000 lbs to 1,000,000 lbs between 2002 and 2003. The 2003 trolling catch rate for wahoo in Hawaii was up by 33.2%. The Northern Marianas wahoo landings (7,803 lb) decreased and catch rate (3.66 lb/trip) increased from the 2002 estimates. The CPUE was still below the long-term average (16.6%).

D. Gear

Troll fisheries continue to dominate the domestic fisheries in Guam and the Northern Mariana Islands. Growing charter fishing businesses in Guam and the Northern Mariana Islands contributed heavily to troll fishing effort. In Hawaii, longline landings continue to dominate pelagic fisheries production and in 2003 accounted for 77% of the landed volume of PPMUS. American Samoa's longline fishery is still expanding and accounted for 99.7% of PPMUS landings in 2003.

III. Issues

In October 2003 NOAA Fisheries initiated the analyses required under the National Environmental Policy Act (NEPA) for the Council's upcoming regulatory amendment on "management measures to implement new technologies for the western Pacific pelagic longline fisheries," which would focus on gear technologies with the potential to mitigate turtle interactions during swordfish-directed longlining. Public scoping meetings were held in American Samoa, Hawaii, CNMI, and Guam during October through December. The first phase would focus on management action related to turtle mitigation and would be completed on a compressed schedule in order to establish turtle mitigation measures by April 1, 2004, the date many of the existing turtle mitigation measures (and the most recent biological opinion issued by NOAA Fisheries for the pelagic fisheries) were due to be invalidated by court order in *Hawaii Longline Assoc.* v. *NMFS*.

IV. 2003 Region-wide Annual Report Recommendations

1. **The Plan Team recommends that the Council, pursuant to its requirement for taking action when overfishing occurs, requests that the US delegation to the**

Preparatory Conference pursue action by the Conference to assure that fishing mortality on bigeye and yellowfin tuna does not exceed a level where overfishing is occurring.

V. Plan Administration

A. Administrative Activities

*prepared by Tom Graham, NMFS-PIRO

NOAA Fisheries approved a supplement to FMP Amendment 8 (68 FR 46112, August 5, 2003). The supplement addresses portions of the original amendment that were disapproved by NOAA Fisheries in 1999 because of inconsistency with the Magnuson-Stevens Act, as amended by the Sustainable Fisheries Act. The supplement includes specifications of a new set of overfishing criteria, bycatch provisions, and identification of "fishing communities" in Hawaii. The supplemental amendment does not revise the existing regulations so rulemaking was not required.

In October 2003 NOAA Fisheries initiated the analyses required under the National Environmental Policy Act (NEPA) for the Council's upcoming regulatory amendment on "management measures to implement new technologies for the western Pacific pelagic longline fisheries," which would focus on gear technologies with the potential to mitigate turtle interactions during swordfish-directed longlining. NOAA Fisheries first published a Notice of Intent to prepare a Supplemental Environmental Impact Statement (SEIS) for pelagic fishery issues generally (68 FR 59771, October 17, 2003). Public scoping meetings were held in American Samoa, Hawaii, CNMI, and Guam during October through December. A supplement to the Notice of Intent was published December 3, 2003 (68 FR 67640) to explain that the NEPA process would be split into two phases. The first phase would focus on management action related to turtle mitigation and would be completed on a compressed schedule in order to establish turtle mitigation measures by April 1, 2004, the date many of the existing turtle mitigation measures (and the most recent biological opinion issued by NOAA Fisheries for the pelagic fisheries) were due to be invalidated by court order in *Hawaii Longline Assoc.* v. *NMFS*. In December 2003 NOAA Fisheries initiated consultation under section 7 of the Endangered Species Act with the NOAA Fisheries Office of Protected Resources. The consultation would consider the Council's "new technologies" regulatory amendment and would ultimately result in the issuance in a new biological opinion.

B. Longline Permits

During 2003, 164 permits, the maximum allowed under the FMP, were maintained in the Hawaii longline limited access fishery. Of the 164 permit holders, 41 were without vessels for those permits. PIRO also processed 22 permit transfers. PIRO also issued Western Pacific longline general permits for the pelagic fisheries, including 64 permits for vessels based in American Samoa, one permit for a vessel based in Guam, and one permit for a vessel based in the Northern Mariana Islands.

The names of the vessels registered with Hawaii limited access permits and Western Pacific longline general permits and permit holders are listed in Table 3.

C. Foreign Fishing Permits

No administrative actions relating to foreign fishing in the western Pacific EEZ were required because no foreign fishing permits were requested for any vessels with which the U.S. has a Governing International Fishing Agreement.

Table 3. Hawaii longline limited access permit holders in 2003

*permit data were compiled by Georgia Matsukawa.

VESSEL NAME	HOLDER
F/V ADRAMYTTIUM	THK Fishing Inc.
F/V ALEUTIAN BEAUTY	Daniel Gunn/William Widing
F/V AMANDA K	Amanda K Inc.
F/V ARROW	Arrow Inc.
F/V BARBARA H	Arthur/Barbara Haworth
F/V BLACK MAGIC	Black Magic LLC
F/V BLUE FIN	Liet An Lu/Mai Thi Do
F/V BLUE SKY	Blue Sky Fishing Producer
F/V CAPT. GREG	Aquanut Co. Inc.
F/V CAPT. MILLIONS I	Nga Van Le
F/V CAPT. MILLIONS III	Capt. Millions III, Inc.
F/V CAPT. MILLIONS IV	H and M Fishery Inc.
F/V CARLETA	Carleta LLC
F/V CAROLEIGH	Vessel Management Assoc.
F/V CRYSTAL	Davis B Inc.
F/V CUMBERLAND TRAIL	Leland Oldenburg
F/V DAE IN HO	KYL Inc.
F/V DAE IN HO IV	Wynne Inc.
F/V DASHER II	DukSung Fishing Inc.
F/V DEBORAH ANN	Amko Fishing Co. Inc.
F/V EDWARD G	Edward G. Co. Inc.
F/V ENTERPRISE	Brian Porter/Larry Suezaki
F/V EXCALIBUR	Bruce Picton
F/V FINBACK	Vessel Management Assoc.
F/V FIREBIRD	Firebird Fishing Corp.
F/V GAIL ANN	Gail Ann Co. Inc.
F/V GARDEN SUN	Konam Fishing
F/V GLORY	Roy Yi
F/V GOLDEN SABLE	Golden Sable Fisheries Inc.
F/V GRACE	Kim Fishing Co.
F/V HAVANA	Thomas Webster
F/V HAWAII POWER	Intl. Quality Fishery Inc
F/V HEOLA	Heola Inc.
F/V HOKUAO	White Inc.

F/V IMMIGRANT	Martin Noel Inc.
F/V INDEPENDENCE	Independence Inc.
F/V JANE	Ohana Fishing LLC
F/V JANTHINA	Trans World Marine Inc.
F/V JENNIFER	Kil Cho Moon
F/V KAIMI	Fishrite Inc.
F/V KAMI M	Pacific Jennings Inc.
F/V KATHERINE II	K.A. Fishing Co. Inc.
F/V KATHERINE VII	Katherine VII LLC
F/V KATHERINE Y	Song Fishing Corp.
F/V KATY MARY	Vessel Management Assoc.
F/V KAWIKA	Vessel Management Assoc.
F/V KAY	Young S Fishing Inc.
F/V KELLY ANN	Kelly Ann Corp.
F/V KILAUEA	Aukai Fishing Co.Ltd.
F/V KINUE KAI	Awahnee Oceanics Inc.
F/V KOLEA	Paik Fishing Inc.
F/V KUKUS	Kuku Fishing Inc.
F/V LADY ALICE	Lady Alice Co. Inc.
F/V LADY CHUL	Jong Ik Fishing Co. Inc.
F/V LAURA ANN	Crivello Fishing LLC
F/V LEA LEA	M.S. Honolulu Inc.
F/V LEGACY	Amak River Legacy
F/V LIHAU	White Inc.
F/V LUCKY I	Duoc Nguyen
F/V MAN SEOK	KMC & PCC Inc.
F/V MANA LOA	Two Bulls Inc.
F/V MARIAH	Vessel Management Assoc.
F/V MARIE M	Viking V Inc.
F/V MARINE STAR	Viking V Inc.
F/V MIDNIGHT III	Albert K. Duarte
F/V MISS JANE	Palmer Pedersen Fisheries
F/V MISS JULIE	Quan Do
F/V MISS LISA	Miss Lisa Inc.
F/V MOKULELE	Robert Cabos
F/V NATALIE ROSE	Charles A. Dye
F/V PACIFIC FIN	Fishrite Inc.
F/V PACIFIC HORIZON	John Gibbs
F/V PACIFIC PARADISE	Twin N Fishery Inc.
F/V PACIFIC REFLECTION	Gunn Pacific Reflection
F/V PACIFICA	Jackson Bay Co.
F/V PAN AM II	Dongwon Marine Inc.
F/V PARADISE 2001	Dang Fishery Inc.
F/V PARADISE 2002	Nguyen Fishery Inc.

F/V PEARL HARBOR II	Gilbert DeCosta
F/V PETITE ONE	Ka'upu Ltd.
F/V PIKY	M/V Piky Inc.
F/V PRINCESS K	Princess K Fishing Corp.
F/V QUEEN DIAMOND	Queen Diamond Inc.
F/V QUYNH VY	Reagan Nguyen
F/V RACHEL	Bethel Inc.
F/V RED BARON	Donald Aasted
F/V RED DIAMOND	Xuan Nguyen
F/V ROBIN	Universal Fishing Co.
F/V ROBIN II	H & Lee Inc.
F/V ROBIN V	L.S. Fishing Inc.
F/V SANDY DORY	Highliner Inc.
F/V SAPPHIRE	H-N Fishery Inc.
F/V SAPPHIRE II	H-N Fishery Inc.
F/V SEA DIAMOND	Nancy Nguyen
F/V SEA DIAMOND II	Sea Diamond II Inc.
F/V SEA FALCON	Frank/Michelle Crabtree
F/V SEA GODDESS	Capt. Washington I Inc.
F/V SEA HAWK	Hawaii Fishing Co.
F/V SEA MOON	Sea Flower Inc.
F/V SEA MOON II	Sea Moon II Inc.
F/V SEA PEARL	Coldwater Fisheries Inc.
F/V SEA SPIDER	Paul Seaton, Trustee
F/V SEASPRAY	Hanson/Hanson Fishing Co.
F/V SEEKER II	Seeker Fisheries Inc.
F/V SEVEN STARS	Kwang Myong Co. Inc.
F/V SKY SUN	Kyong Dok Kim
F/V SPACER K	Hwa Deog Kim
F/V ST. MICHAEL	Tony/Lorna Franulovich
F/V ST. PETER	N. Pac. Fishery Inc.
F/V SUSAN K	Mini Corp.
F/V SWELL RIDER	Bayshore Mgmt. Inc.
F/V SYLVIA	B-52 Inc.
F/V TANYA ROSE	Port Lynch Inc.
F/V TUCANA	Pacboat LLC
F/V TWO STAR	Two Bulls Inc.
F/V ULHEELANI	Ulheelani Corp.
F/V VICTORIA	Aegis Fishing Inc.
F/V VIRGINIA CREEPER	Sylvan Seafoods Inc.
F/V VUI VUI II	Vui Vui II Inc.
F/V VUI-VUI	Nick Van Pham
F/V WHITE NIGHT	Natalia/Kiril Basargin
F/V WONIYA	Sierra Fisheries Inc.

F/V ZEPHYR	Zephyr Fisheries LLC

2003 Hawaii longline limited access permit holders without vessels

Alan Duong	
Andy Hoang	
Bac Tran	
Christine Tran	2 permits
David Lewis	
Diana Thi To	
Gary Painter	
Ho Son Nguyen	
Hong Lu	
James Chan Song Kim	
Jerry Ray	
K.R. Fishing Inc.	
Lady Ann Margaret Inc.	
Lan Thi Van	
Larry DaRosa	
Liana Do	
Lindgren-Pitman Inc.	
Long Thanh Nguyen	
Natali Fishing Inc.	
Ocean Associates Corp.	
Pacific Fishing & Supply	2 permits
Pacific Seafoods Inc.	3 permits
Peter Webster	
Quang Nguyen	
Quy Thanh Truong	
Richard Gallimore	
Scotty Nguyen	
Sea Dragon II Inc.	
Steven Nguyen	
Stewart Miyamoto	
Tina Hoang	
Tom C.Y. Kim	
Tom The Van Le	
Tony Phan Truong	
Tuan Nguyen	
Vessel Management Assoc	2 permits

Western Pacific longline general permit holders in 2003

American Samoa

VESSEL NAME	HOLDER
F/V ADELITA	Adelita Fishing LLC
F/V AETO	Aleni Ripine
F/V ALI-B	Harbor Refuse and Environmental Services
F/V ALLIANCE	Offshore Adventures Inc.
F/V ALLIANCE	Morgan Davies
F/V AMERICA	Robert/Dorothy Pringle
F/V AURO	Longline Services Inc.
F/V BREANA LYNN	Robert/Dorothy Pringle
F/V CAPT. CARLOS ANDRES	Afoa Lures
F/V CHIEF TAPEET	Aiga Ma Uo LLC
F/V EASTERN STAR	Mataio Tiapula
F/V FAAOLATAGA	Pele Tui
F/V FAIVAIMOANA I	Faivaimoana Fishing Co Lt
F/V FETUOLEMOANA	Tuna Ventures Inc.
F/V FLORA	Feli Fisheries Inc.
F/V FOTOLUPE	Richard Solaita
F/V FUAO I	Asifoa Atualevao
F/V FUAO II	Asifoa & Sons Inc.
F/V GALUEGA FOU	Floyd Scanlan
F/V GLORIA PARK	Mee Won Inc.
F/V GOGOSINA	Native Resources Develope
F/V INJA	Taufuiava Vaivai
F/V ISLAND GIRL	Clay Howenstine Inc.
F/V JIMMY JR.	Jimmy Vaiagae
F/V JULIE IRENE	Michael Pulu
F/V KARLY	Tulele Laolagi
F/V KATHERYN ANN	Silva Fishing Inc.
F/V L.J. EXPRESS I	Letalitonu Alofaituli
F/V L.J. EXPRESS II	Letalitonu Alofaituli
F/V LADY ANA	Ioane Maselino
F/V LADY BARBARA	Barbara H Inc.
F/V LADY ELINOR	Afoa Lures
F/V LADY FRANCELLA	Faamausili Pola
F/V LADY HANNACHO II	Afoa Lures
F/V LADY MARIA	Phillip Taula
F/V LADY RIMA	Jamil Shallout
F/V LEANN II	Steve Vaiau
F/V MIDDLEPOINT	Island Tuna Mgmt. Inc.
F/V MONIQUE II	William Hollister
F/V NO 1 JI HYUN	Ji Hyun Inc.
F/V NORTHWEST	Harbor Refuse & Environm
F/V PAGO NO 1	Samoa Enterprises Inc.

F/V PAGO NO 2	Samoa Enterprises Inc.
F/V PAGO NO 3	Samoa Enterprises Inc.
F/V PENINA	Longline Services Inc.
F/V PRINCESS DANIELA	Afoa Lures
F/V PRINCESS KARLINNA	Wearefish Inc.
F/V PRINCESS YASMINNA	Wearefish Inc.
F/V RJ	Lefanoga Eseroma
F/V SALVATION II	Tagialisi Misa
F/V SAMOAN BOY	Feli Fisheries Inc.
F/V SEA VENTURE	Gunn Sea Venture LLC
F/V SIVAIMOANA	Tuna Ventures Inc.
F/V SKOOPY I	Omar Shallout
F/V SOUTH WIND I	Elvin Mokoma
F/V SOUTH WIND II	Elvin Mokoma
F/V SOUTH WIND III	Elvin Mokoma
F/V SOUTH WIND IV	Elvin Mokoma
F/V TABITHA	Uelese Timoteo
F/V TAIMANE	Longline Services Inc.
F/V TELEFONI	Telefoni Sagapolutele
F/V THE MARIA J	Maria J Fishing Inc.
F/V TIFAIMOANA	Longline Services inc.
F/V TRACEY C	Tracey C Fishing LLC

Guam

VESSEL NAME	HOLDER
[no name]	Larry Taylor

Northern Mariana Islands

VESSEL NAME	HOLDER
IL SIN HO	Mariano Falig

D. Protected Species Conservation

This module was not available at the time of first publication of the 2003 Pelagic Annual Report (June 30, 2004). It will be included in future publications when it is made available.

E. USCG Enforcement Activities

The following is a summary of U. S. Coast Guard fisheries law enforcement activity in the western and central Pacific Region and covers the period from October 1, 2002, to September 30, 2003.

During the first three months of fiscal year 2003, the majority of our efforts continued to be focused on maritime homeland security. We were unable to conduct planned C-130 deployments to Guam and American Samoa due to unscheduled maintenance requirements, super typhoon Pongsona relief efforts, and a number of emergent, long-range search and rescue missions. Although initially limited by the availability of resources, as the year progressed we conducted aerial patrols of the exclusive economic zone (EEZs) surrounding the Main Hawaiian Islands, Kingman Reef, Palmyra Atoll, Jarvis Island, Howland Island, Baker Island, Guam, and the Northern Mariana Islands. We had twelve suspected foreign fishing vessel encroachments during the course of the year, but were unable to respond due to non-availability of resources.

Our surface assets patrolled in the vicinity of the Main Hawaiian Islands, conducting boardings and monitoring the activity of the domestic longline fleet. No significant violations were noted, though one domestic longliner was found to be in possession of eight shark fins, without corresponding carcasses in violation of the Shark Finning Prohibition Act.

We capitalized on patrol support available from out of area assets to the greatest extent possible. During this period, we tasked one of the Coast Guard's polar icebreakers transiting to and from Antarctica to patrol the Howland/Baker EEZ along her route. In May, we were able to get 20 additional surface patrol days from the high-endurance cutter HAMILTON. HAMILTON deployed from the mainland and was initially assigned to the Fourteenth Coast Guard District to support the homeland security mission. HAMILTON conducted boardings of the domestic longline fleet southwest of the Main Hawaiian Islands during this period. The most prevalent violations reported were vessels failing to carry a High Seas Fishing Act Compliance Permit and failure to properly mark their floats. All cases were turned over to NOAA Fisheries Enforcement for action. HAMILTON also patrolled the Johnston Island and Kingman Reef/Palmyra Atoll EEZ.

During the month of June, one of the mobile shoreside patrols from Marianas Section observed two foreign fishing vessels offloading shark fins in Apra Harbor, Guam. Upon investigation, the first vessel was determined to be in compliance with sufficient carcasses onboard to support the amount of fins they had. The second vessel was found to have 3,457 pounds of shark fins onboard with an insufficient amount of carcasses. The patrol also found a beaked whale onboard this vessel. Both cases were turned over to NOAA Fisheries Enforcement for further action. Guam-based cutters continued to board foreign fishing vessels inbound to Apra Harbor.

The Coast Guard conducted dedicated surface and aerial patrols of the Hawaiian Island Humpback Whale National Marine Sanctuary in concert with National Marine Fisheries Enforcement Officers from December through the end of May, with no significant violations noted during the season.

During the period from June through August we saw an unprecedented amount of illegal large-scale, high seas driftnet activity well to the north and west of the Northwestern Hawaiian Islands. Although in previous years, vessels were targeting salmon, this year all vessels found to be illegally engaged in driftnetting were targeting squid, with a resultant bycatch of tuna, shark, and marlin.

Responding to reports of illegal activity, the Coast Guard sortied the cutter RUSH in June to proceed and investigate, en route the cutter's scheduled patrol in the Bering Sea. RUSH intercepted and boarded a vessel from the People's Republic of China (PRC) engaged in illegal driftnet operations. Acting on behalf of the PRC government, RUSH rendered the vessel's fishing gear inoperable and ordered the vessel back to port in China for further action by the PRC government.

Later in July, the Coast Guard responded to additional sightings of foreign vessels illegally engaged in high seas driftnet activity. I credit some of these sightings to US fishermen working in the North Pacific, who reported the activity as it occurred to the Coast Guard. The Coast Guard responded by directing the cutter JARVIS to proceed and investigate. During their patrol, JARVIS' crew prosecuted a total of five foreign fishing vessels illegally engaged in driftnetting. JARVIS also provided information to the PRC government regarding two additional vessels suspected of driftnetting. While engaged in prosecuting two additional vessels engaged in illegal driftnet operations, JARVIS' embarked helicopter sighted a third vessel, this one Russian, outfitted for driftnetting. Although unable to pursue this vessel due to the cases in progress, information on this vessel was passed to the Russian Federal Border Service, who dispatched a patrol vessel to investigate. Additionally, during JARVIS' patrol, JARVIS freed a sperm whale that was entangled in driftnets and convinced one of the vessels being prosecuted for driftnetting to haul in approximately 30 nautical miles of driftnet that had been left behind to ghost fish. I am pleased to report that there was a significant amount of cooperation between the United States and the countries of Canada, Russia, Japan, and China to help remove vessels participating in this most environmentally destructive fishery.

F. NOAA Fisheries Office for Law Enforcement Pacific Islands Enforcement Division

Throughout this reporting period, random dockside compliance checks of Hawaii-based longliners were conducted. Minor technical violations were noted and addressed. In addition, several prominent investigations involving potential violations of the Western pacific Pelagic Regulations addressing the harvesting of swordfish were initiated. During the third quarter of 2003, there were four prominent enforcement actions resulting from violations of the MSFCMA which have resulted in financial penalties totaling **$143,817.81**. Actionable conduct ranged from possession and use of float lines less than 20 meters in length, the direct targeting of swordfish, and various logbook and reporting infractions, to violation of the Shark Finning Prohibition Act.

Public education, deterrence, and intervention remain our primary focus with regards to averting marine mammal harassment within Hawaii. Moreover, coordination continues with volunteer organizations and local law enforcement agencies, in order to provide a timely response to marine mammal incidents. Joint patrols were conducted with personnel from the Hawaii Department of Conservation and Resources Enforcement on the Big Islands of Hawaii in order to assess and deter potential harassment of spinner dolphins. Enforcement personnel worked in partnership with researchers from the Pacific Islands Fisheries Science Center to resolve the status of land-locked sea turtles on private property. The turtles were listed as threatened or endangered. Strategies including returning the sea turtles to the open ocean.

The Pacific Islands Enforcement Division continues to provide enforcement support to the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve through the commitment of a special agent, full-time, to address the unique enforcement challenges of the reserve. The resident special agent in American Samoa attended the Coral Reef Advisory Group (CRAG) meeting and provided an enforcement assessment for the area.

To improve coral reef conservation in the Northwestern Hawaiian Islands, the VMS control center was modified to accept depth data that is transmitted automatically from VMS units. The project is ongoing, and the next phase will establish the transmission of depth data from vessel to shore side control center.

During the third quarter, there were two prominent enforcement actions resulting from violations of the Endangered Species Act, affecting sea turtles in Hawaii. Financial penalties totaling **$9,600.00** have resulted. Violations ranged from failing to carry line clippers and dip nets, to illegal takes with prohibited fishing gear.

Public education, outreach, and enforcement efforts in conjunction with the Hawaiian Islands Humpback Whale National Marine Sanctuary continued during 2003. Consistent with previous years, public education, deterrence, and intervention strategies were maintained throughout the 2002/2003 whale watching season. The NOAA Fisheries Office for Law Enforcement participated in pre-season enforcement workshops during November and December of 2002. In addition, the NOAA Office for Law Enforcement responded to over 60 complaints involving potential violations of the humpback whale approach regulations by kayak enthusiasts, recreational water craft, swimmers, and aircraft from January though April of 2003.

The Pacific Islands Enforcement Division continues to provide technical and investigative support to the Forum Fisheries Agency and its member countries. To be specific, the resident special agent has conducted enforcement training and workshops for Forum member

The Vessel Monitoring System (VMW) continued to be an integral part of the Pacific Islands/Southwest Law Enforcement's Monitoring, Control, and Surveillance (MCS) program. The VMS continued to be an effective tool for monitoring compliance with closed area and seasonal restrictions in the region, and cooperation from the fishing community continued to remain at high levels.

The size of the VMS program is relatively stable. OLE continued to monitor the entire permitted Hawaii longline fleet. In addition, most former Hawaii-based vessels that conducted fishing operations in California and American Samoa still have the VMS units on board. To be specific, personnel from the Pacific Islands Enforcement Division traveled to Vigo, Spain to inspect the court-ordered VMS installation on two US vessels that will soon enter the CCAMLR toothfish fishery.

Throughout this reporting period, we have continued to coordinate efforts and to assist NOAA OLE Headquarters in the development of a national oversight strategy for the VMS Program, based upon regional emphasis. The United States Navy in conjunction with the Pacific Missile

Range Facility at Barking Sands, Kauai, relied on the NOAA OLE Hawaii Field Office to assist with the identification of fishing vessels in exclusion zone areas prior to missile test launches. In retrospect, the Hawaii VMS Program has clearly demonstrated that a fishing vessel monitoring system can be an effective use of technology to improve monitoring, control and surveillance of regulated fisheries. VMS, in conjunction with air and surface patrols, promotes and supports regional strategies for conservation and management of highly migratory species in the Central and Western Pacific.

Appendix 1

Territory of American Samoa

Introduction

The pelagic fishery in American Samoa has historically been an important component of the traditional domestic fisheries. Prior to 1995 the pelagic fishery was largely a troll-based fishery. The horizontal method of longlining was introduced to the Territory by Western Samoan fishermen in 1995. The local fishers have found longlining to be a worthwhile venture to engage in because they land more pounds with less effort and use less gas for trips. Almost all of the vessels used are “alias”. These are locally built, twin-hulled (wood with fiberglass or aluminum) boats about 30 feet long, powered by 40HP gasoline outboard engines. Navigation on the alias is visual, using landmarks with the exception of a few modernized alias which have global positioning systems (GPS) for navigation. The gear is stored on deck attached to a hand-crank reel which can hold as much as 10 miles (25 miles for the jig-boat) of monofilament mainline. The gear is set by spooling the mainline off the reel and retrieved by hand pulling and cranking the mainline back onto the reel. Trips are one day long (about 8 hours) with the exception of 2 boats which go out fishing more than one day. These boats at 40 feet or so are slightly bigger than the regular alia (32+feet). Setting the equipment generally begins in the early morning. Haulback is generally in the mid-day to afternoon. The catch is stored in containers secured to the deck, or in the hulls. Albacore is the primary species caught, and is generally stored in personal freezers until a sufficient amount is accumulated to sell to the canneries. Some of the catch is also sometimes sold to stores, restaurants, local residents and donated for family functions.

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

Prior to 1985, only commercial landings were monitored. From October 1985 to the present, data was collected through an offshore creel survey that included subsistence and recreational fishing as well as commercial fishing. In September, 1990 a Commercial Purchase (receipt book) System was instituted in which all businesses in Samoa, except for the canneries, that buy fish commercially were required by local law to submit to 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 which requires them to submit logs containing detailed data on each of their sets and the resulting catch. From 1996 to 1999, the logbooks submitted by the local longliners were edited in Samoa for any missing data and were then sent to the NMFS Honolulu Lab every week for further editing and data processing. Starting with 2000, logbook data was entered and maintained in Samoa and downloaded to NMFS in Hawaii periodically.

On July of 1999, In response to a problem with delinquent longline logs, the Department of Marine and Wildlife initiated a Daily Effort Census (DEC) program to monitor the local longline fleet. Using the Daily Effort Census form, which contains all active longline vessels, data collectors go out on a daily basis, except on Sundays, Holidays, and off-duty days, to check which boats are out longlining and which boats are in port. The DEC form is returned to DMWR for data entry at the end of each working day. Federal logbooks are required to be submitted to DMWR by the following Monday after each fishing trip. If they are not, warnings are issued to the fishermen and more punitive measures are taken if these 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 they were not in port. To solve this problem the longline logbook data was compared with reports from the canneries of fish unloaded by these boats to identify which boats were delinquent in their longline logs and to take corrective action.

Newly discovered “peculiarities” in the historical data, the emergence of new, bigger boats that make multi-day trips required amending and supplementing the algorithms that expand American Samoa’s offshore creel survey data. WPacFIN staff have completed modifications to the Visual FoxPro data processing system to address these data concerns to better reflect the status of the territory’s pelagic fisheries. These changes are outlined below. The data from 1982-1985 has been left unchanged from the Dbase IV Commercial Catch Monitoring System but data from 1986-2003 in this report has been re-expanded with the new Visual FoxPro data processing system. These expansions are true annual expansions of the entire year’s interviews across the entire year’s sample days and are no longer sums of 12 monthly expansions. Note that there are some changes to the historical data due to the new re-expanded and adjusted data. As a result, the graph presentations have also changed.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Summary

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

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

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

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

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

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

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

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

2002 Recommendations and ***current status***:

1 The Pelagics Plan Team recommends that the National Marine Fisheries Service (NMFS) or the PFRP (Pelagic Fisheries Research Program) perform a study on the spatial and temporal dynamics of longline fishing around American Samoa. Some of the analyses in the American Samoa module suggest fishery interactions may be occurring, and the concentration of fishery effort in the American Samoa fishery now exceeds anything previously seen in Council managed fisheries. ***A PFRP funded project will conduct the analyses outlined in this recommendation.***

2. The Pelagics Plan Team recommends that more collaborative research and management initiatives be developed between the American Samoa Department of Marine and Wildlife Resources (DMWR) and the Western Samoa Fisheries Division, given that the combined landings from both longline fisheries produce about 30% of the albacore caught in the southern Pacific Ocean, and may be representative of the stock as a whole. ***The Council contacted the Samoa Fisheries Division in August 2003 and received a favorable response in September 2003 about collaborative approach to longline research and management. Note also that the PFRP project mentioned above includes collaboration with Samoa’s Fisheries Division***.

3. The Pelagics Plan Team recommends holding informative workshops for boat-owners and fishermen explaining to them the importance of obtaining this information, how to accurately fill in the information and benefits they can receive through accurately filling out this information e.g longline logbook**. *NMFS-PIRO has conducted protected species workshops in American Samoa which included instruction on logbook completion.***

4. The Pelagics Plan Team recommends that NMFS fund an observer program for the American Samoa longline fishery. A priority for the observer program in American Samoa should be the documentation of the condition and disposition of all fish released from longline fisheries. The Pelagics Plan Team recognizes that there may be an issue with the large percentage of releases of species in this expanding fishery. It will be important to document or estimate how many of these releases are alive. Although less reliable than observer data, logbook data could provide such information, especially if the observer program is slow to start. ***An observer program will be implemented when the American Samoa limited entry program is finalized in 2004. Trials with observers on three longline trips were completed by PIRO in 2003.***

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

2003 Recommendations:

1. The Pelagic Plan Team recommends that, pending the results of a re-analysis of the longline set data with the verified area closure coordinates, the Council send a letter to NMFS Office of Law Enforcement outlining concerns that large (>50ft) longline vessels may be fishing within the 50 nm closed area around the islands of American Samoa, and that NMFS OLE should conduct an investigation and take action to ensure that these violations are curtailed. [The letter should include the results of an investigation of a rerun of the data with the verified coordinates for the area closures].

2. The Pelagic Plan Team recommends that as the Council and DMWR move forward with the original recommendation for closer collaboration with neighboring Samoa that this be expanded to include broader cooperation with all the countries bordering the American Samoa EEZ, to collect and process regional data in order to have a regional view of the fisheries.

3. The Pelagic Plan Team recommend that DMWR seek grants to develop infrastructure and processes to utilize bycatch, which may require hiring a qualified contract grant writer.

Plan Team Action Items

1. The Pelagic Plan Team recommends that DMWR continue to develop their GIS mapping capability of the American Samoa longline catch, effort and CPUE data

2. The Pelagic Plan Team recommend that WPacFIN develop a time series of vessels by size classes as per the four size classes used in the limited entry amendment for the 2005 Pelagic Plan Team annual meeting.

Tables

Figures

Table 1. American Samoa 2003 estimated total landings by pelagic species by gear type.

Species	LongLine Pounds	Troll Pounds	Other Pounds	Total Pounds
Skipjack Tuna	257,676	19,374	120	277,170
Albacore	8,821,199	0	0	8,821,199
Yellowfin Tuna	1,138,397	6,909	110	1,145,417
Kawakawa	0	733	0	733
BigeyeTuna	557,557	0	0	557,557
Tunas	1,285	0	0	1,285
TUNAS SUBTOTALS	10,776,115	27,017	230	10,803,361
Mahimahi	80,994	1,411	0	82,406
Black marlin	4,487	0	0	4,487
Blue marlin	23,368	1,294	0	24,661
Striped Marlin	8,910	0	0	8,910
Wahoo	434,221	603	13	434,837
Sharks	8,643	160	48	8,851
Swordfish	16,441	0	0	16,441
Sailfish	6,858	0	0	6,858
Spearfish	5,102	0	0	5,102
Moonfish	9,283	0	0	9,283
Oilfish	1,490	0	0	1,490
Pomfret	2,192	0	15	2,207
NON-TUNA PMUS SUBTOTALS	601,989	3,468	76	605,532
Barracudas	2,367	431	351	3,149
Rainbow runner	0	20	40	60
Dogtooth tuna	0	177	1,070	1,246
Other Pelagic Fish	1,394	0	0	1,394
OTHER PELAGICS SUBTOTALS	3,761	627	1,461	5,849
TOTAL PELAGICS	**11,381,865**	**31,112**	**1,767**	**11,414,743**

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

Table 2. American Samoa 2003 estimated commercial landings, value and average price by pelagic species.

Species	Pounds	$/LB	Value($)
Skipjack Tuna	259,292	$0.60	$155,421
Albacore	8,819,677	$0.94	$8,333,515
Yellowfin Tuna	1,118,398	$0.88	$979,223
BigeyeTuna	542,788	$1.11	$600,868
TUNAS SUBTOTALS	10,740,154	$0.94	$10,069,027
Mahimahi	17,250	$1.74	$29,997
Black marlin	4,192	$1.00	$4,192
Blue marlin	4,703	$1.05	$4,926
Wahoo	374,438	$0.96	$358,737
Sharks	129	$0.50	$65
Swordfish	8,086	$2.25	$18,230
Sailfish	2,108	$0.94	$1,973
Moonfish	4,091	$1.00	$4,091
Oilfish	183	$1.00	$183
NON-TUNA PMUS SUBTOTALS	415,181	$1.02	$422,393
Barracudas	1,652	$2.37	$3,909
Rainbow runner	32	$2.00	$65
Dogtooth tuna	1,073	$1.47	$1,574
OTHER PELAGICS SUBTOTALS	2,757	$2.01	$5,548
TOTAL PELAGICS	**11,158,092**	**$0.94**	**$10,496,968**

The price/pound of barracuda is high because most of the interviews with barracuda price/pound data are when they are caught by bottomfishing and sold at bottomfish prices with the rest of the bottomfish catch.

Table 3. American Samoa 2003 longline effort, kept and released by three sizes of longline vessels

EFFORT

	Alias	Monohull < 50'	Monohull > 50 '
Boats	15	4	32
Trips	650	39	243
Sets	852	335	5,033
1000 Hooks	248	575	13,345
Lightsticks	149	553	3,567

KEPT (Number of Fish)

Species	Alias	Monohull < 50'	Monohull > 50 '	All Vessels
Skipjack Tuna	1,812	247	27,725	29,784
Albacore	5,097	8,921	218,310	232,328
Yellowfin Tuna	2,046	912	25,878	28,836
BigeyeTuna	291	629	13,970	14,890
Tunas	5	0	78	83
TUNAS SUBTOTALS	9,251	10,709	285,961	305,921
Mahimahi	1,109	62	2,760	3,931
Black marlin	0	0	3	3
Blue marlin	64	7	163	234
Striped Marlin	4	3	78	85
Wahoo	742	283	13,213	14,238
Sharks	8	5	124	137
Swordfish	19	6	224	249
Sailfish	21	1	41	63
Spearfish	0	0	111	111
Moonfish	24	0	160	184
Oilfish	9	9	84	102
Pomfret	0	3	266	269
NON-TUNA PMUS SUBTOTALS	2,000	379	17,227	19,606
Barracudas	5	0	94	99
Other Pelagic Fish	8	2	27	37
OTHER PELAGICS SUBTOTALS	13	2	121	136
TOTAL PELAGICS	**11,264**	**11,090**	**303,309**	**325,663**

RELEASED (Number of Fish)

Species	Alias	Monohull < 50'	Monohull > 50 '	All Vessels
Skipjack Tuna	0	546	11,192	11,738
Albacore	0	0	109	109
Yellowfin Tuna	0	47	1,537	1,584
BigeyeTuna	0	35	1,206	1,241
Tunas	0	3	4	7
TUNAS SUBTOTALS	0	631	14,048	14,679
Mahimahi	0	28	2,305	2,333
Black marlin	0	0	30	30
Blue marlin	0	72	2,477	2,549
Striped Marlin	0	6	204	210
Wahoo	0	90	1,723	1,813
Sharks	0	634	10,197	10,831
Swordfish	0	1	189	190
Sailfish	0	15	469	484
Spearfish	0	2	333	335
Moonfish	0	41	732	773
Oilfish	0	122	7,081	7,203
Pomfret	0	38	868	906
NON-TUNA PMUS SUBTOTALS	0	1,049	26,608	27,657
Barracudas	0	3	275	278
Other Pelagic Fish	0	15	2,832	2,847
OTHER PELAGICS SUBTOTALS	0	18	3,107	3,125
TOTAL PELAGICS	**0**	**1,698**	**43,763**	**45,461**

Interpretation: This table indicates the effort and catch data by three different types of vessels participating in the American Samoa longline fishery in the year 2003. Clearly it illustrates that the majority of the effort and catch is performed by the monohulls that are greater than 50 ft. in length. They account for 93.5% of the total pelagics caught, compared to the 3.5% by the monohulls less than 50 ft. and 3.0% by the alias. It also shows that 96.3% of the releases are made by the big boats while smaller monohull make the rest. It's important to note that the alias fleet don't release any fish.

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

Table 4. American Samoa 2003 longline effort and catch by boats < 50' long and > 50' long inside and outside of restricted areas less than 50 miles from shore

EFFORT

	Boats < 50' Inside	Boats < 50' Outside	Boats > 50' Inside	Boats > 50' Outside
Boats	18	7	19	32
Trips	669	20	45	198
Sets	1,008	179	98	4,935
1000 Hooks	542	280	236	13,108

CATCH (Number of Fish)

Species	Boats < 50' Inside	Boats < 50' Outside	Boats > 50' Inside	Boats > 50' Outside
Skipjack Tuna	1,818	787	328	38,589
Albacore	10,187	3,831	4,447	213,972
Yellowfin Tuna	1,888	1,117	416	26,999
BigeyeTuna	389	566	331	14,845
Tunas	5	3	0	82
TUNAS SUBTOTALS	14,287	6,304	5,522	294,487
Mahimahi	1,027	172	58	5,007
Black marlin	0	0	2	31
Blue marlin	106	37	27	2,613
Striped Marlin	6	7	2	280
Wahoo	832	283	203	14,733
Sharks	356	291	194	10,127
Swordfish	21	5	7	406
Sailfish	20	17	10	500
Spearfish	0	2	5	439
Moonfish	44	21	27	865
Oilfish	48	92	144	7,021
Pomfret	12	29	22	1,112
NON-TUNA PMUS SUBTOTALS	2,472	956	701	43,134
Barracudas	5	3	1	368
Other Pelagic Fish	12	13	7	2,852
OTHER PELAGICS SUBTOTALS	17	16	8	3,220
TOTAL PELAGICS	**16,776**	**7,276**	**6,231**	**340,841**

Interpretation: This table shows the longline effort and catch by boats less than and greater than 50 feet in length inside and outside the 50 miles from shore. Albacore continues to be the most commonly caught species inside and outside of the 50 mile areas regardless of boat size.

It is important to note that even though the percentage of fish caught by the boats > 50 feet illegally in the restricted areas is only 1.8% of the fish caught by them legally outside of the restricted areas 50 nm around Tutuila and Swains, that the boats > 50 feet catch almost 40% as much fish as the boats < 50 feet do inside of the restricted areas.

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

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

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

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

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

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

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

Table 5A. American Samoa 2003 longline bycatch percentages for the three sizes of longline vessels

Species	Alias	Monohulls < 50'	Monohulls' > 50 '	All Boats
Skipjack Tuna	0.00 %	68.85 %	28.76 %	28.27 %
Albacore	0.00 %	0.00 %	0.05 %	0.05 %
Yellowfin Tuna	0.00 %	4.90 %	5.61 %	5.21 %
BigeyeTuna	0.00 %	5.27 %	7.95 %	7.69 %
Tunas	0.00 %	100.0 %	4.88 %	7.78 %
TUNAS SUBTOTALS	0.00%	5.56%	4.68%	4.58 %
Mahimahi	0.00 %	31.11 %	45.51 %	37.24 %
Black marlin	0.00 %	0.00 %	90.91 %	90.91 %
Blue marlin	0.00 %	91.14 %	93.83 %	91.59 %
Striped Marlin	0.00 %	66.67 %	72.34 %	71.19 %
Wahoo	0.00 %	24.13 %	11.54 %	11.30 %
Sharks	0.00 %	99.22 %	98.80 %	98.75 %
Swordfish	0.00 %	14.29 %	45.76 %	43.28 %
Sailfish	0.00 %	93.75 %	91.96 %	88.48 %
Spearfish	0.00 %	100.0 %	75.00 %	75.11 %
Moonfish	0.00 %	100.0 %	82.06 %	80.77 %
Oilfish	0.00 %	93.13 %	98.83 %	98.60 %
Pomfret	0.00 %	92.68 %	76.54 %	77.11 %
NON-TUNA PMUS SUBTOTALS	0.00%	73.46%	60.70%	58.52 %
Barracudas	0.00 %	100.0 %	74.53 %	73.74 %
Other Pelagic Fish	0.00 %	88.24 %	99.06 %	98.72 %
OTHER PELAGICS SUBTOTALS	0.00%	90.00%	96.25%	95.83 %
TOTAL PELAGICS	**0.00%**	**13.28%**	**12.61%**	**12.25 %**

Table 5B. American Samoa 2003 Trolling Bycatch

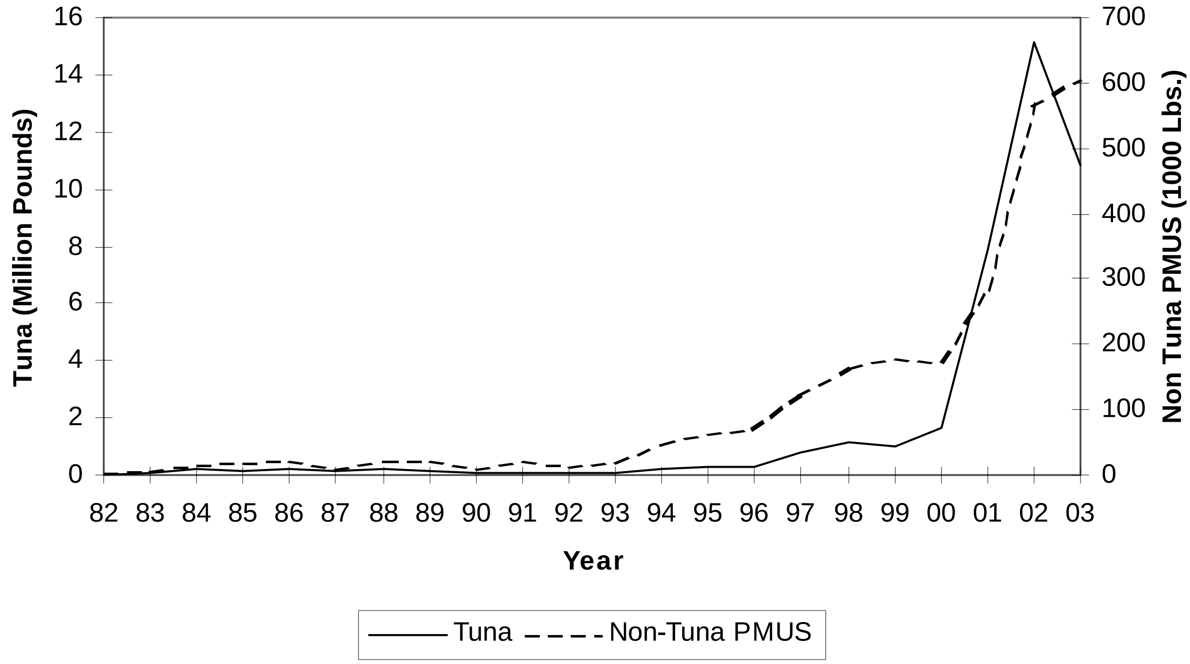
	Bycatch						Interviews		
Species	Alive	Dead Inj	Unk	Total	Catch	%BC	With BC	All	%BC
No Bycatch							0	389	0.00
All Species (Comparison)					3338	0.00			

Interpretation: Table 5A shows longline and trolling bycatch percentages for the three different sizes of longline vessels in 2003. It shows that the fishery is mostly focused on one group of species (there was little bycatch for the tuna). The bycatch is far more important for the large industrial vessels than for the alias, which can sell their incidental catch locally keeping from becoming bycatch. Table 5B shows no bycatch for the trolling method during this period.

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

The Trolling Bycatch table is obtained from creel survey interviews. The Bycatch numbers are obtained by counting fish in the interviews for purely trolling trips with a disposition of bycatch. The catch for all species included for comparison is obtained by counting all species of fish caught by purely trolling interviews and the number of interviews is a count of purely trolling interviews

Figure 1. American Samoa annual estimated total landings of Tuna and Non-Tuna PMUS

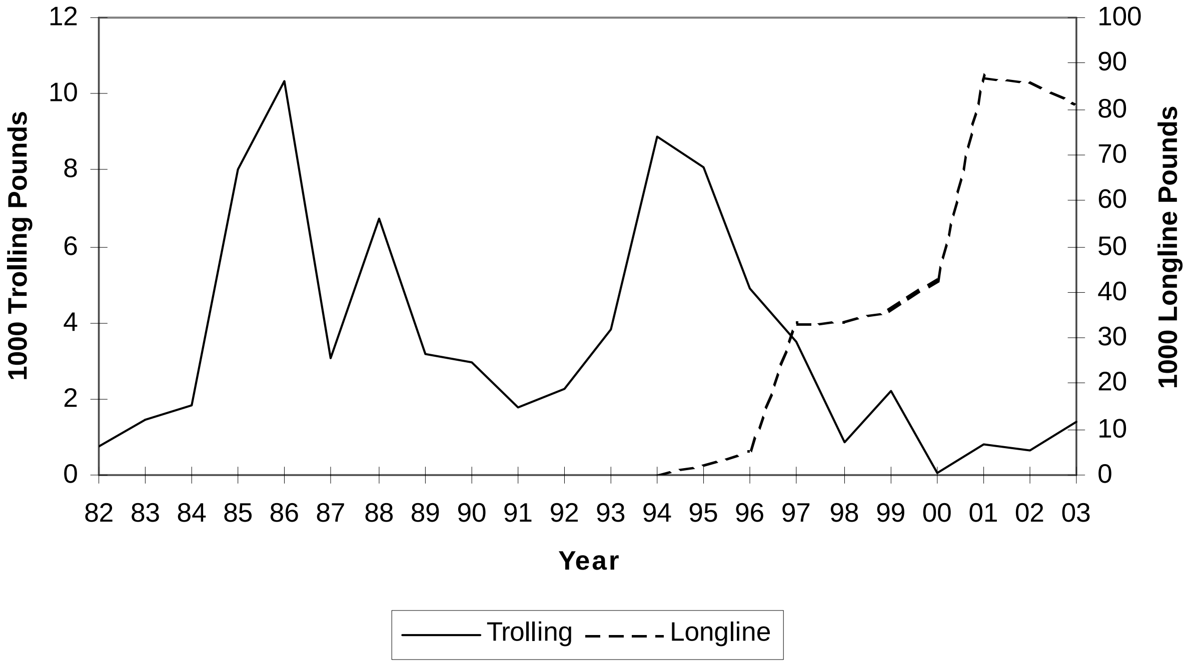


Interpretation: Estimated total landings are variable in the 1980s up to 1993. However there was an increase in the number of total landings from 1993 to the present. This year there has been a 28.7% decrease in the total landings of tuna compared to the 92% increase from 2002. The total landing for other pelagic species also increase about 7% for 2003

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.

	Pounds Landed	
Year	**Tuna**	**Non Tuna PMUS**
1982	23,042	2,106
1983	90,057	4,806
1984	198,961	15,121
1985	107,659	19,686
1986	187,909	23,415
1987	144,121	10,899
1988	207,083	23,462
1989	173,518	20,720
1990	78,827	9,848
1991	71,425	21,100
1992	92,600	11,893
1993	45,806	19,104
1994	187,459	47,418
1995	282,897	61,931
1996	315,320	67,946
1997	791,399	122,687
1998	1,160,079	163,953
1999	1,007,322	179,187
2000	1,668,188	172,252
2001	7,863,783	283,665
2002	15,152,595	566,075
2003	10,803,361	605,532
Average	**1,847,882**	**111,491**
Std. Dev.	**3,926,745**	**166,769**

Figure 2. American Samoa annual estimated total landings of Mahimahi by gear.

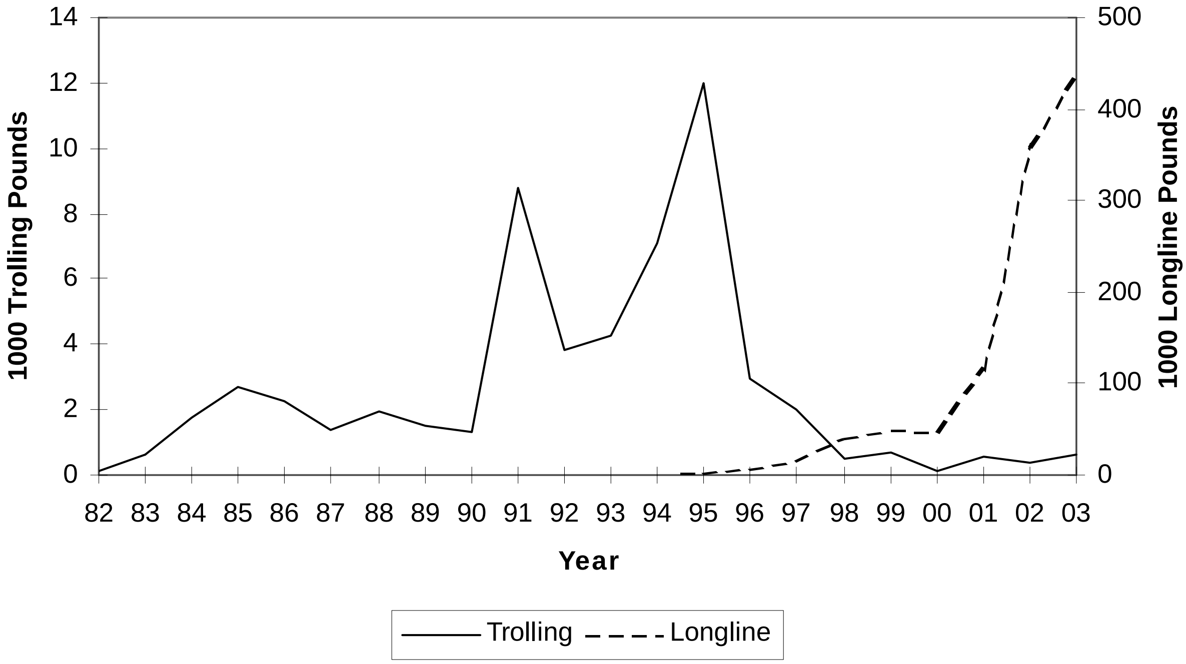


Interpretation: Through the years, Mahimahi landings have been variable. From 1984-1988, American Samoan fishermen exported mahimahi to Hawaii so landings were unusually high and remained stable until 1995. After 8 years of increase in catch by longlining, 2003 is the second consecutive year of decrease (5.7% less since 2002). The number of pounds landed by trolling increased by 115.7 % this year. In 2003, longliners caught 98.3% of the mahimahi and trolling took in only 1.7%

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

	Pounds Landed	
Year	**Longline**	**Trolling**
1982	0	777
1983	0	1,443
1984	0	1,844
1985	0	8,011
1986	0	10,327
1987	0	3,051
1988	0	6,736
1989	0	3,201
1990	0	2,971
1991	74	1,748
1992	0	2,242
1993	215	3,809
1994	98	8,869
1995	2,301	8,052
1996	5,395	4,906
1997	33,031	3,517
1998	33,458	843
1999	35,909	2,193
2000	42,616	66
2001	87,114	786
2002	85,912	654
2003	80,994	1,411
Average	**31,317**	**3,521**
Std. Dev.	**32,969**	**2,931**

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

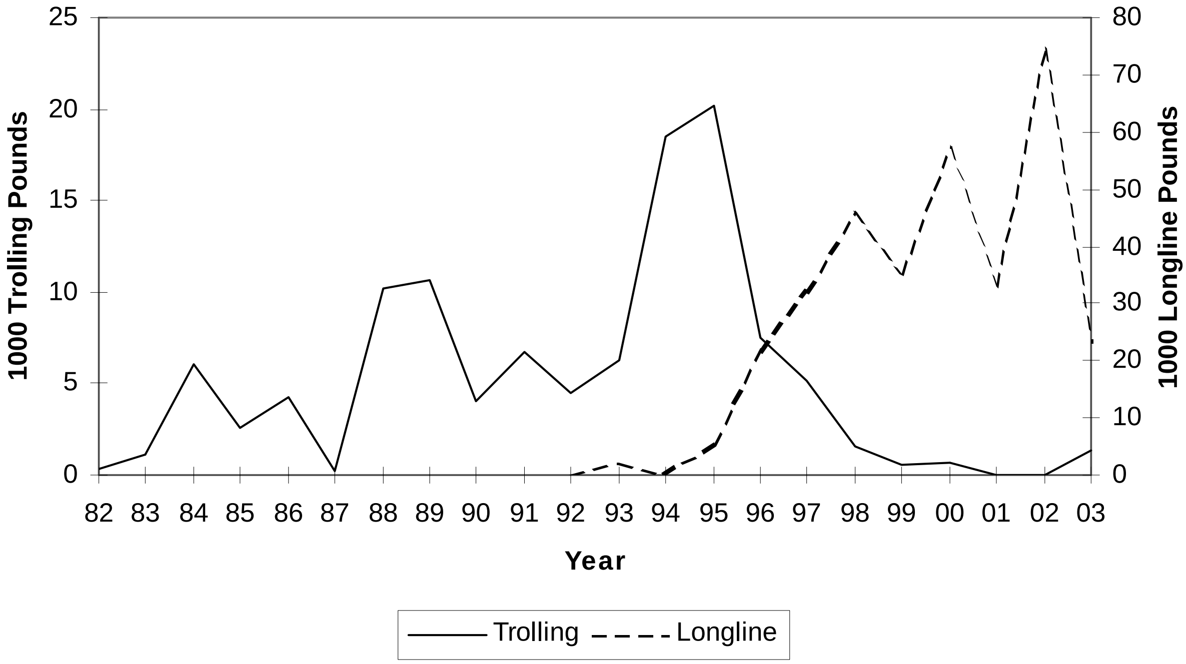


Interpretation: Although there is a decline in the number of trolling activities for wahoo, the number of total landings by longlining have been on an increasing trend since 1995. Longliners took in almost the rest of the landings this year for wahoo, the remaining 0.14 % is accounted for by trollers. The continuous increase in wahoo landings is primarily due to the increase in longline trips and effort. In 2003, we had a 21.3 % increase of catch compared to last year.

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

	Pounds Landed	
Year	**Longline**	**Trolling**
1982	0	114
1983	0	632
1984	0	1,777
1985	0	2,678
1986	0	2,244
1987	0	1,395
1988	84	1,962
1989	0	1,489
1990	0	1,299
1991	369	8,764
1992	0	3,848
1993	557	4,250
1994	0	7,124
1995	1,576	11,986
1996	6,931	2,945
1997	15,620	2,001
1998	40,405	487
1999	48,303	685
2000	47,355	140
2001	114,517	588
2002	358,101	351
2003	434,221	603
Average	**66,752**	**2,607**
Std. Dev.	**128,721**	**2,971**

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

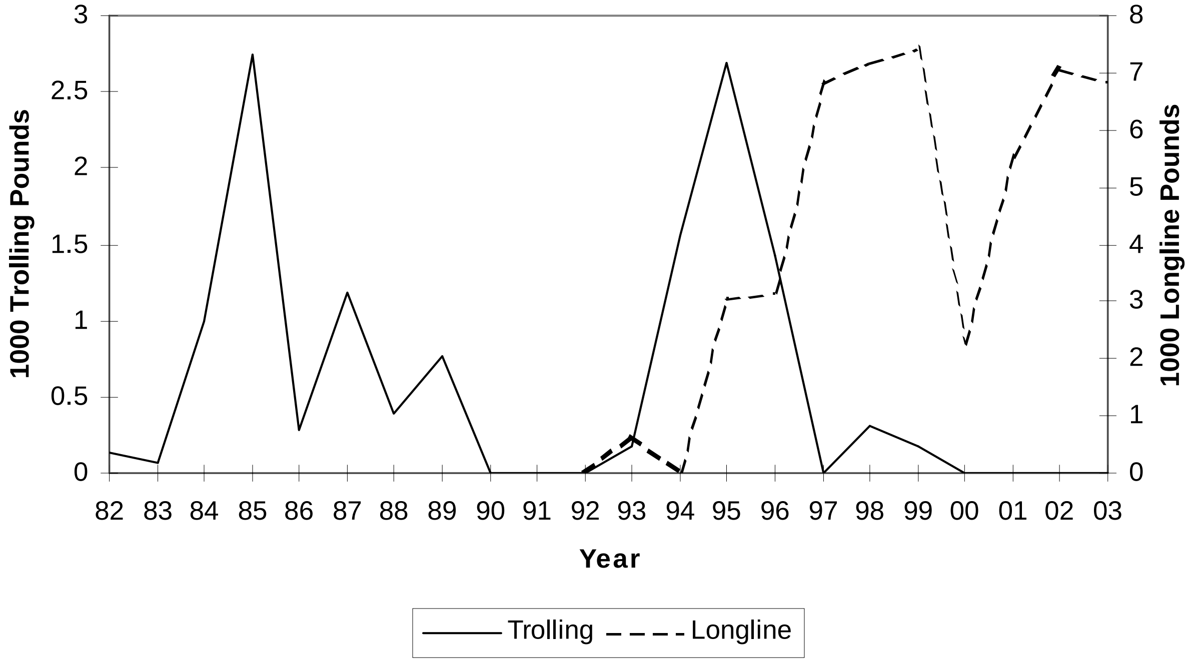


Interpretation: All of the blue marlin landings were caught by trolling method since 1982 until 1994, except in 1993 where blue marlin catches were recorded being caught by four vessels that were engaged in longline activities. A gradual increase in blue marlin landings by longline method since 1995 is primarily due to the influx in the longline fishery by the local fishermen, whereas catches by trolling method began to decline. Unlike 2002, the landings in 2003 included trolling pounds. After the large increase of 126% in 2002, we observed a large decrease of 68.5 % this year. This is the lowest level of catch since 1995. Over the years, the total landings for blue marlin is very erratic and since 1997 has been cyclic with a 2 year cycle.

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

	Pounds Landed	
Year	**Longline**	**Trolling**
1982	0	315
1983	0	1,083
1984	0	6,097
1985	0	2,574
1986	0	4,223
1987	0	265
1988	0	10,217
1989	0	10,680
1990	0	4,012
1991	0	6,726
1992	0	4,524
1993	2,193	6,331
1994	0	18,538
1995	5,267	20,196
1996	21,450	7,547
1997	31,869	5,160
1998	45,440	1,592
1999	34,981	590
2000	57,100	623
2001	32,836	0
2002	74,216	0
2003	23,368	1,294
Average	**29,884**	**5,118**
Std. Dev.	**22,087**	**5,507**

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

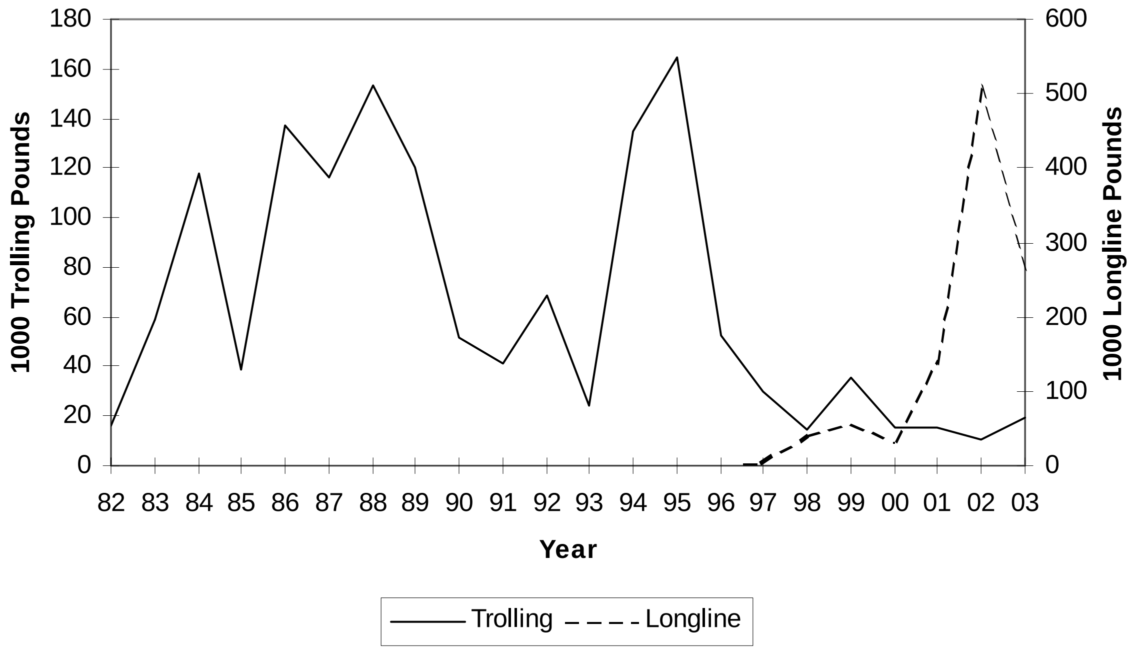


Interpretation: Sailfish landings are variable throughout the years. Initially trolling was the dominant method of fishing however longlining grew to be the popular fishing method. In 1990 to 1992, for unknown reasons, there were no sailfish recorded. Due to the continuous development of the longline fishery in 1995, there was a gradual increase in sailfish landings by longliners until 2000, where there was a 70% decrease. After that sailfish landings increased by 146% in 2001, by 27% in 2002 and by 27% this year.

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

	Pounds Landed	
Year	**Longline**	**Trolling**
1982	0	127
1983	0	74
1984	0	989
1985	0	2,744
1986	0	279
1987	0	1,188
1988	0	394
1989	0	767
1990	0	0
1991	0	0
1992	0	0
1993	626	183
1994	0	1,561
1995	3,048	2,693
1996	3,146	1,420
1997	6,822	0
1998	7,185	314
1999	7,424	184
2000	2,245	0
2001	5,535	0
2002	7,060	0
2003	6,858	0
Average	**4,541**	**587**
Std. Dev.	**2,673**	**827**

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



Interpretation: There was a gradual increase in skipjack landings for longlining since 1995, except for a 43% decrease in 2000, and a notable decrease of 49.4% this year after a huge increase of 318% in 2002.

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

Trolling has declined since 1995 as a result of an increase in longline activities, except in 1999 when skipjack landings increased by 137%. This reflects the increase in number of boats that were involved in trolling activities before obtaining their longline permit to begin longlining.

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

	Pounds Landed	
Year	**Longline**	**Trolling**
1982	0	15,877
1983	0	58,997
1984	0	117,693
1985	0	38,902
1986	0	137,180
1987	0	116,505
1988	0	153,671
1989	0	120,171
1990	0	51,650
1991	345	40,992
1992	0	68,977
1993	539	24,264
1994	101	134,955
1995	160	164,957
1996	434	52,562
1997	2,517	29,894
1998	40,596	14,822
1999	56,171	35,171
2000	31,871	15,477
2001	137,947	15,169
2002	509,426	10,803
2003	257,676	19,374
Average	**79,829**	**65,367**
Std. Dev.	**143,560**	**50,784**

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

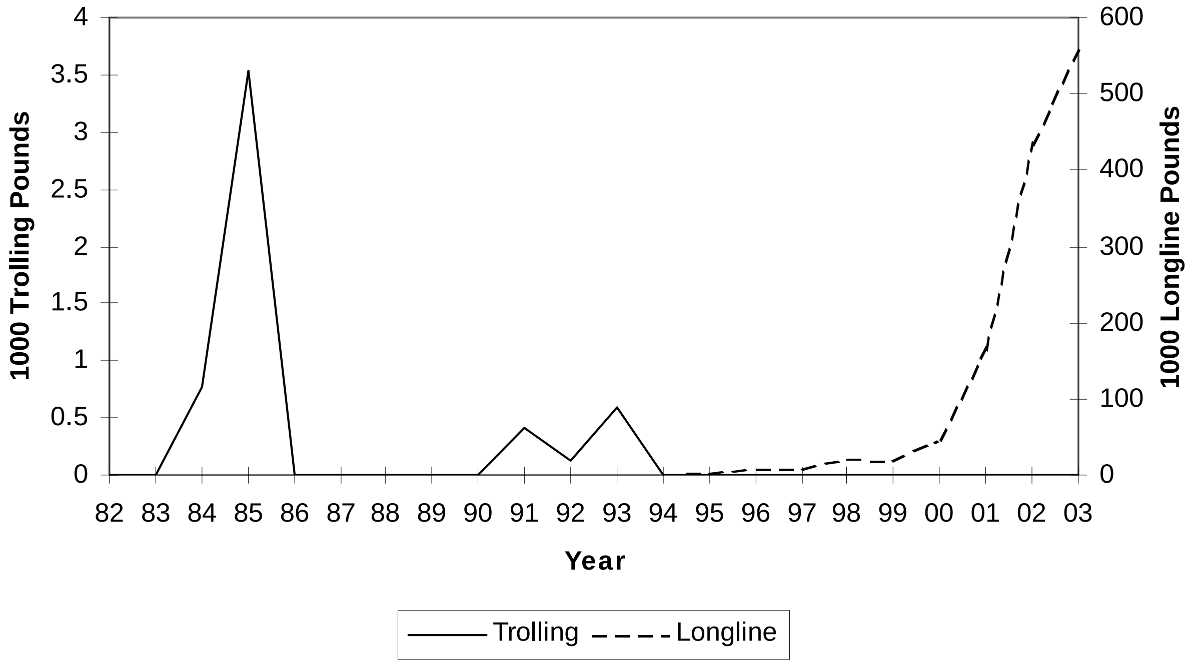
Interpretation: Trolling activities yielded all of the Yellowfin tuna landings in the 1980s until 1987 and the number of landings were variable until 1995 when trolling activities began to decline. With the increase in longline fishery in 1995, yellowfin landings began a rapid increase that escalated until 2002.

In 2003 the landings for longlining increased only by 6.5%, while landings for trolling decreased by 41.4%, but these erratic variations have happened often in the past.

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

	Pounds Landed	
Year	**Longline**	**Trolling**
1982	0	7,038
1983	0	19,789
1984	0	58,704
1985	0	38,586
1986	0	50,622
1987	0	27,467
1988	1,775	48,316
1989	129	52,350
1990	0	24,152
1991	262	27,525
1992	0	23,247
1993	2,225	16,990
1994	1,637	48,548
1995	4,022	52,428
1996	25,655	36,551
1997	47,996	21,219
1998	92,462	6,763
1999	140,061	11,566
2000	188,949	4,829
2001	413,986	5,573
2002	1,068,969	11,781
2003	1,138,397	6,909
Average	**195,408**	**27,316**
Std. Dev.	**359,334**	**17,626**

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

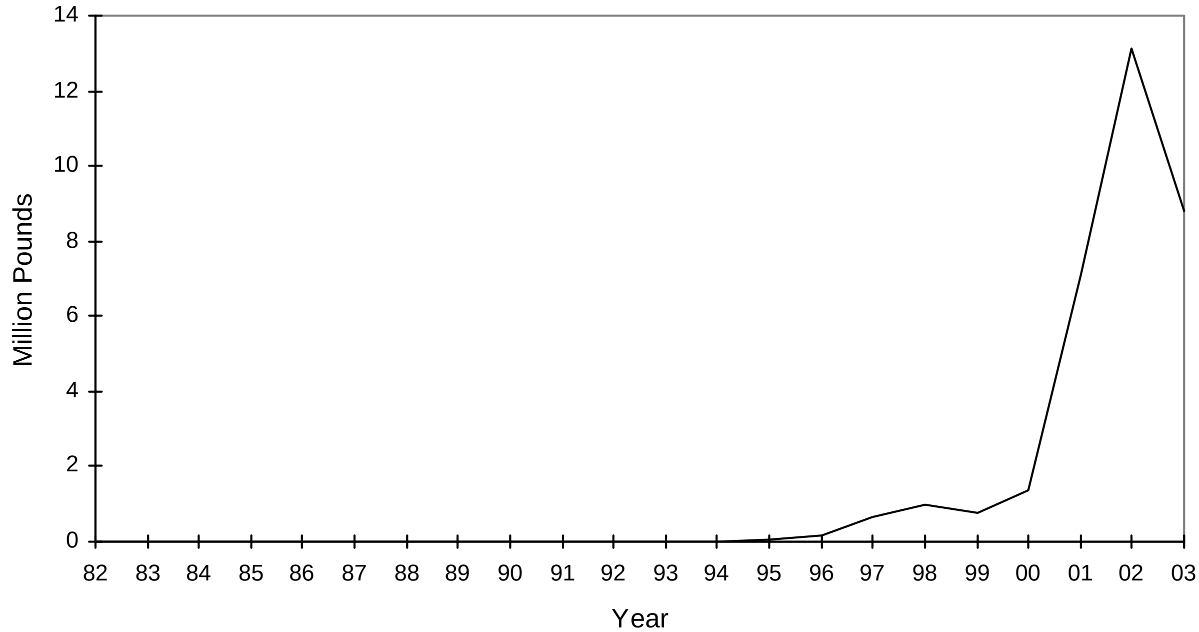


Interpretation: Before the Longline Fishery began, Bigeye tuna was sometimes caught by trolling. In 1985 there was a high peak of 3,527 pounds of Bigeye, however from 1995 to the present, there has been a steady increase in the number of total landings by longline fishermen. All 100% of the total landings of Bigeye caught from 1995 to 2003 was by longlining. This year, there is a significant increase of Bigeye landings by 29%.

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

	Pounds Landed	
Year	**Longline**	**Trolling**
1982	0	0
1983	0	0
1984	0	769
1985	0	3,527
1986	0	0
1987	0	0
1988	0	0
1989	0	0
1990	0	0
1991	18	417
1992	0	126
1993	79	604
1994	0	0
1995	2,191	0
1996	8,653	0
1997	8,355	0
1998	22,287	0
1999	19,254	0
2000	46,873	0
2001	165,420	0
2002	432,367	0
2003	557,557	0
Average	**97,158**	**247**
Std. Dev.	**176,651**	**746**

Figure 9. American Samoa annual estimated total landings of Albacore by longlining.

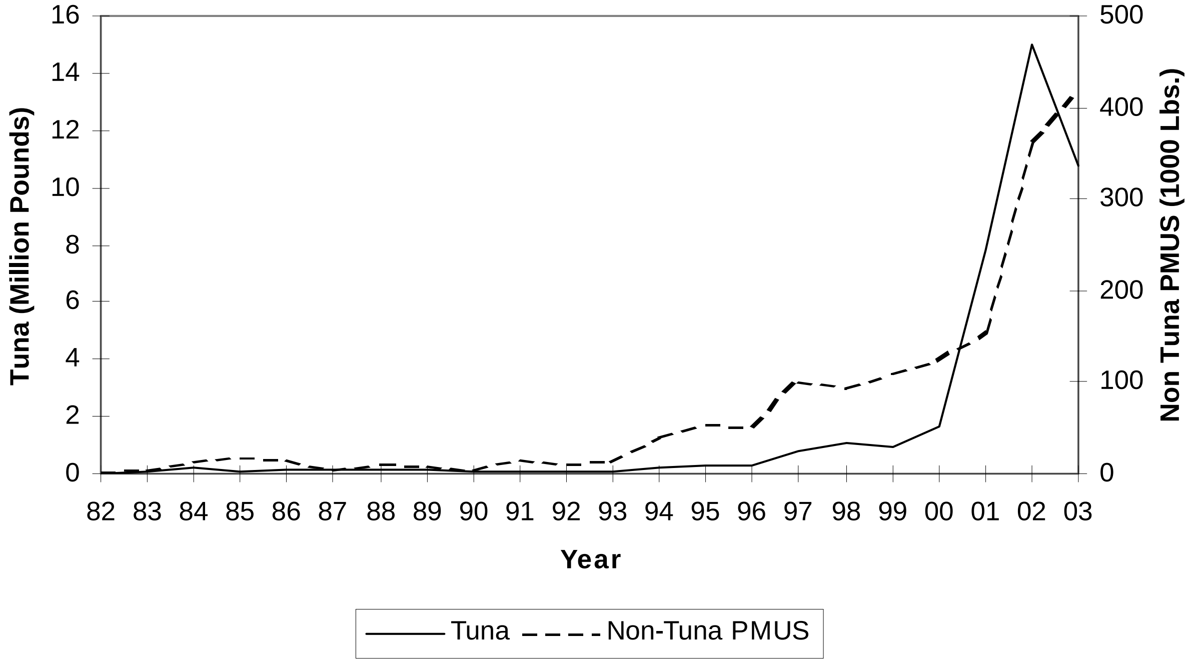


Interpretation: Since the Longline Fishery initially began, it has been the most commonly used method of fishing for pelagic species. Till this year, there has been a continuous increase since 1995 in the number of estimated albacore landings with exception of the landings in 1999 where there was a 24% decrease. Compared to the estimated number of landings in 2002, there has been a 32.8% decrease of albacore landings in 2003. In addition to being the dominant pelagic species caught in the fishery, 100% of the albacore landings in 2003 were caught by longlining and none by trolling (See Table 1).

Calculation: The estimated total annual landings of albacore tuna is listed for the longline and trolling fishing methods. The All methods landings may be greater than the sum of longline and trolling landings when albacore are caught by other methods. The average and standard deviation is calculated from 1988 onward.

Year	Pounds
1982	0
1983	0
1984	0
1985	0
1986	0
1987	0
1988	1,875
1989	244
1990	0
1991	1,730
1992	0
1993	35
1994	1,572
1995	58,446
1996	189,210
1997	680,806
1998	983,017
1999	744,980
2000	1,380,060
2001	7,125,536
2002	13,118,759
2003	8,821,199
Average	**2,069,217**
Std. Dev.	**3,841,474**

Figure 10. American Samoa annual commercial landings of Tunas and Non Tuna PMUS.



Interpretation: Commercial landings for all pelagic species and tuna significantly varied throughout the 1980s until 1995 where a steady increase in landings began to appear. This was primarily due to a surge in longline effort. However, for unknown reasons, there was a 5% decrease in 1998 for other pelagic species. After a dramatic increase of 349% in commercial landings for tuna and a 135% increase of other pelagic species last year, we record a significant decrease of 28.3% in tuna and an increase of 14.4% of non-tuna PMUS.

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.

	Pounds Landed	
Year	**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	167,791	14,995
1987	132,316	4,843
1988	172,788	12,110
1989	114,671	8,240
1990	55,420	3,564
1991	57,474	15,236
1992	88,953	10,698
1993	43,525	14,053
1994	186,199	40,708
1995	276,332	53,127
1996	309,147	50,781
1997	789,260	100,024
1998	1,114,702	94,933
1999	949,355	109,960
2000	1,630,410	122,511
2001	7,795,730	154,409
2002	14,978,767	363,014
2003	10,740,154	415,181
Average	**1,818,464**	**73,878**
Std. Dev.	**3,893,646**	**109,259**

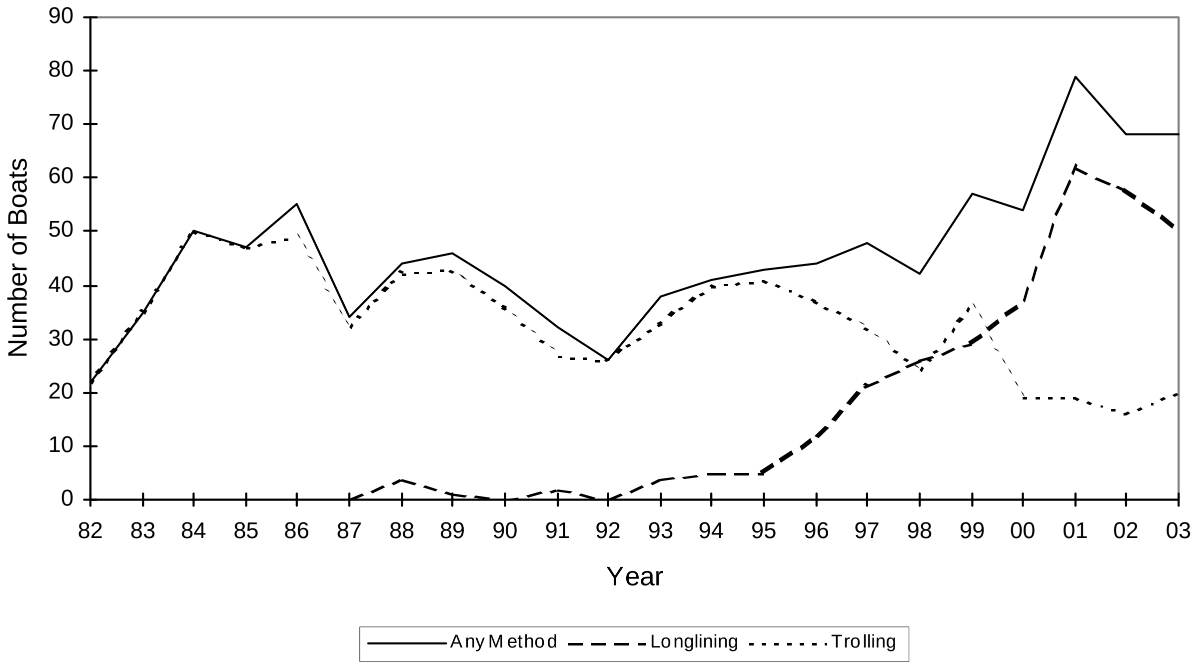
Figure 11. Number of American Samoa boats landing any pelagic species, tunas and non-tuna PMUS.

Interpretation: Since 1982, the number of boats that landed any pelagic species, tuna and Non-Tuna PMUS varied. However in 2001, there was a dramatic increase in the number of boats landing pelagic fish in American Samoa. This is the highest number of boats ever recorded participating in the pelagic fishery since 1982. This year, and for the second consecutive year, there has been a decrease in the number of boats landing fish, probably due to the decrease in the prices at the canneries and the difficulty of exporting fresh fish from American Samoa.

	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	68	67	65
Average	**46**	**44**	**36**
Std. Dev	**13**	**14**	**15**

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

Figure 12. Number of American Samoa boats landing any pelagic species by longlining, trolling and all Methods.

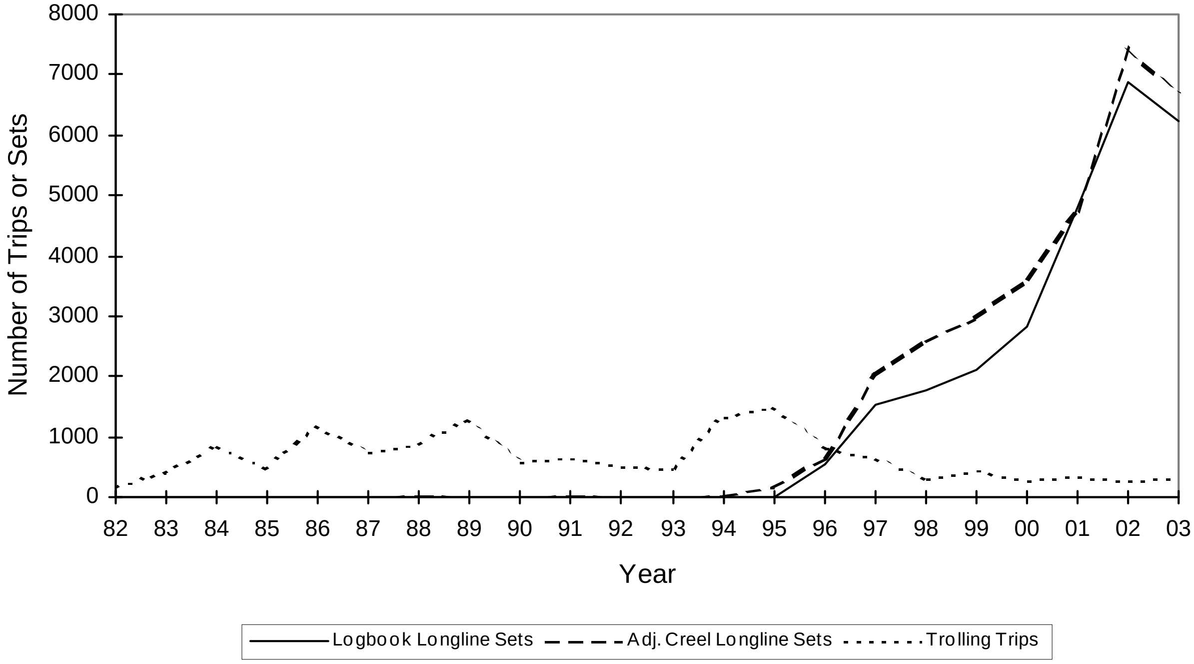


Interpretation: Since the longline fishery was introduced, there has been a continuous increase in the number of boats using this kind of fishing method till 2001. For the last 2 years, a decrease in the number of boats longlining shows a shift in the fishery. More large vessels that make multiple day trips with a large number of hooks are replacing small alias that make daily trips and set less hooks. Conversely, the number of boats fishing commercially by trolling have steadily decreased from 38 in 1994 to only 9 in 2003 due to the development of the longline fishery.

	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	68	50	20
Average	**46**	**20**	**33**
Std. Dev.	**13**	**21**	**10**

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

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



Interpretation: Trolling trips varied from 1982 until 1997 when the number of boats decreased to a stable level of around 300 trips a year. Since 1996 and the establishment of the longline logbook system, the longline sets increased continuously until 2002. A first change occurred in the fishery during the first 3 years of this period, with a majority of the boats switching from trolling to longlining. Then the big vessels started to enter the fishery and represent a more and more important part of the sets deployed. This year is the first year that the number of sets have decreased (9.5%), while the total number of hooks still are increasing. This reflects the second change in the fishery, showing that the Alia fleet has became a minor part of the fishery.

		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	1,208	0	0
1987	752	0	0
1988	875	0	31
1989	1,277	0	3
1990	587	0	0
1991	634	0	21
1992	506	0	0
1993	464	0	17
1994	1,330	0	19
1995	1,504	0	184
1996	834	528	650
1997	645	1,529	2,009
1998	316	1,754	2,582
1999	428	2,108	2,978
2000	285	2,814	3,598
2001	331	4,800	4,722
2002	289	6,872	7,428
2003	307	6,220	6,662
Average	**658**	**3,328**	**3,829**
Std. Dev.	**372**	**2,191**	**2,166**

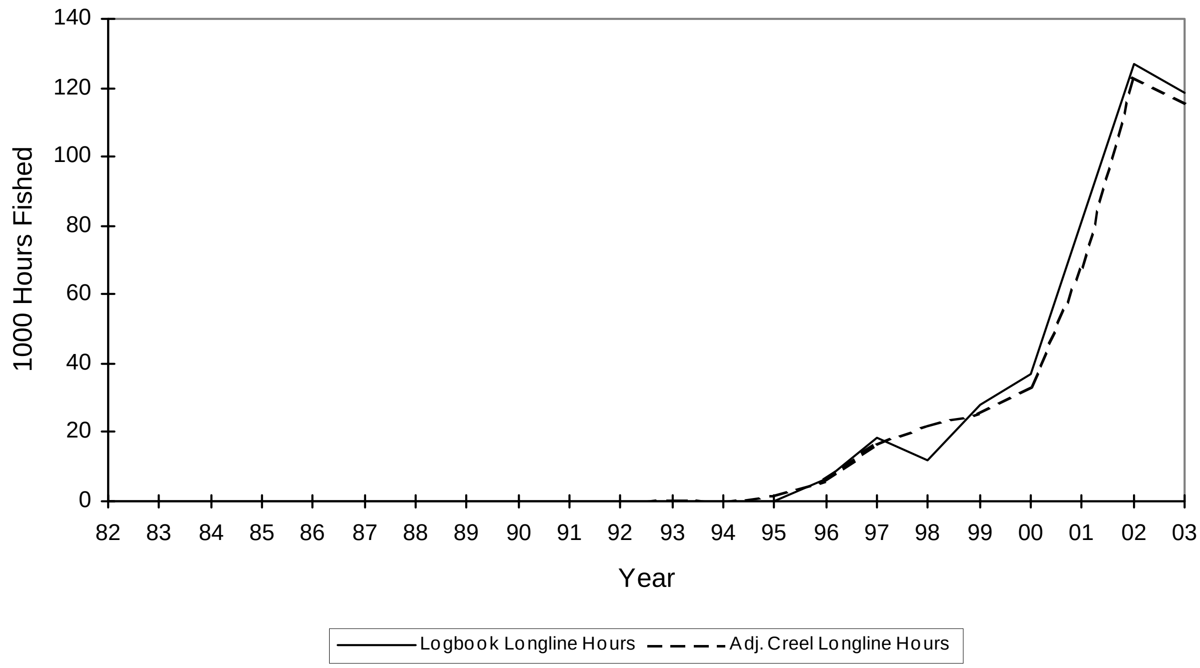
The number of longline sets reported in the Adjusted Creel Survey has always been more than that reported in the Longline Logbook System due to delinquency in turning in longline logs primarily by alias. The delinquency problem was almost eliminated in 2001 resulting in the logbook number of sets actually being more than those reported in the Adjusted Creel Survey Data.

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



Interpretation: The combination of longline hours from Longline Logbooks and the Longline Creel Survey significantly shows a continuous increase in hours fished every year since the Longline Fishery was initially introduced, until 2002. This year, according to the longline creel survey, there was a 6.8% decrease in the number of hours spent fishing and according to the Logbook monitoring system, this decrease was 5.9%. This indicates that there is a decrease in the amount of effort put into the fishery.

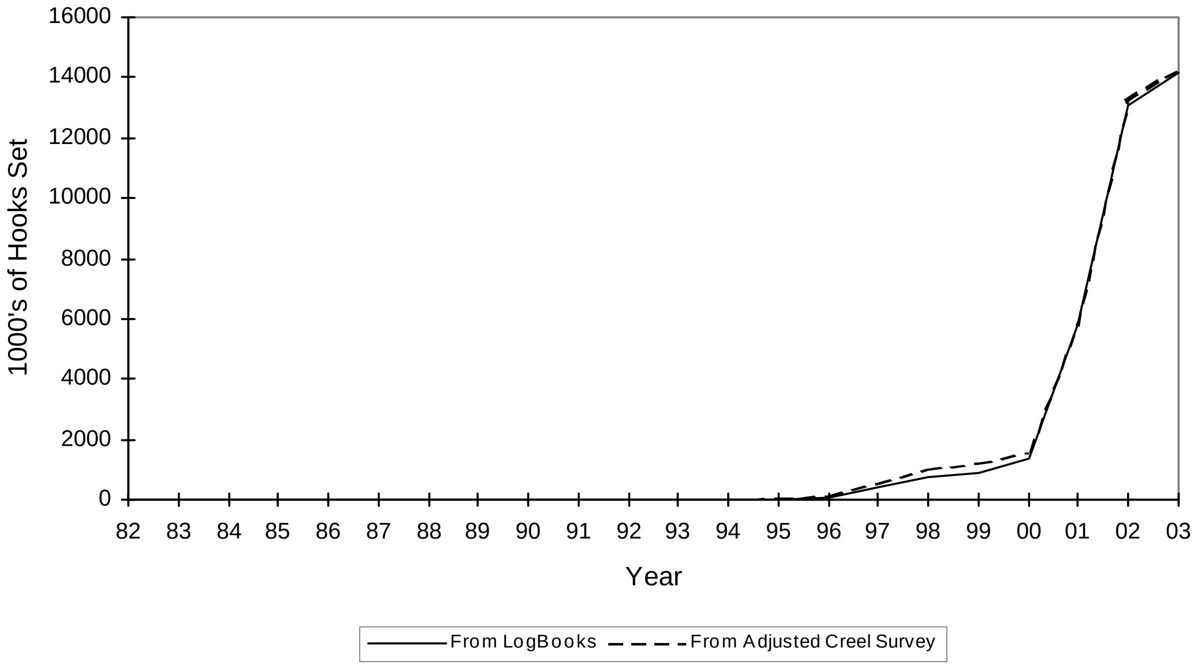
The hours fished reported by the Longline Logbook system in the early years before the large boats dominated the fishery is usually larger than that reported by the adjusted Creel Survey System because the logbook hours are calculated from actual beginning of set times and end of haul times while many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

	Hours Fished	
Year	Longline Logbook	Longline Creel (Adj.)
1982	0	0
1983	0	0
1984	0	0
1985	0	0
1986	0	0
1987	0	0
1988	0	198
1989	0	17
1990	0	0
1991	0	164
1992	0	0
1993	0	299
1994	0	156
1995	0	1,824
1996	6,403	5,877
1997	18,760	16,754
1998	11,981	21,953
1999	27,773	25,865
2000	36,973	33,288
2001	81,264	67,707
2002	127,023	123,088
2003	118,417	115,820
Average	**53,574**	**51,294**
Std. Dev.	**45,380**	**42,829**

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.

Figure 15. Thousands of American Samoa longline hooks set from logbook and creel survey data.



Interpretation: Since the Longline Fishery began in 1995, the number hooks set has been increasing at a steady rate and became an explosion in 2000 with 10 times increase by 2002. This year, according to the Logbook data, the number of hooks increased by 8.2% and according to the creel survey by 7.9%. This continuous increase reveals the constant growth in the proportion of large vessels in the fishery.

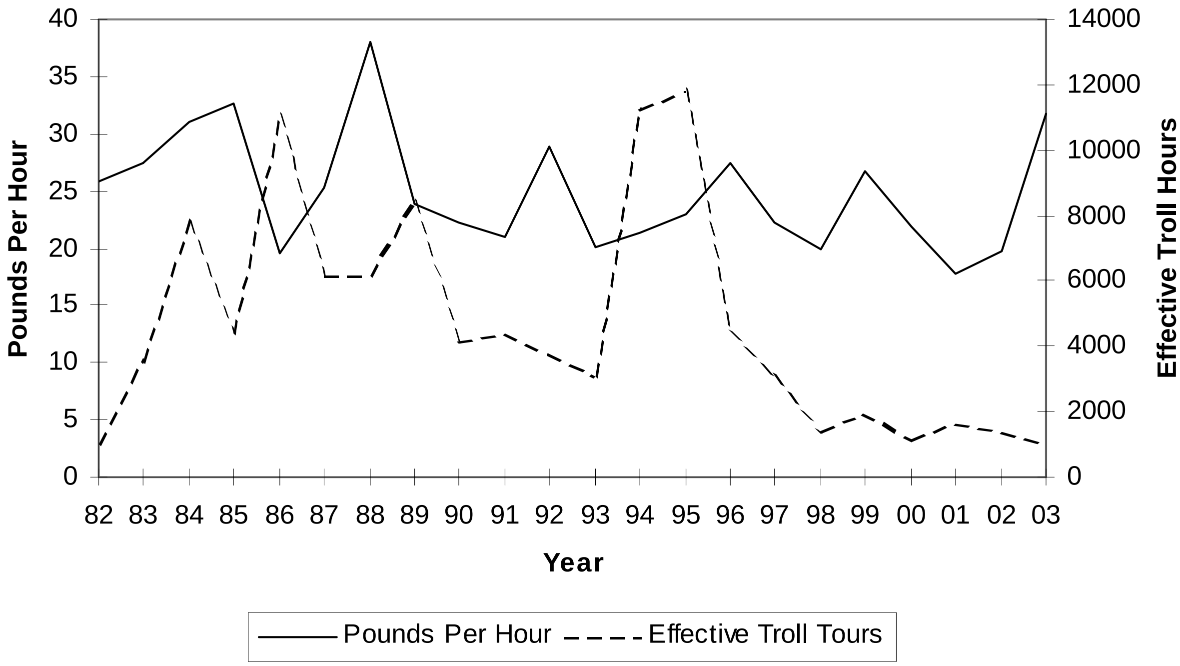
Calculation: The number of longline hooks using logbook data is obtained by summing the number of hooks for sets entered in the longline logbook system for the given year for interviewed and non-interviewed boats and dividing by 1000.

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

	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	420	512
1998	771	1,042
1999	914	1,229
2000	1,332	1,567
2001	5,794	5,806
2002	13,099	13,241
2003	14,168	14,292
Average	**4,575**	**4,731**
Std. Dev.	**5,498**	**5,473**

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.

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



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

The decline in trolling hours in 1996 was mainly due to the popularity of the longline fishery since it was introduced. However, 1999 was an exceptional year because of the number of new boats that entered the pelagic fishery and were involved in trolling before obtaining their longline permits. This year, the hours spent in trolling are the lowest since 1982, but at the same time the number of boats has increased by 25 % from last year. The result is that we have the lowest average hours spent on trolling since 1982 with only 51.75 hours per boat. Compared to last year, the CPUE has increased by 6%. The explanation may be in the fact that fishermen go to fish only when the conditions are very good, as trolling seems to be a less professional activity then before.

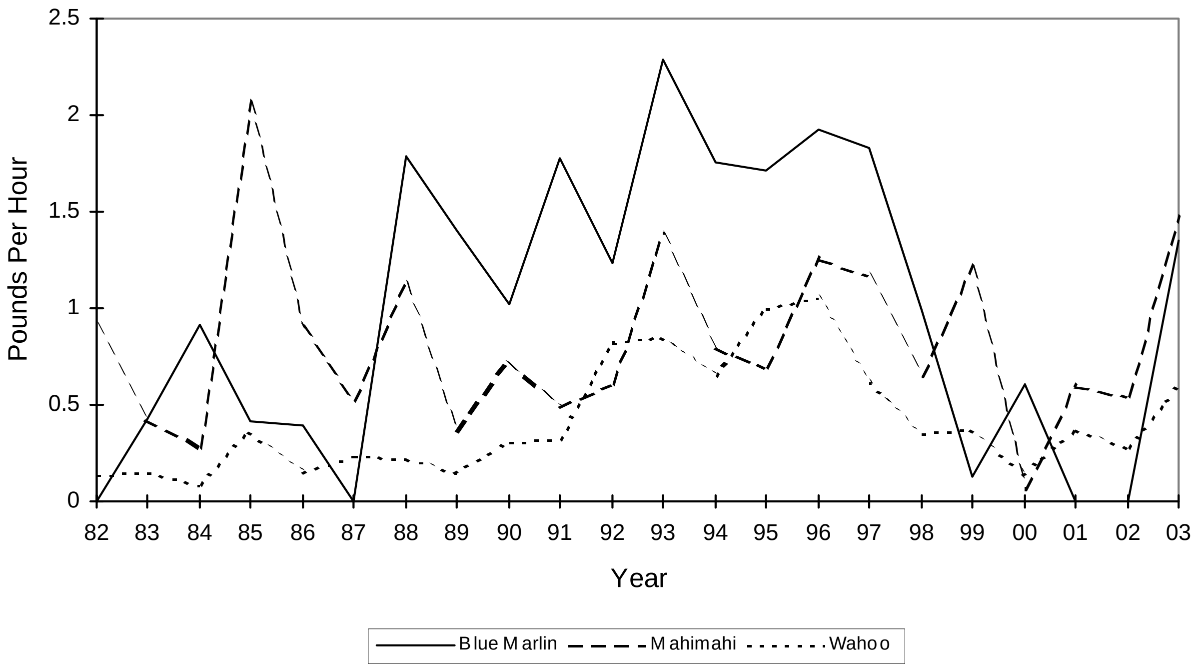
Calculation: For purely trolling trips where the number of hours was recorded, the total catch was divided by the total number of trolling hours to obtain CPUE.

The number of effective Trolling Trip_Hours is

Year	CPUE	Hours
1982	25.91	1,019
1983	27.41	3,513
1984	30.97	7,785
1985	32.59	4,394
1986	19.49	11,030
1987	25.34	6,182
1988	38.01	6,126
1989	23.87	8,425
1990	22.16	4,136
1991	20.93	4,407
1992	28.90	3,748
1993	20.17	3,065
1994	21.37	11,211
1995	23.01	11,781
1996	27.36	4,365
1997	22.29	3,089
1998	19.93	1,405
1999	26.81	1,977
2000	21.94	1,122
2001	17.72	1,661
2002	19.79	1,359
2003	31.78	1,035
Average	**24.90**	**4,674**
Std. Dev.	**5.04**	**3,350**

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

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



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

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

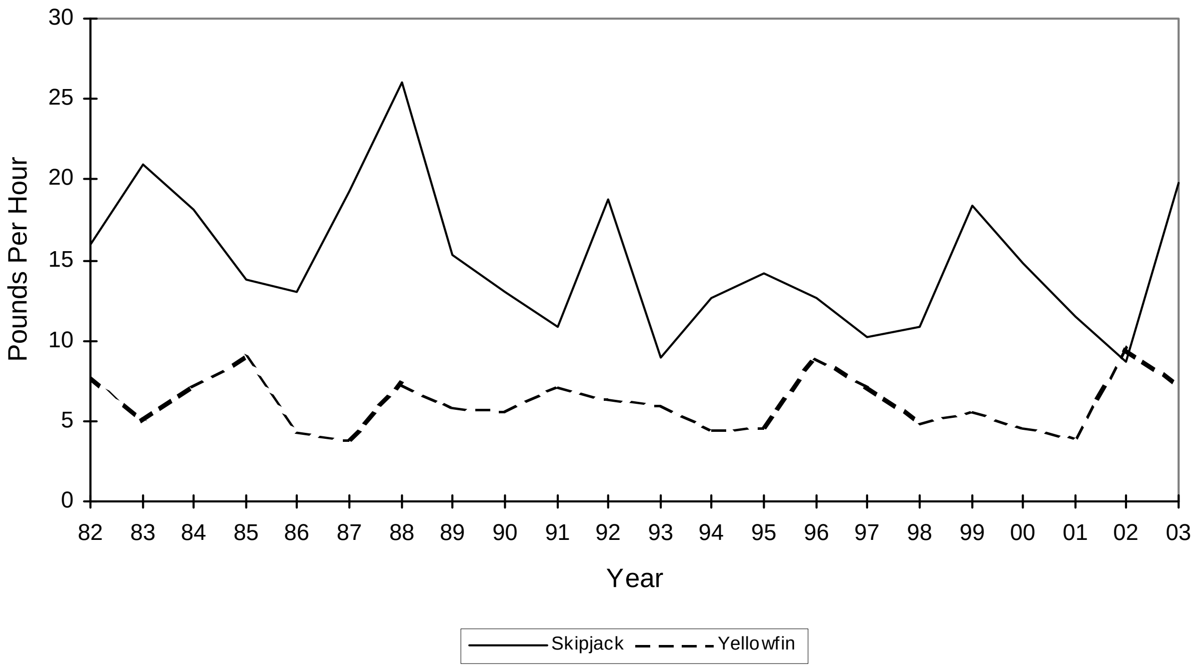
Since 1996 wahoo catch rates have dropped similar to blue marlin rates. This may be related to the increase in longline activity around the island. This year Wahoo CPUE has indeed increased by 107%.

	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	1.02	0.72	0.31
1991	1.78	0.49	0.32
1992	1.23	0.61	0.82
1993	2.29	1.38	0.85
1994	1.76	0.80	0.65
1995	1.71	0.69	1.00
1996	1.93	1.26	1.05
1997	1.83	1.17	0.62
1998	0.99	0.65	0.35
1999	0.13	1.21	0.37
2000	0.61	0.06	0.14
2001	0.00	0.60	0.37
2002	0.00	0.54	0.28
2003	1.35	1.47	0.58
Average	**1.00**	**0.83**	**0.42**
Std. Dev.	**0.73**	**0.45**	**0.29**

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

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

Figure 18. American Samoa trolling catch rates for Skipjack and Yellowfin Tuna

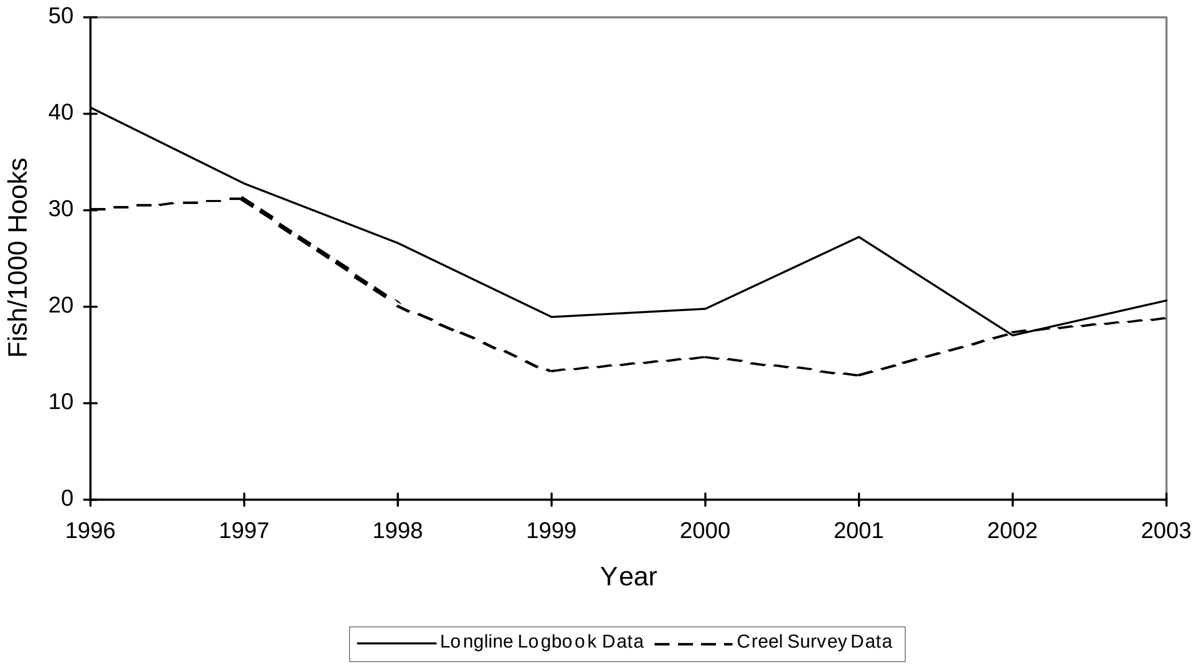


Interpretation: The values for Skipjack and Yellowfin CPUE has been variable through the years. During 1999, a couple of boats did some extensive trolling before obtaining their longline permits to longline. This however was a contributing factor to the increase in the number of trolling activity at this time. CPUE for Skipjack increased by 128% this year from 2002 whereas the CPUE for Yellowfin experienced a 25% decrease this year.

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	13.00	4.35
1987	19.30	3.88
1988	26.00	7.30
1989	15.30	5.91
1990	13.00	5.59
1991	10.80	7.16
1992	18.80	6.34
1993	8.94	6.03
1994	12.70	4.50
1995	14.20	4.56
1996	12.70	8.99
1997	10.20	7.21
1998	10.80	4.89
1999	18.40	5.62
2000	14.80	4.64
2001	11.50	4.01
2002	8.67	9.49
2003	19.80	7.10
Average	**14.90**	**6.21**
Std. Dev.	**4.28**	**1.64**

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



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

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

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

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

Table 6A. American Samoa 1996-1999 catch per 1000 hooks by species for the alia longline fishery comparing logbook and creel survey Data

	Number of Fish Per 1000 Hooks							
	1996		1997		1998		1999	
Species	Log	Creel	Log	Creel	Log	Creel	Log	Creel
Skipjack Tuna	0.06	0.29	1.15	0.60	3.71	4.01	4.97	4.77
Albacore	40.60	30.26	32.77	31.20	26.61	20.23	18.83	13.44
Yellowfin Tuna	6.50	4.32	2.73	2.48	2.18	2.27	6.73	4.49
BigeyeTuna	1.33	1.06	0.30	0.14	0.27	0.11	0.68	0.20
Tunas					0.01			
Mahimahi	2.29	1.31	2.24	2.84	1.70	1.83	2.24	1.76
Black marlin			0.09	0.02			0.18	0.03
Blue marlin	0.93	0.90	0.65	0.61	0.55	0.49	0.50	0.38
Striped Marlin			0.02		0.03		0.02	
Wahoo	0.83	0.52	0.90	0.85	2.20	2.03	2.03	1.57
Sharks	0.28	0.37	0.12	0.17	0.12	0.08	0.06	0.03
Swordfish	0.03	0.01	0.06	0.01	0.03	0.02	0.03	0.01
Sailfish	0.18	0.23	0.17	0.21	0.05	0.14	0.01	0.13
Spearfish					0.03			0.01
Moonfish			0.10	0.15	0.07	0.07	0.07	0.13
Oilfish					0.01	0.04	0.01	0.01
Pomfret							0.01	
Barracudas		0.57		0.87		0.42		0.19
Rainbow runner				0.01		0.01		0.02
Dogtooth tuna						0.00		
Other Pelagic Fish					0.22	0.01	0.25	

Table 6B. American Samoa 2000-2003 catch per 1000 hooks by species for the alia longline fishery, comparing logbook and creel survey data.

	Number of Fish Per 1000 Hooks							
	2000		2001		2002		2003	
Species	**Log**	**Creel**	**Log**	**Creel**	**Log**	**Creel**	**Log**	**Creel**
Skipjack Tuna	2.02	1.95	3.01	3.35	5.94	5.44	7.31	3.92
Albacore	19.75	14.81	27.23	12.94	17.08	17.55	20.55	18.93
Yellowfin Tuna	6.22	3.25	3.27	4.19	7.04	10.65	8.25	6.98
BigeyeTuna	0.40	0.22	0.61	0.35	0.58	0.48	1.17	0.46
Tunas							0.02	
Mahimahi	1.71	1.76	3.35	4.46	3.99	2.97	4.47	3.16
Black marlin	0.11		0.07	0.03		0.07		0.13
Blue marlin	0.46	0.47	0.38	0.26	0.23	0.35	0.26	0.13
Striped Marlin	0.06		0.03		0.05		0.02	
Wahoo	1.15	0.90	1.43	1.44	2.64	2.37	2.99	2.63
Sharks	0.01	0.04	0.01	0.02	0.01	0.02	0.03	0.01
Swordfish	0.02		0.10	0.02	0.11	0.02	0.08	0.09
Sailfish	0.03	0.06	0.04	0.13	0.05	0.17	0.08	0.19
Spearfish	0.01				0.02			
Moonfish	0.07	0.20	0.10	0.07	0.08	0.05	0.10	0.11
Oilfish			0.03	0.10	0.02		0.04	0.04
Pomfret	0.02	0.04	0.02		0.02	0.11		
Barracudas		0.30	0.02	0.14		0.26	0.02	0.47
Rainbow runner						0.03		
Dogtooth tuna				0.02		0.02		
Other Pelagic Fish			0.03				0.03	

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

	2000		2001		
	Alias	**Mono-**	**Alias**	**Monohull**	
Species		**hull**		**< 50'**	**> 50'**
Skipjack Tuna	2.02	1.70	3.11	1.74	2.21
Albacore	19.79	28.08	27.26	28.34	33.83
Yellowfin Tuna	6.23	3.07	3.31	1.39	1.41
BigeyeTuna	0.40	0.97	0.63	0.47	1.04
TUNAS SUBTOTALS	28.44	33.82	34.31	31.94	38.49
Mahimahi	1.71	0.36	3.36	0.60	0.50
Black marlin	0.11	0.10	0.07	0.00	0.02
Blue marlin	0.47	0.23	0.39	0.42	0.21
Striped Marlin	0.06	0.32	0.03	0.02	0.08
Wahoo	1.15	1.06	1.45	0.42	0.67
Sharks	0.01	0.70	0.04	1.18	0.63
Swordfish	0.02	0.01	0.10	0.04	0.03
Sailfish	0.03	0.04	0.05	0.02	0.03
Spearfish	0.01	0.09	0.00	0.02	0.04
Moonfish	0.07	0.15	0.10	0.10	0.08
Oilfish	0.00	0.12	0.03	0.14	0.22
Pomfret	0.02	0.12	0.02	0.07	0.09
NON-TUNA PMUS SUBTOTALS	3.66	3.31	5.64	3.03	2.60
Barracudas	0.00	0.00	0.02	0.01	0.03
Rainbow runner	0.00	0.00	0.00	0.00	0.00
Other Pelagic Fish	0.00	0.00	0.03	0.00	0.05
OTHER PELAGICS SUBTOTALS	0.00	0.00	0.05	0.01	0.07
TOTAL PELAGICS	**32.11**	**37.13**	**40.00**	**34.98**	**41.17**

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

	2002			2003		
	Alias	**Monohull**		**Alias**	**Monohull**	
Species		**< 50'**	**> 50'**		**< 50'**	**> 50'**
Skipjack Tuna	5.94	2.13	5.11	7.31	1.38	2.92
Albacore	17.08	23.18	25.97	20.55	15.51	16.37
Yellowfin Tuna	7.04	0.99	1.32	8.25	1.67	2.05
BigeyeTuna	0.58	0.44	0.95	1.17	1.15	1.14
Tunas	0.00	0.02	0.00	0.02	0.01	0.01
TUNAS SUBTOTALS	30.64	26.76	33.35	37.30	19.71	22.48
Mahimahi	3.99	0.91	0.56	4.47	0.16	0.38
Blue marlin	0.23	0.21	0.29	0.26	0.14	0.20
Striped Marlin	0.05	0.00	0.03	0.02	0.02	0.02
Wahoo	2.64	1.04	1.01	2.99	0.65	1.12
Sharks	0.02	1.31	0.79	0.03	1.11	0.77
Swordfish	0.11	0.05	0.04	0.08	0.01	0.03
Sailfish	0.05	0.01	0.03	0.08	0.03	0.04
Spearfish	0.02	0.02	0.02	0.00	0.00	0.03
Moonfish	0.08	0.07	0.07	0.10	0.07	0.07
Oilfish	0.02	0.26	0.52	0.04	0.23	0.54
Pomfret	0.02	0.03	0.09	0.00	0.07	0.08
NON-TUNA PMUS SUBTOTALS	7.23	3.90	3.45	8.06	2.48	3.28
Barracudas	0.00	0.00	0.09	0.02	0.01	0.03
Other Pelagic Fish	0.00	0.05	0.27	0.03	0.03	0.21
OTHER PELAGICS SUBTOTALS	0.01	0.06	0.36	0.05	0.03	0.24
TOTAL PELAGICS	**37.88**	**30.72**	**37.17**	**45.42**	**22.23**	**26.00**

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

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

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

	Creel Survey Annual Average Pounds per Fish							
Species	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
Skipjack Tuna	9.6	8.4	12.5	9.7	11.6	14.8	11.1	8.6
Albacore	39.9	44.0	45.7	42.6	45.1	44.8	45.5	38.6
Yellowfin Tuna	37.9	44.2	45.9	33.1	38.1	31.3	28.0	17.8
BigeyeTuna	52.3	82.8	79.2	57.1	61.1	69.2	67.6	37.2
Tunas								
Mahimahi	26.2	25.6	23.3	22.3	24.8	19.7	19.3	20.3
Black marlin		148.3		101.9		67.2	31.9	90.0
Blue marlin	151.8	117.7	119.9	101.9	135.7	70.9	190.4	98.8
Striped Marlin								
Wahoo	44.3	38.4	26.3	27.3	31.9	29.7	28.2	30.8
Sharks	112.3	96.8	69.3	38.0	39.5	68.8	68.5	62.4
Swordfish	150.0	100.0	212.6	12.0		59.4	23.4	117.4
Sailfish	88.4	70.7	67.0	61.8	39.1	42.0	33.8	57.6
Spearfish				46.0				
Moonfish		70.3	33.5	57.7	30.9	102.5	78.3	107.1
Oilfish			12.7	10.0		23.9		11.1
Pomfret					16.5		8.2	
Barracudas	13.5	14.6	15.3	11.0	13.1	7.6	9.2	8.8
Rainbow runner		14.0	17.5	6.5			16.1	
Dogtooth tuna			10.0			15.6	40.8	
Other Pelagic Fish			45.3					

	Cannery Sampled Average Lbs. per Fish					
Species	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
Skipjack Tuna				15.7	10.7	9.4
Albacore	41.0	47.2	40.7	39.8	39.1	37.8
Yellowfin Tuna				57.0	62.4	44.3
BigeyeTuna				40.7	46.8	37.4
Mahimahi				16.2	13.5	20.7
Black marlin				36.3		
Wahoo				30.6	30.7	30.0
Sailfish					34.0	
Moonfish				147.6	117.6	
Pomfret				2.2	2.2	
Rainbow runner					9.4	

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

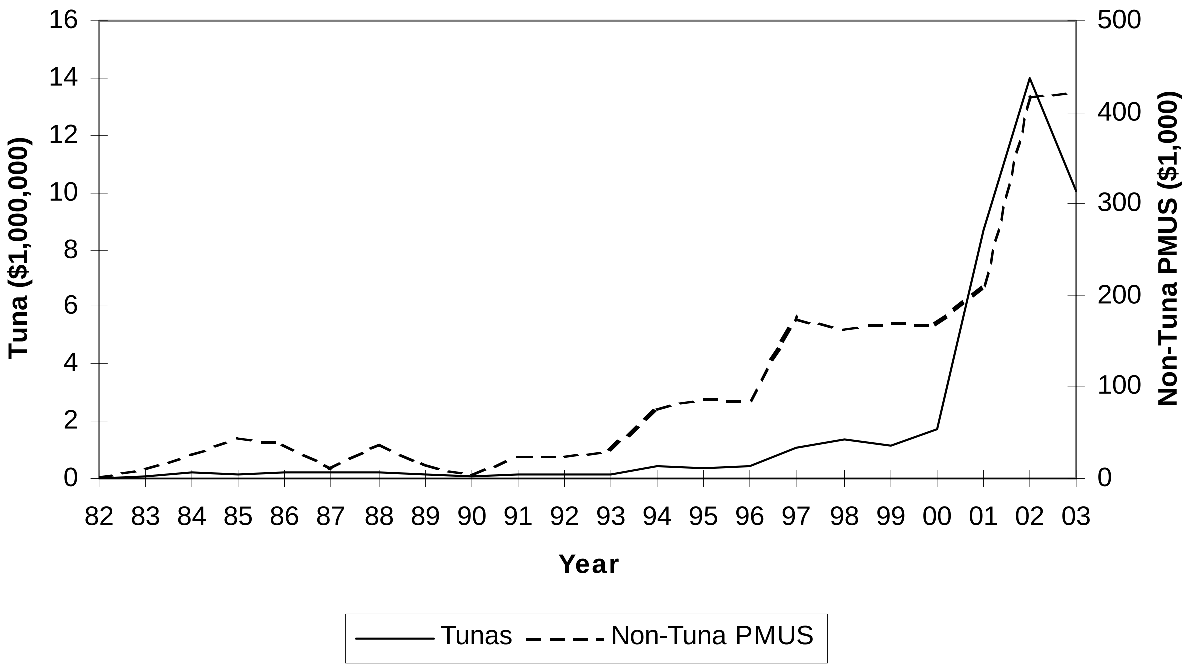
The average size of fish reported in the creel survey of Alias is smaller than in the logbook data from the cannery. Two factors can help explain this difference. First, Alia fishermen retain small fish as well as large, while on the large vessels small fish are discarded. Second, only the Alias troll,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

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

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

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

Figure 20. American Samoa annual inflation-adjusted revenue in 2003 dollars for Tuna and non-Tuna PMUS.



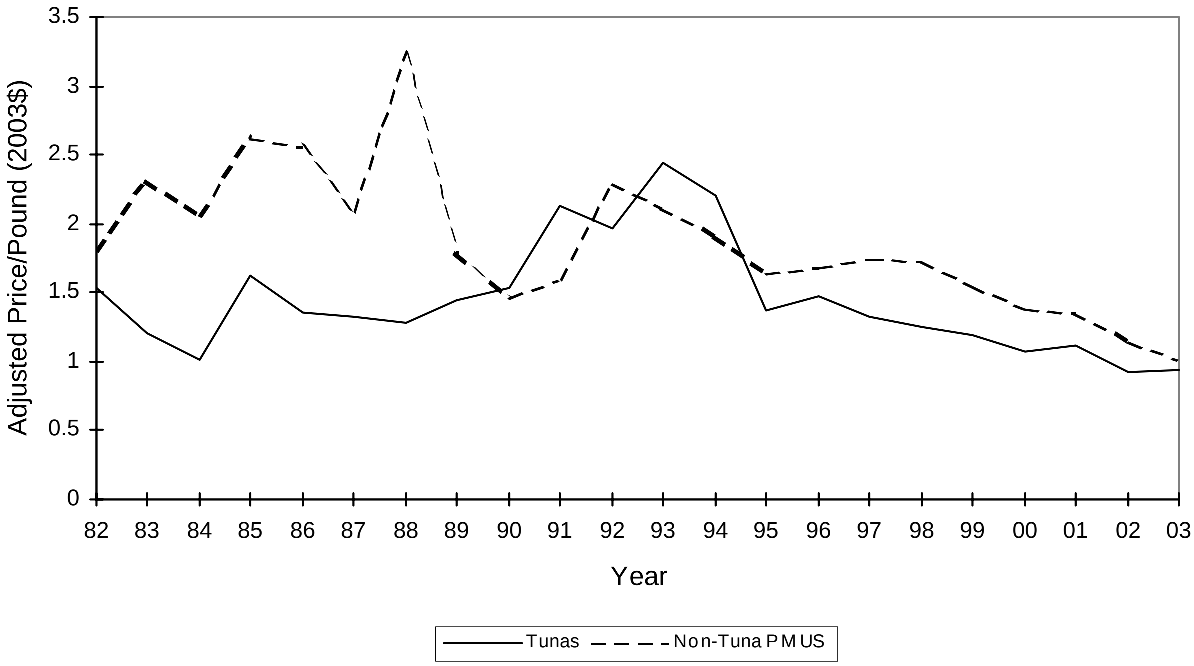
Interpretation: Until 2002, there has been an increase in revenues for commercial landings for all pelagic species since 1995, a period of great influx in the longline fishery, with a significant increase of 305% in 2001. In 2003, there was a decrease of 27.1% of revenues for all landed pelagic species (-27.9% for tuna and +1.2% for others species). The estimated revenue generated from these total landings in 2003 was $10,491,420.00 compared to $14,390,751.00 in 2002. From the early 1980's to 1995, the primary gear type for the fishery was trolling, however from 1995 to the present the dominant form of fishing was longlining.

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	$33,745	$1,534	$2,726
1983	100.8	$58,561	$103,302	$5,828	$10,281
1984	102.7	$114,981	$198,917	$15,938	$27,573
1985	103.7	$95,157	$163,098	$26,800	$45,936
1986	107.1	$137,143	$227,657	$23,151	$38,430
1987	111.8	$110,076	$175,021	$6,347	$10,092
1988	115.3	$143,613	$221,451	$25,372	$39,124
1989	120.3	$111,425	$164,798	$9,901	$14,644
1990	129.6	$61,918	$85,013	$3,795	$5,211
1991	135.3	$93,060	$122,281	$18,525	$24,342
1992	140.9	$138,179	$174,244	$19,390	$24,451
1993	141.1	$84,341	$106,270	$23,700	$29,862
1994	143.8	$332,860	$411,415	$62,579	$77,348
1995	147.0	$312,638	$377,979	$71,891	$86,916
1996	152.5	$391,211	$455,761	$73,455	$85,574
1997	156.4	$919,535	$1,045,511	$154,121	$175,235
1998	158.4	$1,240,618	$1,391,974	$146,630	$164,518
1999	159.9	$1,018,884	$1,132,999	$153,750	$170,970
2000	166.7	$1,639,341	$1,749,177	$158,053	$168,643
2001	168.8	$8,235,858	$8,672,359	$199,269	$209,830
2002	169.2	$13,295,392	$13,973,457	$397,045	$417,294
2003	177.5	$10,069,027	$10,069,027	$422,393	$422,393
Average	**136.8**	**$1,755,582**	**$1,866,157**	**$91,794**	**$102,336**
Std. Dev.	**24.90**	**$3,597,835**	**$3,713,801**	**$117,235**	**$118,878**

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



Interpretation: The average inflation-adjusted price per pound varied since 1982 until 1992-1993 when a continuous decrease was seen. This gradual decrease may be due to the lower price that the canneries pay per pound of tuna compared to the price the local stores and restaurants pay. The decreasing percentage of longline catches that make it to the higher revenue local markets after 1993 probably contribute to this decline in prices for tuna. Additionally, this decline in prices could be due to competition from frozen fish purchased from foreign longline vessels moored in Pago Harbor and from fishes imported from neighboring islands.

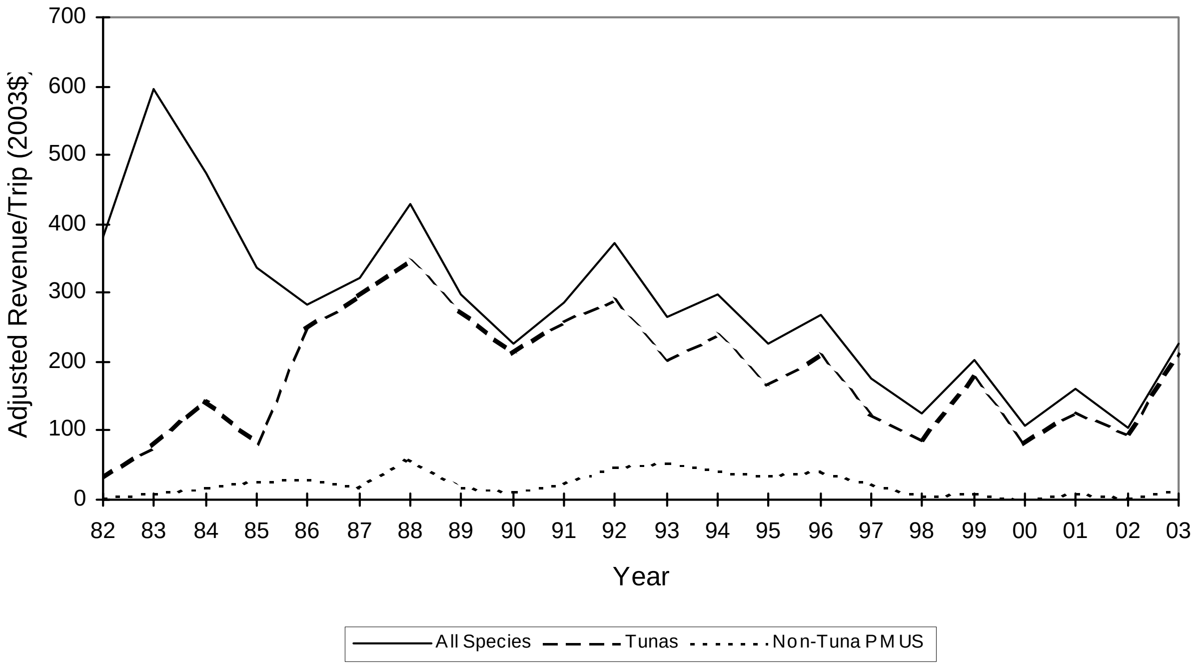
	Average Price/Pound ($)			
	Tunas		Non-Tuna PMUS	
Year	Unadjust.	Adjusted	Unadjust.	Adjusted
1982	$0.86	$1.53	$1.01	$1.80
1983	$0.69	$1.21	$1.31	$2.31
1984	$0.59	$1.01	$1.18	$2.05
1985	$0.95	$1.63	$1.53	$2.62
1986	$0.82	$1.36	$1.54	$2.56
1987	$0.83	$1.32	$1.31	$2.08
1988	$0.83	$1.28	$2.10	$3.23
1989	$0.97	$1.44	$1.20	$1.78
1990	$1.12	$1.53	$1.06	$1.46
1991	$1.62	$2.13	$1.22	$1.60
1992	$1.55	$1.96	$1.81	$2.29
1993	$1.94	$2.44	$1.69	$2.12
1994	$1.79	$2.21	$1.54	$1.90
1995	$1.13	$1.37	$1.35	$1.64
1996	$1.27	$1.47	$1.45	$1.69
1997	$1.17	$1.32	$1.54	$1.75
1998	$1.11	$1.25	$1.54	$1.73
1999	$1.07	$1.19	$1.40	$1.55
2000	$1.01	$1.07	$1.29	$1.38
2001	$1.06	$1.11	$1.29	$1.36
2002	$0.89	$0.93	$1.09	$1.15
2003	$0.94	$0.94	$1.02	$1.02
Average	**$1.10**	**$1.44**	**$1.39**	**$1.87**
Std. Dev.	**$0.34**	**$0.40**	**$0.26**	**$0.51**

This year, even if the adjusted price per pound increased (+1.1%) it is still close to the lowest price ever obtained last year. The price per pound for non–tuna PMUS is the lowest ever obtained.

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

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

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



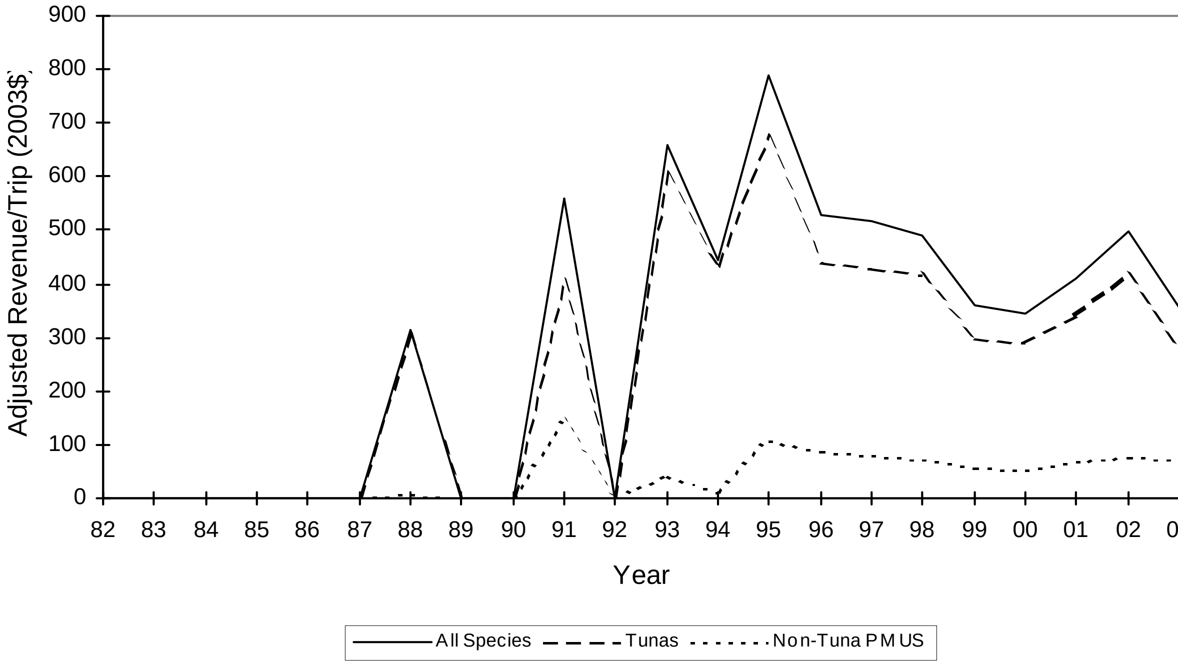
Interpretation: Since 1992 there has been a gradual decrease in revenue per trolling trip to 28% of the 1992 value in 2002 with a 114% jump in 2003 due to a jump in CPUE. This gradual decrease in revenue per trip tracks a decrease in hours per trip from 7.40 in 1992 to 3.37 in 2003 as the troll fishery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

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

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

	All Species		Tunas		Non-Tuna PMUS	
Year	**Adj.**	**Unadj.**	**Adj.**	**Unadj.**	**Adj.**	**Unadj.**
1982	$381	$214	$28	$16	$2.3	$1.3
1983	$596	$338	$76	$43	$9.2	$5.2
1984	$474	$274	$142	$82	$18.2	$10.5
1985	$336	$196	$80	$47	$27.1	$15.8
1986	$284	$171	$249	$150	$29.5	$17.8
1987	$322	$203	$294	$185	$17.6	$11.1
1988	$429	$278	$347	$225	$60.0	$38.9
1989	$299	$202	$274	$185	$19.1	$12.9
1990	$228	$166	$211	$154	$10.7	$7.8
1991	$284	$217	$258	$196	$24.3	$18.5
1992	$371	$294	$288	$228	$46.9	$37.2
1993	$266	$211	$204	$162	$53.0	$42.1
1994	$298	$241	$239	$194	$42.6	$34.5
1995	$226	$187	$168	$139	$36.1	$29.9
1996	$269	$231	$210	$180	$40.8	$35.0
1997	$177	$155	$125	$110	$22.4	$19.7
1998	$126	$112	$87	$78	$6.8	$6.1
1999	$202	$182	$175	$158	$8.2	$7.4
2000	$107	$100	$81	$76	$0.9	$0.8
2001	$161	$153	$127	$121	$9.4	$8.9
2002	$106	$100	$96	$91	$4.0	$3.8
2003	$227	$227	$209	$209	$14.1	$14.1
Average	**$280**	**$202**	**$180**	**$138**	**$22.9**	**$17.2**
Std. Dev.	**$118**	**$59**	**$84**	**$61**	**$16.8**	**$12.8**

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



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

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

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

Year	All Species		Tunas		Non-Tuna PMUS	
	Adj.	**Unadj.**	**Adj.**	**Unadj.**	**Adj.**	**Unadj.**
1982	$0	$0	$0	$0	$0.0	$0.0
1983	$0	$0	$0	$0	$0.0	$0.0
1984	$0	$0	$0	$0	$0.0	$0.0
1985	$0	$0	$0	$0	$0.0	$0.0
1986	$0	$0	$0	$0	$0.0	$0.0
1987	$0	$0	$0	$0	$0.0	$0.0
1988	$314	$203	$305	$198	$8.3	$5.4
1989	$0	$0	$0	$0	$0.0	$0.0
1990	$0	$0	$0	$0	$0.0	$0.0
1991	$558	$424	$405	$308	$145	$110
1992	$0	$0	$0	$0	$0.0	$0.0
1993	$660	$524	$606	$481	$43.8	$34.8
1994	$443	$359	$432	$349	$11.4	$9.2
1995	$790	$653	$676	$559	$109	$90.1
1996	$530	$455	$440	$378	$87.3	$74.9
1997	$517	$455	$430	$378	$80.4	$70.7
1998	$490	$437	$417	$372	$71.0	$63.3
1999	$359	$323	$299	$269	$58.9	$53.0
2000	$345	$323	$290	$272	$54.3	$50.9
2001	$411	$390	$339	$322	$70.8	$67.2
2002	$497	$473	$418	$398	$77.8	$74.0
2003	$356	$356	$278	$278	$74.6	$74.6
Average	**$392**	**$336**	**$333**	**$285**	**$55.8**	**$48.6**
Std. Dev.	**$222**	**$187**	**$191**	**$160**	**$41.3**	**$34.7**

Appendix 2

Guam

Introduction and Summary

Pelagic fishing vessels based on Guam are classified into two general groups: 1) distant-water purse seiners and longliners that fish a majority of the time outside Guam's EEZ (Economic Exclusive Zone) and transship through the island and 2) 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 report covers primarily the local, Guam-based, small-boat pelagic fishery.

The number of boats involved in Guam's pelagic or open ocean fishery gradually increased from 193 in 1983 to 469 in 1998 and has dropped since. 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.

The estimated annual pelagic landings have varied widely, ranging between 322,000 and 937,000 pounds in the 22-year time series. The 2003 total pelagic landings was approximately 506,000 pounds, a decrease of 5% compared with 2002. 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 prediosus*), and three less common species of barracuda. Sailfish and sharks were also caught during 2003. 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.

There are general wide year-to-year fluctuations in the estimated landings of the five major pelagic species. Mahimahi and yellowfin tuna landings, however, have been showing more general decreasing trends since 1996 and 1998 respectively. Pacific blue marlin landings dramatically increased from 1982 and peaked in 1990 primarily from a growth in the charter boat industry. Charter boats actively target marlin during the summer, landing 20% of this year's marlin catch.

Aggregate landings of all pelagics, tuna, and non-tuna Pelagic Management Unit Species (PMUS) dropped slightly in 2003, but still show a general increase for the 22-year time series. Landings of all pelagics increased 5%, with tuna PMUS increasing 16% and non-tuna PMUS decreasing 29%. Supertyphoon Pongsona's direct hit on Guam in December 2002 caused significant damage to boats, the two major public boat ramps, an oil storage tank, the availability of adequate quantities of ice, and the island's infrastructure, which significantly decreased fishing activity for non-charter boats for the first few months of 2003. Charter fishing was impacted more severely since tourism, the primary source of income for charter fishing, did not begin picking up to near normal levels until after the first quarter of 2003. The decrease in trolling activity during the first quarter may have also decreased mahimahi landings, making skipjack tuna landings the top pelagic species landed in 2003. Overall Bonita, blue marlin, and yellowfin tuna landings increased 4%, 23%, and 51% respectively, while wahoo and mahimahi landings decreased 12% and 52% respectively. Blue marlin landings for charter boats showed the most significant increase compared with 2002, increasing 188%.

Participation and effort generally decreased in 2003. While the number of trolling boats decreased slightly, the number of trolling trips and hours spent trolling decreased over 20%. Charter trolling trips, however, decreased only 4% for the year as tourism recovered and charter trips by military personnel were more common. Charter trips, however, have steadily decreased ever year after peaking at 1996, from 5,781 trips to 1,368 trips in 2003.

Trolling catch rates (pounds per hour fished) showed a general increase compared with 2002, except for mahimahi, which decreased 38%. Wahoo, skipjack tuna, yellowfin tuna, and blue marlin catch rates increased 18%, 33%, 91%, and 62%. The catch rates for non-charter yellowfin tuna and charter blue marlin showed the most significant increases, 100% and 222% respectively.

Commercial landings and revenues decreased in 2003, with total, non-charter, and charter landings decreasing 15%, 13%, and 16%, and total, non-charter, and charter commercial revenues decreasing 19%, 12%, and 23%. The average price for all pelagics decreased 5%, with tuna PMUS prices increasing slightly ($0.01), and non-tuna PMUS decreasing 8%. Adjusted revenue per trolling trip increased 15% for all pelagics, increased slightly ($0.45) for tuna PMUS, and decreased 12% for non-tuna PMUS. Commercial landings show an overall increasing trend, although commercial revenues show a general decreasing trend but with more yearly fluctuations. The average price of tuna and revenue per trolling trip show a significant decrease from the early 1980's, but appear to be leveling off for the past five years. Despite decreasing revenues with increased commercial landings, pelagic fishing continues since a majority of trollers do not rely on the catch or selling of fish as their primary source of income. However, a downturn in Guam's economy in recent years has made it more costly for the average fishermen to purchase fuel, do boat maintenance and repair, and replace fishing gear.

Several factors in recent years may have negatively affected trolling activity and may affect fishing activity in the future. The downturn in Asia's economy compared from a decade ago had a significant negative impact on Guam's economy, decreasing the number of tourists to Guam, with the average visitor spending less. The decrease in tourism and related revenues, an increase in fuel and boat maintenance costs, El Nino events, and the local government's recent financial crisis have had negative impacts on commercial, subsistence, and recreational trolling. On the other hand, fishermen have used pelagic fishing to earn additional income, with local FADs and offshore banks being fished more regularly. An important factor for the local pelagic fishery is its fish markets, primarily the Guam's Fishermen's Coop, which serves as a reliable market for fish.

The collection and processing of data, and efforts to improve the quality of data is ongoing. Prospective vendors to participate in the voluntary receipt book program are regularly solicited for their participation, although numerous smaller vendors selling locally caught fish opt not to participate in the program, and have usually not provided data consistently over long periods of time. Incentives to increase vendor coverage are currently being explored in order to capture these vendors into the receipt book program.

Ylig Bay is a non-surveyed port on the eastern side of Guam that is heavily fished during periods of calm weather, which occurs during the summer months but also during several days each month. Pelagic highliners have been regularly observed launching from this site. Problems with surveying Ylig, however, include a lack of lighting, no public phone to use in case of emergencies, and other safety issues for Fisheries staff. The Department of Agriculture's Fisheries section is currently exploring ways to do opportunistic surveying at Ylig in order to obtain an idea of fishing effort, participation, and catch at this port.

2003 Recommendations

1. Explore the feasibility of drafting new legislation requiring local fish vendors to participate in the "Commercial Fish Receipt Book Program".

2. Explore the feasibility of collecting pelagic data from Ylig boat ramp in order to capture the pelagic fishing occurring there.

Tables

Figures

Table 1. Guam 2003 Creel Survey - Pelagic Species Composition

Species	Total Landing (Lbs)	Non-Charter	Charter
Skipjack Tuna	182,726	167,614	15,112
Yellowfin Tuna	67,690	64,635	3,055
Kawakawa	7,920	4,685	3,235
Albacore	0	0	0
Bigeye Tuna	0	0	0
Other Tuna PMUS	0	0	0
Tuna PMUS	**258,336**	**236,934**	**21,402**
Mahimahi	83,730	73,767	9,963
Wahoo	63,285	52,528	10,757
Blue Marlin	66,058	52,961	13,097
Black Marlin	0	0	0
Striped Marlin	0	0	0
Sailfish	0	0	0
Shortbill Spearfish	0	0	0
Swordfish	0	0	0
Oceanic Sharks	0	0	0
Pomfrets	0	0	0
Oilfish	264	264	0
Moonfish	0	0	0
Non-tuna PMUS	**213,337**	**179,520**	**33,817**
Dogtooth Tuna	7,573	7,521	52
Rainbow Runner	18,383	17,628	755
Barracudas	7,360	7,360	0
Double-lined Mackerel	1,321	1,321	0
Misc. Troll Fish	0	0	0
Non-PMUS Pelagics	**34,637**	**33,830**	**807**
Total Pelagics	**506,310**	**450,284**	**56,026**

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, therefore, may slightly differ in those tables.

Table2: Guam 2003 Annual Commercial Average Price of Pelagic Species

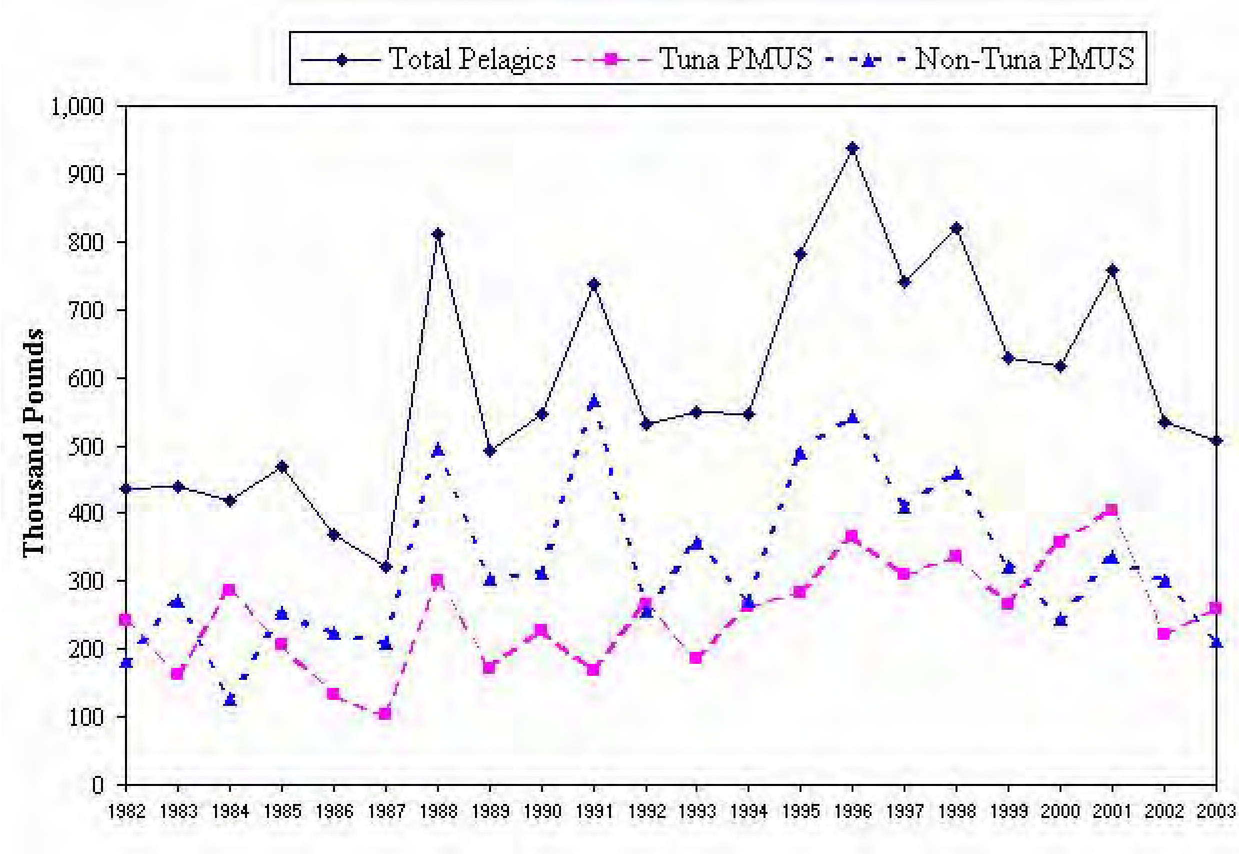
Species	Average Price ($/Lb)
Misc. Tuna	2.00
Kawakawa	1.18
Yellowfin Tuna	1.99
Bonita/skipjack Tuna	1.05
Tunas Subtotal	**1.35**
Monchong	2.50
Spearfish	1.06
Sailfish	1.29
Marlin	1.10
Wahoo	1.98
Mahimahi	1.63
Non-tuna PMUS Subtotal	**1.55**
Troll Fish	1.34
Barracuda	1.96
Rainbow Runner	1.70
Dogtooth Tuna	1.26
Non-PMUS Pelagic Subtotal	**1.68**
Pelagic Total	**1.46**

Source: The WPacFIN-sponsored commercial landings system.

Table 3. Annual Consumer Price Indexes And CPI Adjustment Factors (For Reference Only)

Year	Consumer Price Index	CPI Adjust Factor
1980	134.0	3.79
1981	161.4	3.14
1982	169.7	2.99
1983	175.6	2.89
1984	190.9	2.66
1985	198.3	2.56
1986	203.7	2.49
1987	212.7	2.39
1988	223.8	2.27
1989	248.2	2.04
1990	283.5	1.79
1991	312.5	1.62
1992	344.2	1.47
1993	372.9	1.36
1994	436.0	1.16
1995	459.2	1.11
1996	482.0	1.05
1997	489.7	1.04
1998	487.1	1.04
1999	496.0	1.02
2000	505.9	1.00
2001	499.4	1.02
2002	502.0	1.01
2003	**507.2**	**1.00**

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



Interpretation: The estimated total pelagic, tuna, and non-tuna PMUS landings have shown a general increasing trend until 1996. Several factors relating to this trend may be the decrease in the number of trolling boats in the fishery since 1996, a downturn in the local economy making it more expensive for boat repair and maintenance for the average recreational fishermen, a decrease in fishing effort, a significant number of bad weather days in 2003, and anecdotal evidence from the average fishermen that pelagic fish is not caught consistently year round around Guam. Compared with 2002, total pelagics and non-tuna PMUS decreased 5% and 29% respectively, while tuna landings increased 17%. Generally, tuna species are consistently caught year round, with the other major pelagic species are seasonal. Except for tuna PMUS, total pelagics and non-tuna PMUS landings are below the 22-year average.

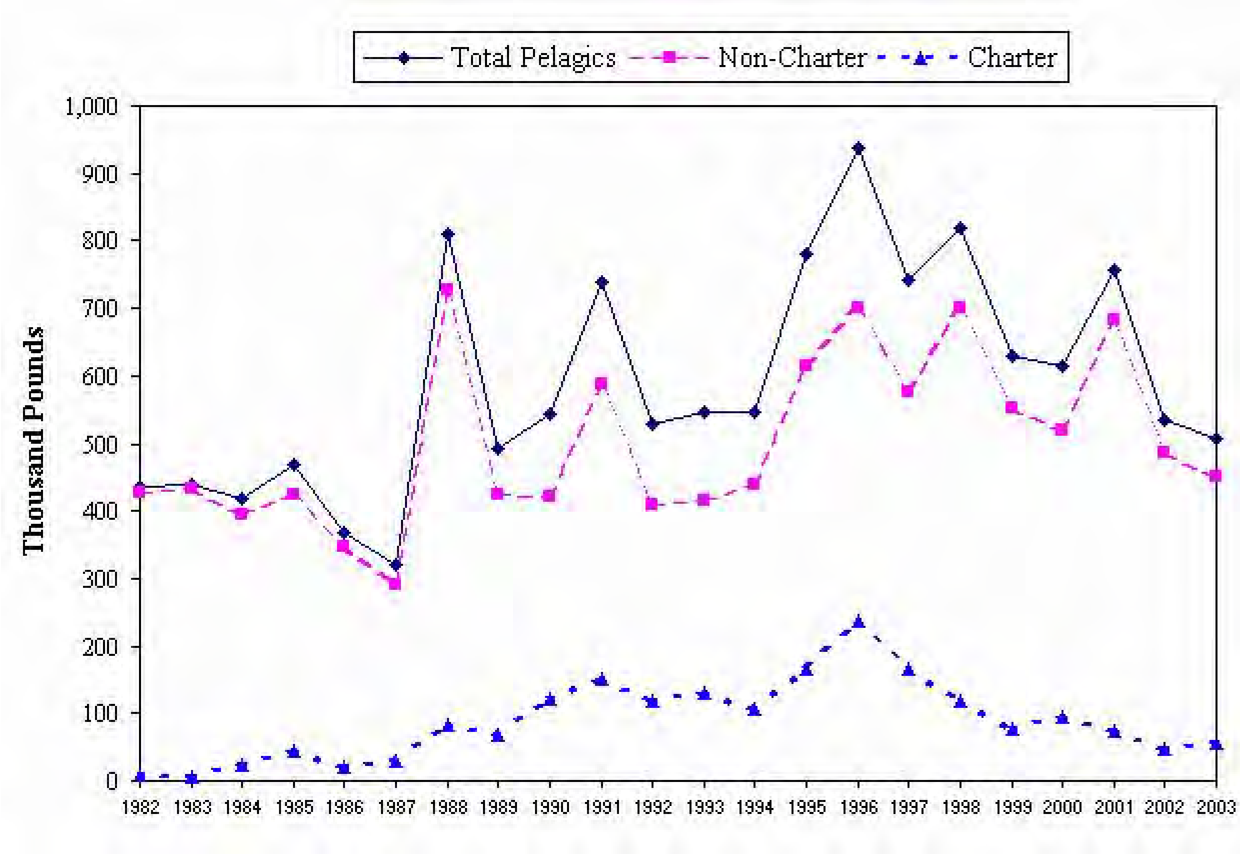
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel survey.

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	435,648	243,184	182,782
1983	440,319	162,334	270,536
1984	418,010	284,871	127,711
1985	468,917	207,027	253,551
1986	368,355	133,570	224,390
1987	321,846	104,534	210,663
1988	810,303	301,785	494,864
1989	491,694	170,722	303,357
1990	544,457	225,926	311,622
1991	737,898	168,800	566,353
1992	529,634	264,392	256,282
1993	547,240	184,532	356,682
1994	544,922	261,665	272,697
1995	780,727	282,587	489,614
1996	937,450	365,855	541,991
1997	740,790	308,538	410,487
1998	820,007	334,991	460,380
1999	627,928	265,941	320,802
2000	615,724	355,710	243,470
2001	756,851	404,990	337,093
2002	533,850	221,396	300,841
2003	**506,118**	**258,340**	**213,324**
Average	589,940	250,531	324,977
Standard Deviation	165,331	77,995	120,774

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. Beginning in 1988, this percentage decreased due to an increase in charter boat activity, catering primarily to Asian tourists. From 1996, a downturn in Japan's economy caused a significant decrease in charter trips and subsequent landings, while no trend is observed for non-charters. In 2003, total pelagic and non-charter landings decreased 5% and 7% respectively, while charter landings increased 17%. Non-charter boats landed 89% of all pelagics. All landings still fall below the 22-year average.

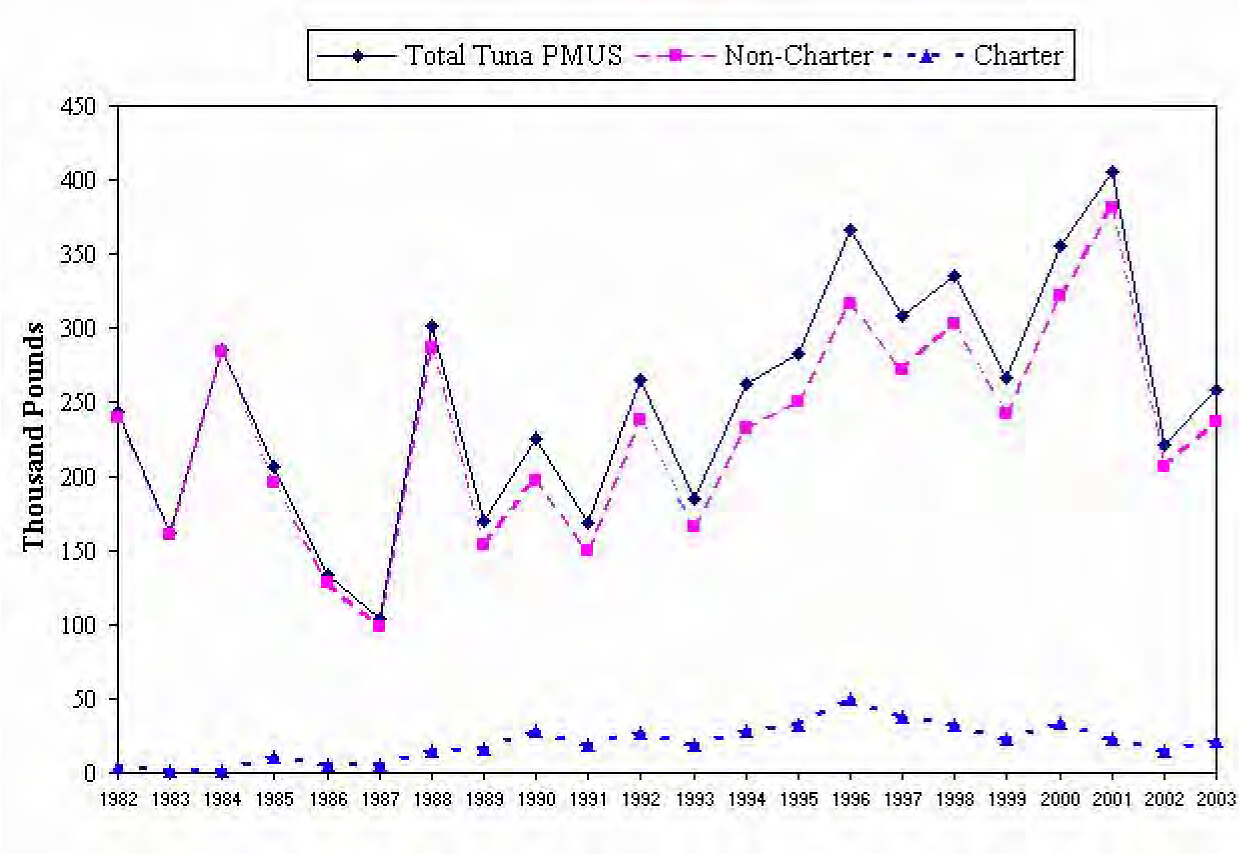
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel survey data.

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	435,648	426,939	8,709
1983	440,319	434,664	5,655
1984	418,010	395,649	22,361
1985	468,917	424,389	44,528
1986	368,355	346,616	21,740
1987	321,846	291,913	29,933
1988	810,303	726,274	84,029
1989	491,694	424,043	67,651
1990	544,457	421,797	122,660
1991	737,898	587,400	150,498
1992	529,634	410,966	118,667
1993	547,240	415,432	131,809
1994	544,922	437,735	107,187
1995	780,727	613,379	167,347
1996	937,450	700,709	236,741
1997	740,790	574,977	165,812
1998	820,007	701,672	118,335
1999	627,928	550,613	77,314
2000	615,724	520,734	94,990
2001	756,851	683,347	73,504
2002	533,850	486,141	47,709
2003	**506,118**	**450,094**	**56,024**
Average	589,940	501,158	88,782
Standard Deviation	165,331	123,715	59,439

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 2003, total tuna, non-charter, and charter tuna landings increased 17%, 15%, and 45% respectively. The 2003 estimated tuna PMUS landings were slightly higher than the 22-year average.

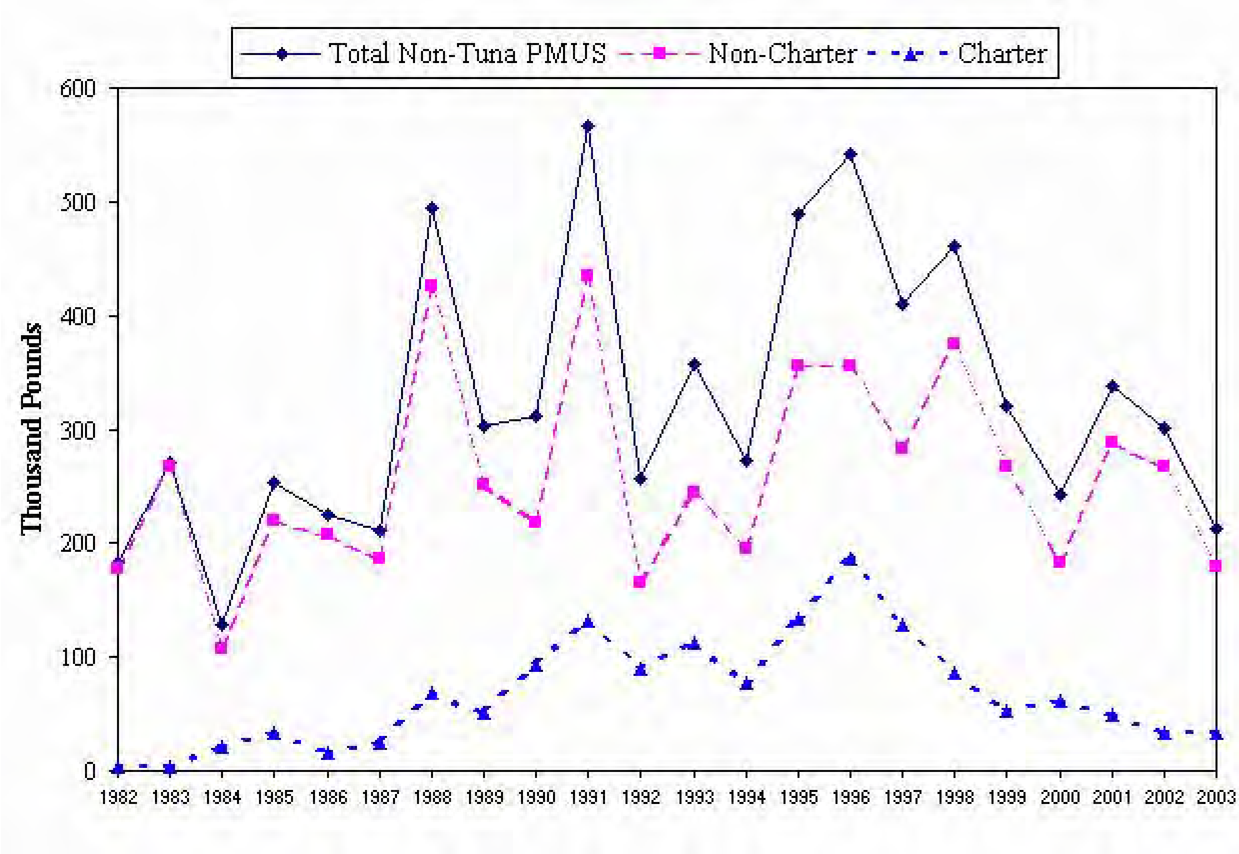
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program, expanded with the assistance of NMFS.

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	243,184	239,082	4,102
1983	162,334	160,613	1,721
1984	284,871	283,312	1,559
1985	207,027	196,020	11,007
1986	133,570	128,201	5,369
1987	104,534	98,820	5,714
1988	301,785	286,974	14,811
1989	170,722	154,355	16,366
1990	225,926	197,255	28,672
1991	168,800	149,735	19,065
1992	264,392	237,257	27,135
1993	184,532	165,705	18,827
1994	261,665	232,747	28,918
1995	282,587	249,901	32,686
1996	365,855	316,394	49,462
1997	308,538	271,288	37,250
1998	334,991	302,903	32,089
1999	265,941	242,440	23,501
2000	355,710	322,057	33,652
2001	404,990	381,583	23,407
2002	221,396	206,677	14,719
2003	**258,340**	**236,938**	**21,401**
Average	250,531	230,012	20,520
Standard Deviation	77,995	70,448	12,688

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



Interpretation: The estimated total PMUS landings show a general increase since 1984, 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, and began decreasing when charter fishing activity began significantly increasing, associated with an increase in tourism. Charter PMUS harvest began decreasing significantly after 1996, while non-charter PMUS landings show extreme yearly fluctuations. In 2003, total non-tuna PMUS and non-charter non-tuna PMUS decreased, 29% and 33% respectively. Charter non-tuna PMUS increased 4%. Non-charter boats harvested 84% of non-tuna PMUS species in 2003.

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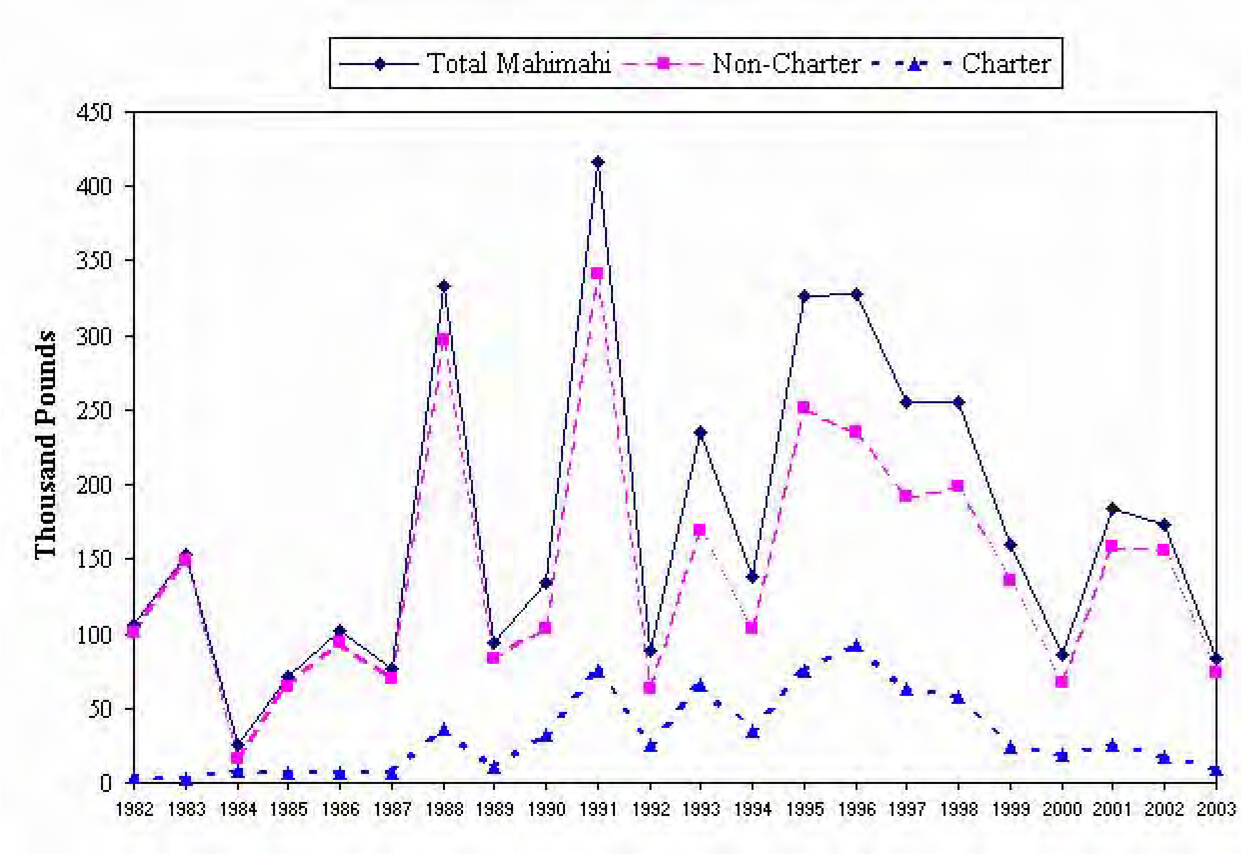
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program, expanded with the assistance of NMFS.

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

Estimated Total Landings (Pounds)

Year	Total Non-Tuna PMUS	Non-Charter	Charter
1982	182,782	178,551	4,231
1983	270,536	266,602	3,934
1984	127,711	106,910	20,802
1985	253,551	220,043	33,508
1986	224,390	208,111	16,279
1987	210,663	186,706	23,957
1988	494,864	425,850	69,015
1989	303,357	252,395	50,961
1990	311,622	218,154	93,468
1991	566,353	435,148	131,205
1992	256,282	165,882	90,400
1993	356,682	244,215	112,467
1994	272,697	194,674	78,022
1995	489,614	355,532	134,082
1996	541,991	355,315	186,675
1997	410,487	282,828	127,659
1998	460,380	374,650	85,730
1999	320,802	267,823	52,979
2000	243,470	182,533	60,937
2001	337,093	288,095	48,998
2002	300,841	268,271	32,570
2003	**213,324**	**179,508**	**33,816**
Average	324,977	257,173	67,804
Standard Deviation	120,774	86,806	48,354

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



Interpretations: The estimated total mahimahi landings appear to have increased up to 1995, and then appear to be generally decreasing. Non-charter trolling trips have generally always accounted for the bulk of the mahimahi catch, with charter activity harvesting proportionally more beginning in the late 1980's due to the economic boom in Japan. Charter catch then began dropping in the mid 1990's due to the downturn in Asia's economy. In 2003, mahimahi landings drastically decreased, with total, charter, and non-charter harvest decreasing 52%, 41%, and 53% respectively. Mahimahi season generally occurs during the first quarter of the year, and the after effects of Supertyphoon Pongsona in December 2002 and a significant number of bad weather days may contributed to this drastic decrease. The 2003 total and non-charter harvest are approximately half of the 22 year time series, with the charter harvest approximately a third of the 22-year average. The 2003 total mahimahi harvest is the lowest annual harvest since 1985.

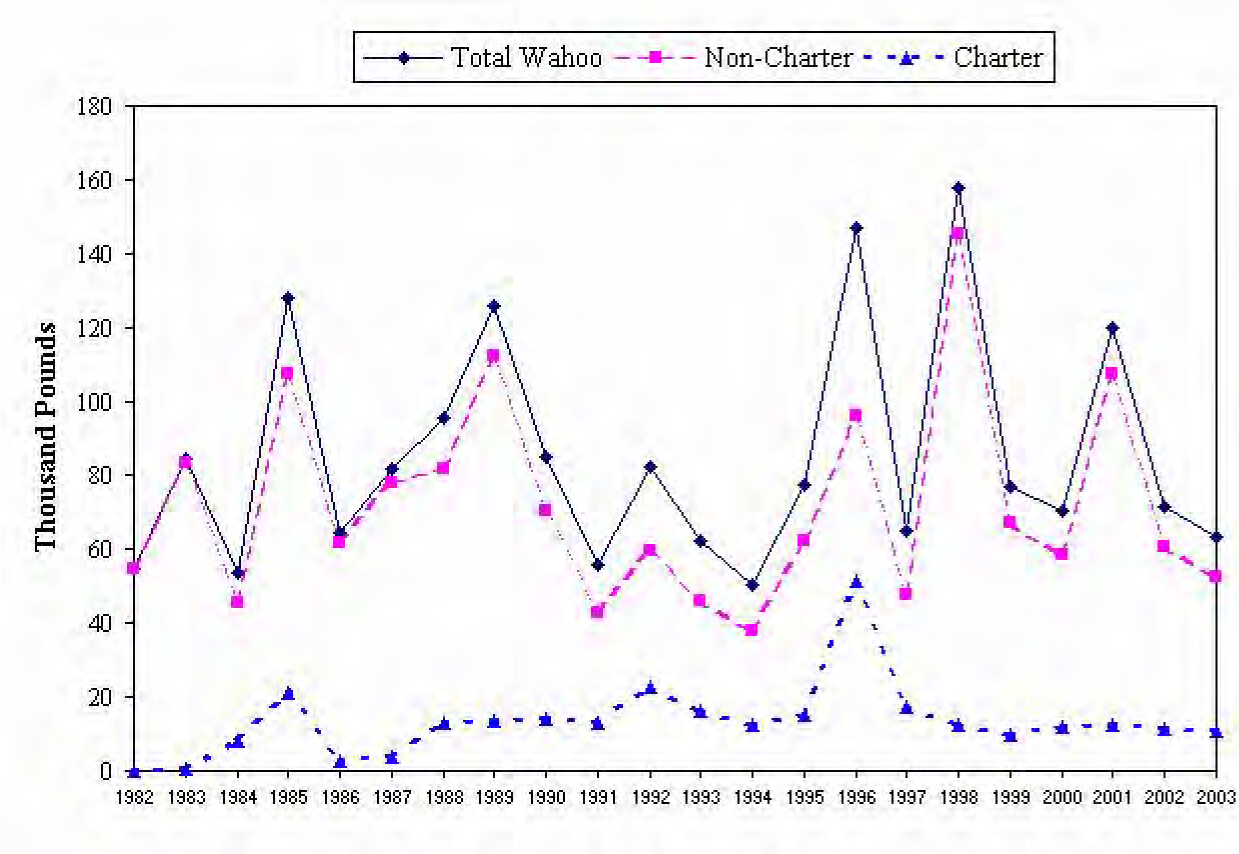
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files, expanded with the assistance of NMFS.

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	105,503	101,348	4,155
1983	152,678	149,531	3,147
1984	25,420	16,739	8,681
1985	71,569	64,619	6,951
1986	101,487	94,646	6,841
1987	76,129	69,326	6,803
1988	333,393	296,937	36,456
1989	93,709	83,069	10,640
1990	134,747	102,838	31,910
1991	416,053	341,358	74,695
1992	89,115	63,259	25,856
1993	234,522	169,200	65,322
1994	137,768	103,448	34,320
1995	326,868	251,367	75,501
1996	327,635	234,575	93,060
1997	254,806	191,864	62,942
1998	255,814	198,425	57,389
1999	160,150	136,229	23,921
2000	85,827	66,798	19,029
2001	184,011	158,409	25,601
2002	172,673	155,798	16,874
2003	**83,734**	**73,771**	**9,963**
Average	173,801	141,980	31,821
Standard Deviation	105,363	83,123	27,352

Figure 2b. Guam Annual Estimated Total Wahoo Landings:
Wahoo: 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, most wahoo non-charter landings accounted for over 95% of the total catch. Beginning in 1988, this percentage decreased due to an increase in charter boat activity. From 1988 to 1998, wahoo non-charter landings have fluctuated, accounting for 65% - 92% of the total catch. The general trend of wahoo charter landings has slightly increased since 1986. In 1996, wahoo charter landings reached a high, accounting for 35% of the total catch, and have generally decreased since then. In 2003, total, non-charter, and charter harvest of wahoo decreased 12%, 13%, and 4% respectively. Non-charter boats harvested 83% of the total wahoo harvest. The 2003 harvest of wahoo still falls below the 22-year average harvest levels.

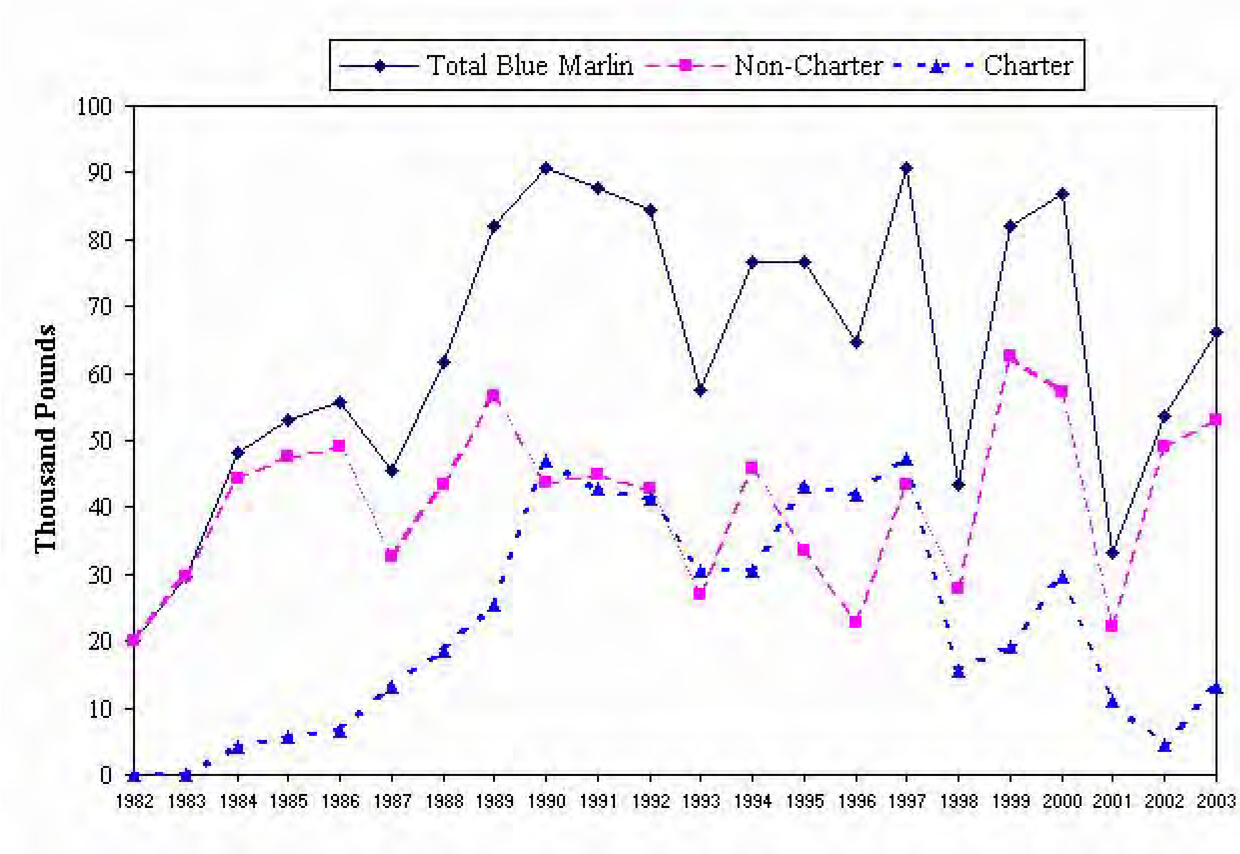
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files, expanded with the assistance of NMFS.

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	54,976	54,900	75
1983	84,349	83,562	786
1984	53,490	45,424	8,066
1985	128,209	107,275	20,934
1986	64,756	61,985	2,771
1987	82,024	78,000	4,024
1988	95,180	82,107	13,073
1989	125,720	112,006	13,714
1990	84,873	70,698	14,176
1991	55,952	42,681	13,270
1992	82,238	59,675	22,563
1993	62,373	46,318	16,055
1994	50,390	37,712	12,677
1995	77,325	62,224	15,102
1996	147,181	95,884	51,297
1997	64,956	47,538	17,418
1998	157,947	145,524	12,424
1999	76,958	67,170	9,788
2000	70,614	58,436	12,178
2001	119,603	107,186	12,417
2002	71,809	60,654	11,155
2003	**63,287**	**52,530**	**10,757**
Average	85,191	71,795	13,396
Standard Deviation	31,065	27,331	10,233

Figure 3a. Guam Annual Estimated Total Blue Marlin Landings:
Blue Marlin: 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 activity began to account for about 50% of the total catch, then began to accounting for most of the catch by the mid-1990's. 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 was due to the decrease in charter trips as the overall economy of Asia decreased, decreasing the number of Asian tourists and decreasing the number of tourists paying for higher priced activities such as charter fishing. In 2003, the overall, non-charter, and charter blue marlin landings increased 23%, 8%, and 188% respectively. Non-charter catch of blue marlin increased 8%. The wide fluctuations in blue marlin landings from non-charters are probably due to the high variability in the year-to-year abundance and availability of the stocks.

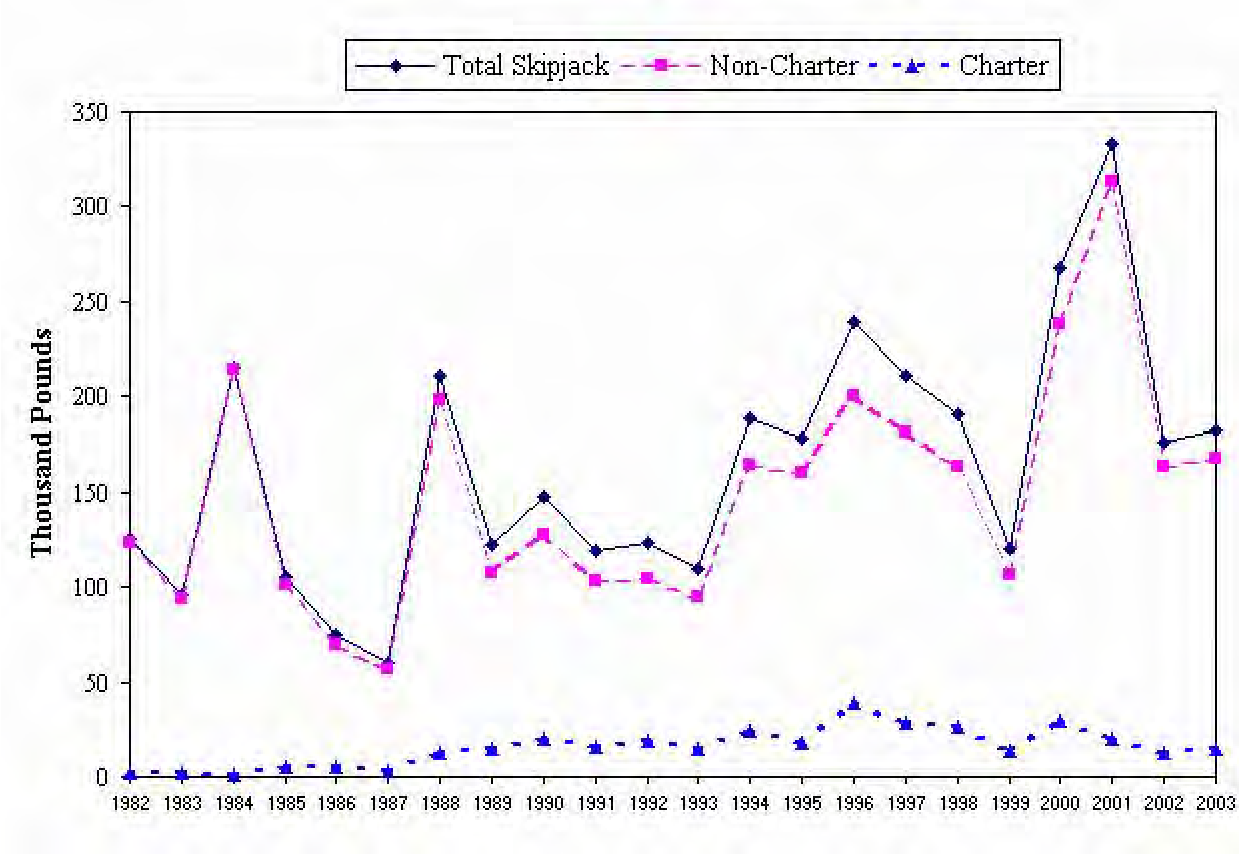
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files, expanded with the assistance of NMFS.

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	20,086	20,086	0
1983	29,688	29,688	0
1984	48,239	44,185	4,055
1985	53,117	47,494	5,623
1986	55,766	49,099	6,667
1987	45,620	32,490	13,130
1988	61,816	43,342	18,474
1989	82,120	56,721	25,399
1990	90,749	43,600	47,148
1991	87,838	44,941	42,897
1992	84,356	42,937	41,419
1993	57,530	27,046	30,484
1994	76,514	45,889	30,625
1995	76,637	33,451	43,186
1996	64,677	22,742	41,935
1997	90,726	43,427	47,299
1998	43,511	27,886	15,625
1999	81,888	62,724	19,164
2000	86,891	57,161	29,730
2001	33,254	22,274	10,979
2002	53,552	49,012	4,540
2003	**66,058**	**52,961**	**13,097**
Average	63,211	40,871	22,340
Standard Deviation	21,034	12,173	16,310

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



Interpretations: The estimated total landings have generally increased in the past 15 years, coinciding with an increase in trolling boat activity. A drop in skipjack tuna during 2002 may be due to direct hits by two supertyphoons, resulting in boat damage, lack of fish around Guam immediately after the storms, and infrastructure damage to the three major survey ports, and use of the survey ports by the Guam National Guard to disperse water. A direct hit by Supertyphoon Pongsona in December 2002 also caused a significant decrease in fishing activity during the month of January 2003. For 2003, however, skipjack tuna landings increased from 2002. Total skipjack tuna landings, non-charter landings, and charter landings, increased 4%, 3%, and 19% respectively. Despite a significant number of bad weather days, skipjack tuna is caught year-round, unlike other pelagics such as mahi and marlin that are more seasonal. During 2003, fishermen reported troll more often to several banks north and south of Guam than other years. This may have increased the catch of highliners which regularly fish, increasing the bonita catch this year despite the after effects of Supertyphoon Pongsona during the first few months of 2003.

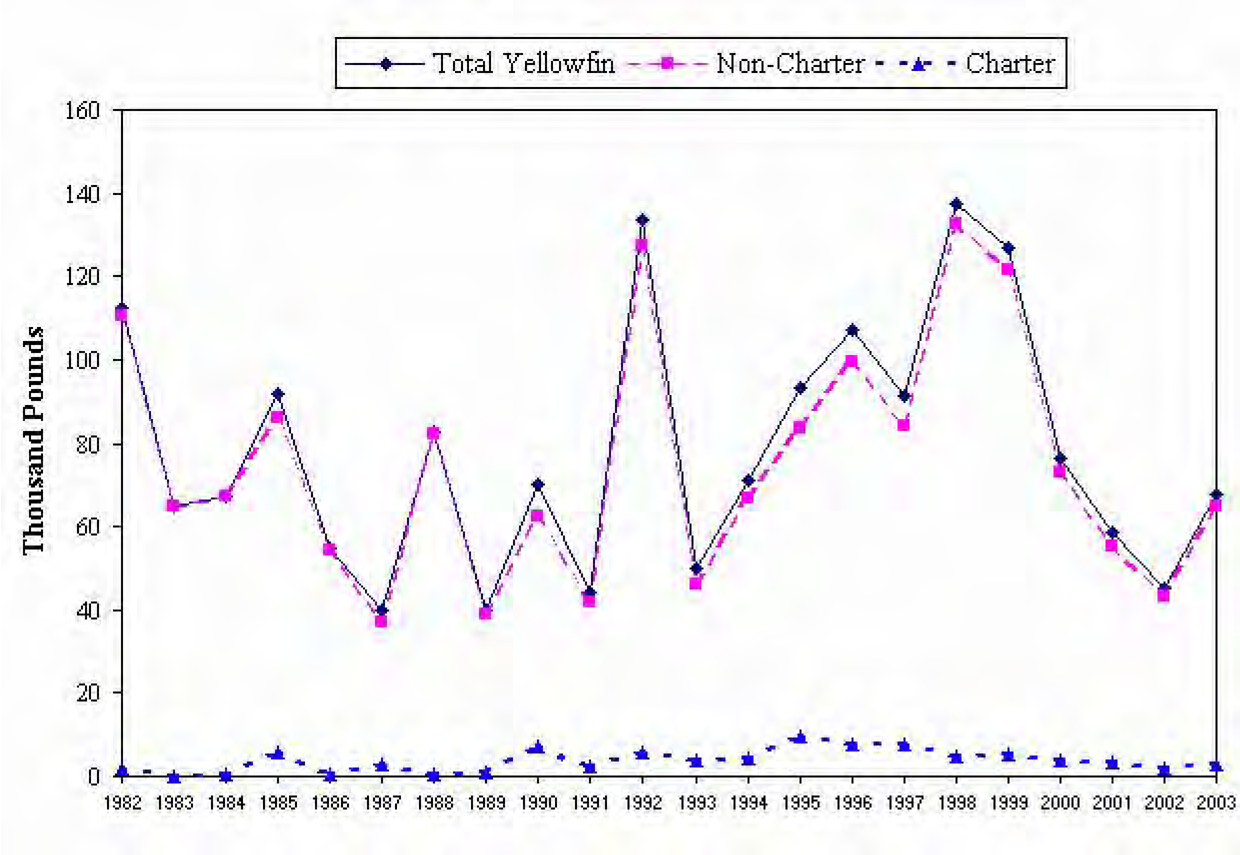
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files, expanded with the assistance of NMFS.

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	125,472	123,247	2,225
1983	95,449	93,796	1,652
1984	215,102	213,937	1,165
1985	105,754	100,732	5,022
1986	74,450	69,642	4,808
1987	59,569	56,908	2,661
1988	211,014	198,085	12,929
1989	122,588	107,678	14,910
1990	147,702	127,870	19,832
1991	118,799	102,967	15,832
1992	123,731	104,504	19,227
1993	109,244	94,713	14,532
1994	188,408	163,937	24,471
1995	178,404	160,052	18,353
1996	239,006	199,958	39,048
1997	210,535	181,605	28,930
1998	190,466	163,858	26,609
1999	120,137	106,199	13,938
2000	267,562	238,529	29,033
2001	332,680	313,176	19,504
2002	175,834	163,118	12,716
2003	**182,728**	**167,617**	**15,112**
Average	163,392	147,824	15,569
Standard Deviation	66,492	61,018	10,140

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



Interpretations: The overall yellowfin landings showed wide fluctuations during the 22-year time series, although he 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 since. Between 2002 and 2003, total, non-charter, and charter landings have increased 51%, 50%, and 77% respectively, despite a significant number of bad weather days in 2003.

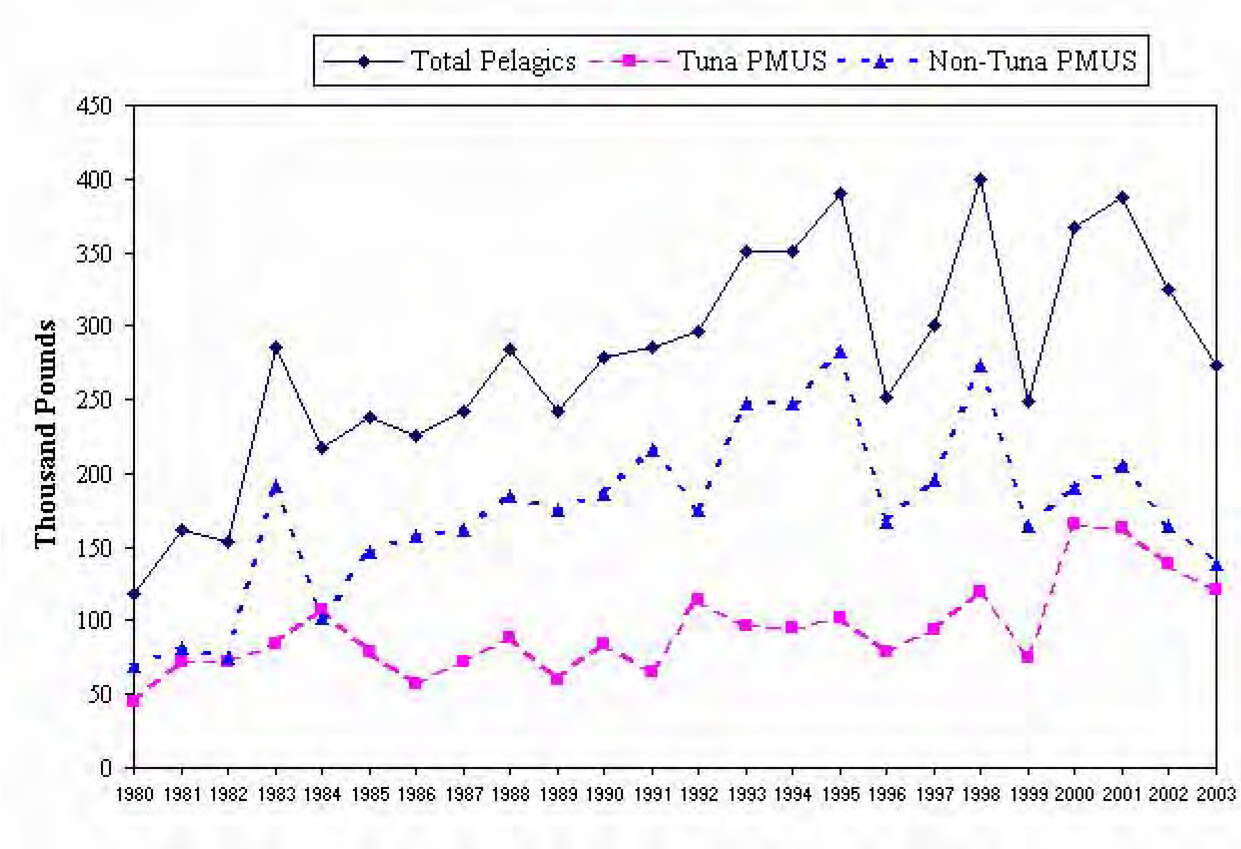
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files, expanded with the assistance of NMFS.

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	112,287	110,410	1,877
1983	64,684	64,684	0
1984	67,463	67,207	256
1985	91,560	85,813	5,748
1986	54,781	54,297	485
1987	39,766	37,061	2,705
1988	82,549	81,985	565
1989	39,967	39,048	920
1990	69,952	62,519	7,433
1991	44,073	41,865	2,208
1992	133,397	127,508	5,889
1993	49,973	46,053	3,920
1994	71,081	66,899	4,183
1995	93,329	83,703	9,626
1996	107,244	99,343	7,901
1997	91,455	83,982	7,474
1998	137,395	132,388	5,008
1999	126,858	121,398	5,460
2000	76,528	72,828	3,700
2001	58,446	55,208	3,238
2002	44,932	43,202	1,730
2003	**67,691**	**64,636**	**3,055**
Average	78,428	74,638	3,790
Standard Deviation	30,080	28,759	2,755

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 22-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 supertyphoons, resulting in boat damage, lack of tourist for the commercial charter boats, and unavailability of ice for fishermen. A significant number of bad weather days preceding Supertyphoon Pongsona in December 2002 may have also affected fishing in the first quarter of 2003. In 2003,a significant number of bad weather days also occurred, especially during creel census survey days. Between 2002 and 2003, commercial landings for all pelagics, tuna PMUS, and non-tuna PMUS decreased 16%, 13%, and 16% respectively.

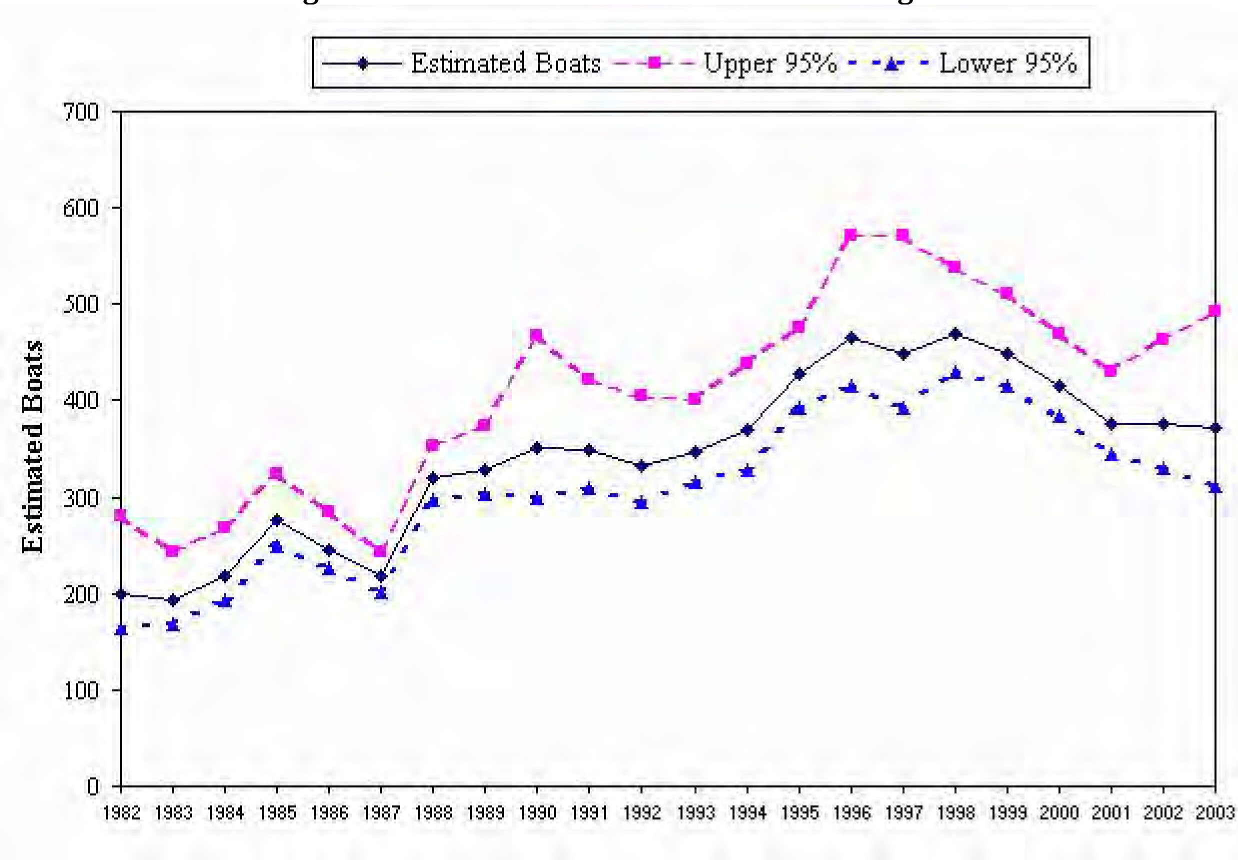
Source: The WPACFIN-sponsored commercial landings system.

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

Estimated Commercial Landings (Pounds)

Year	All Pelagics	Tuna PMUS	Non-Tuna PMUS
1980	118,251	45,043	69,062
1981	162,186	72,229	81,808
1982	153,577	72,347	74,832
1983	285,118	83,764	191,676
1984	218,028	107,568	102,398
1985	237,695	79,028	146,477
1986	226,138	57,689	157,377
1987	242,444	72,004	161,657
1988	284,408	88,093	185,451
1989	242,554	59,825	175,667
1990	279,121	84,176	185,934
1991	285,696	64,694	216,611
1992	296,809	114,765	175,751
1993	351,201	96,289	248,070
1994	351,187	95,321	246,860
1995	389,849	102,236	282,468
1996	252,075	78,636	166,702
1997	300,457	93,825	196,324
1998	400,200	120,186	272,882
1999	248,472	75,346	164,082
2000	367,143	165,898	190,761
2001	387,368	163,369	205,648
2002	325,299	139,009	164,853
2003	**272,633**	**121,326**	**138,160**
Average	278,246	93,861	175,063
Standard Deviation	74,522	31,167	56,598

Figure 6. Guam Estimated Number of Trolling Boats



Interpretations: The number of trolling boats on Guam had been steadily increasing until 1998, partially due to the addition of two marinas to the offshore sampling program, but then declined for three consecutive years. The number of boats has been essentially the same for the past 3 years. In 2003, the number of estimated trolling boats decreased slightly (1%) to 371, with an upper 95% non-parametric confidence limit of 492 and a lower confidence limit of 312. The boat estimates in the fishery are above the 22-year average, but are about 17% less than the average for 1995-2000.

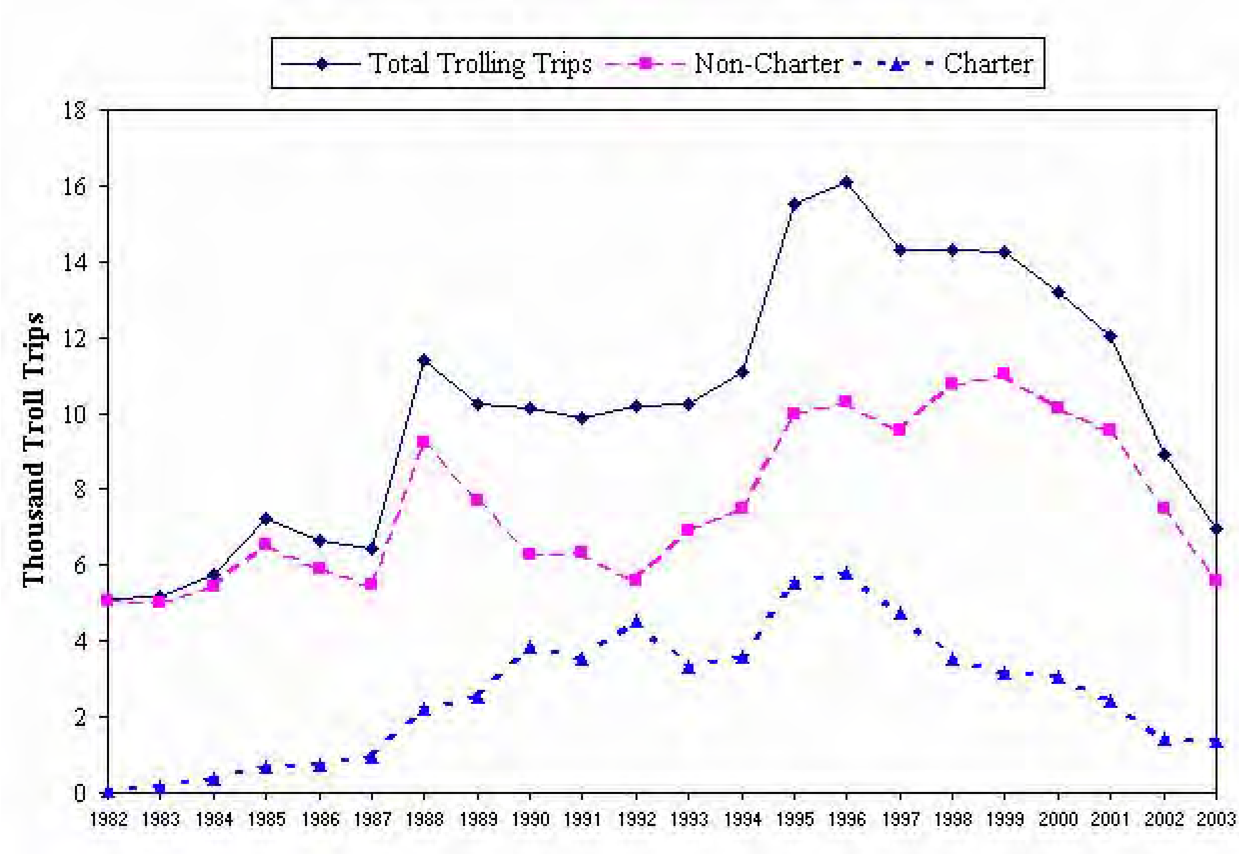
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files, expanded with the assistance of NMFS.

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 2003 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**
Average	343	410	308
Standard Deviation	87	103	80

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



Interpretations: Although, non-charter and charter troll trips have generally increased for the first 15 years of the 22-year time series, a general decrease in troll trips has been occurring since the mid 1990's. The decreases are most likely due to 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 2002, a significant number of bad weather days and direct hits by two supertyphoons caused a significant decrease in troll trips. Compared with 2003, total, non-charter, and charter trips decreased 22%, 26%, and 4% respectively. Limited access to the two largest public boat launching ramps during the first quarter of 2003 and a significant number of bad weather days during 2003 may have added to this decrease.

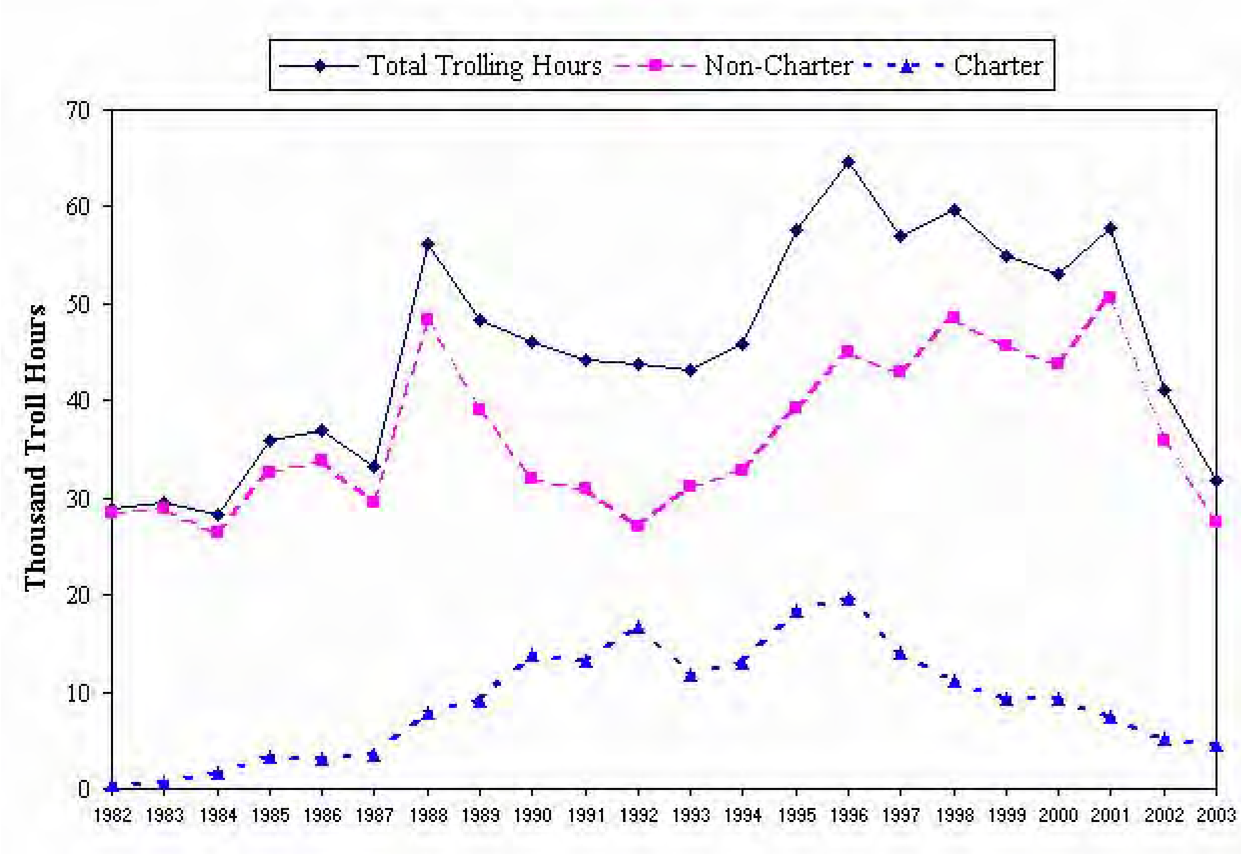
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files.

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	5,138	5,078	60
1983	5,187	5,039	148
1984	5,763	5,411	353
1985	7,209	6,544	665
1986	6,677	5,932	744
1987	6,458	5,513	945
1988	11,412	9,221	2,192
1989	10,230	7,714	2,515
1990	10,130	6,264	3,865
1991	9,870	6,325	3,545
1992	10,165	5,614	4,551
1993	10,247	6,931	3,316
1994	11,103	7,497	3,606
1995	15,528	10,000	5,528
1996	16,098	10,317	5,781
1997	14,279	9,528	4,751
1998	14,295	10,758	3,537
1999	14,233	11,053	3,180
2000	13,204	10,152	3,052
2001	12,016	9,563	2,453
2002	8,933	7,512	1,421
2003	**6,962**	**5,594**	**1,368**
Average	10,234	7,616	2,617
Standard Deviation	3,419	2,065	1,733

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. From 1996, charter troll hours dropped due to a decrease in charter trolling activity from a downturn in the Asian economy, which also added to the decrease in total troll hours. In 2003, total hours, non-charter hours, and charter trolling hours decreased 22%, 24%, and 14% respectively. Lack of access to the two major boat launching ramps during the first quarter of 2003 and a significant number of bad weather days during 2003 may have caused this decrease.

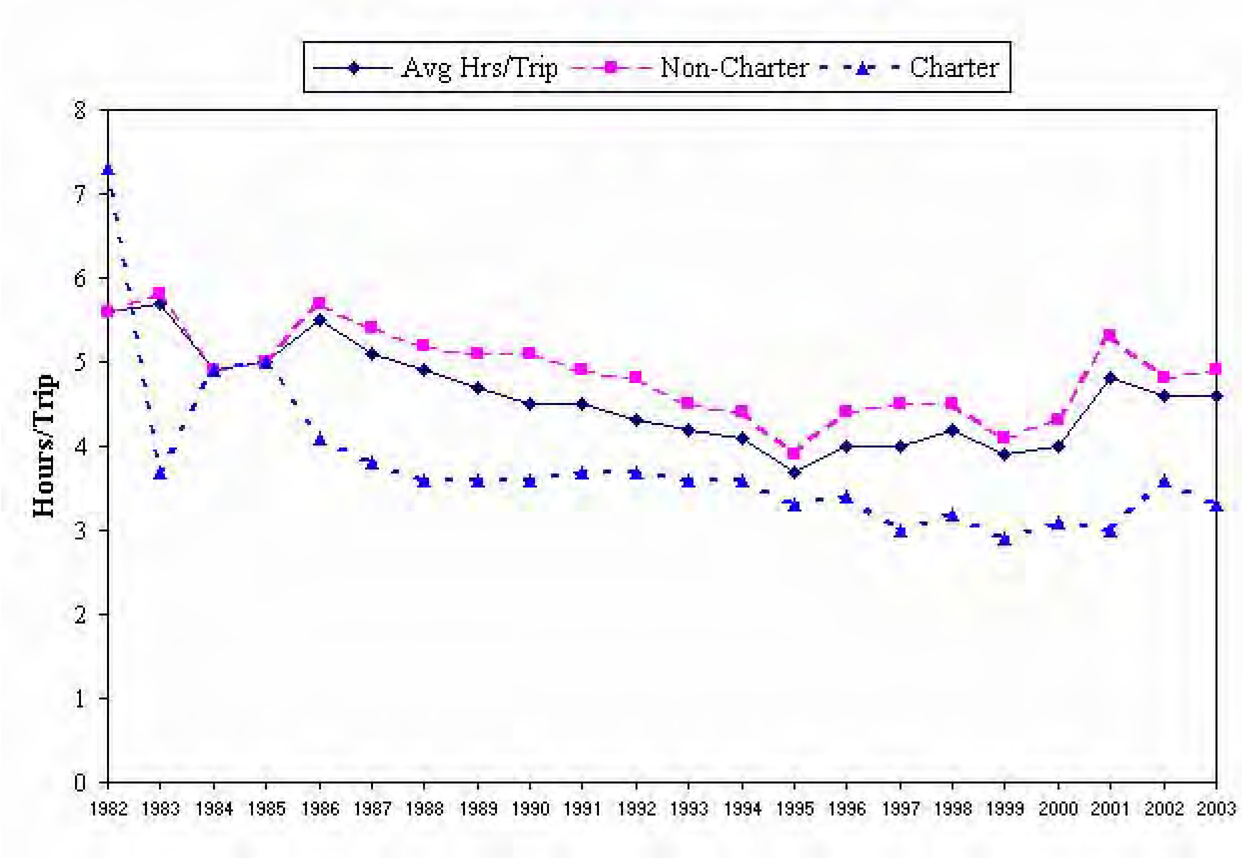
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files.

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	28,857	28,419	438
1983	29,555	29,009	546
1984	28,256	26,528	1,727
1985	35,895	32,593	3,302
1986	36,997	33,940	3,057
1987	33,187	29,605	3,582
1988	56,224	48,398	7,826
1989	48,226	39,063	9,163
1990	46,021	32,096	13,925
1991	44,151	31,016	13,135
1992	43,855	27,070	16,785
1993	43,131	31,274	11,857
1994	45,931	32,829	13,102
1995	57,626	39,284	18,342
1996	64,603	44,916	19,687
1997	56,994	42,856	14,137
1998	59,645	48,453	11,192
1999	54,991	45,685	9,305
2000	53,066	43,731	9,335
2001	57,825	50,489	7,336
2002	41,040	35,876	5,164
2003	**31,834**	**27,380**	**4,454**
Average	45,360	36,387	8,973
Standard Deviation	11,185	7,853	5,749

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



Interpretations: The overall average hours per trip remained the same for 2003. The average trip length did not change significantly for non-charter and charter trips, increasing 2% and decreasing 8% respectively. The redeployment of fish aggregating devices (FADs) during 2003 to replace those missing during 2002 still provide fishermen, charter and non-charter boats, with a prescribed route for trolling activity, although many trolling boats have been observed to be fishing banks located north and south of Guam. Overall trolling trip length appears to have remained constant throughout the 22-year time series, although the average charter trip has slightly declined to approximately three hours a trip.

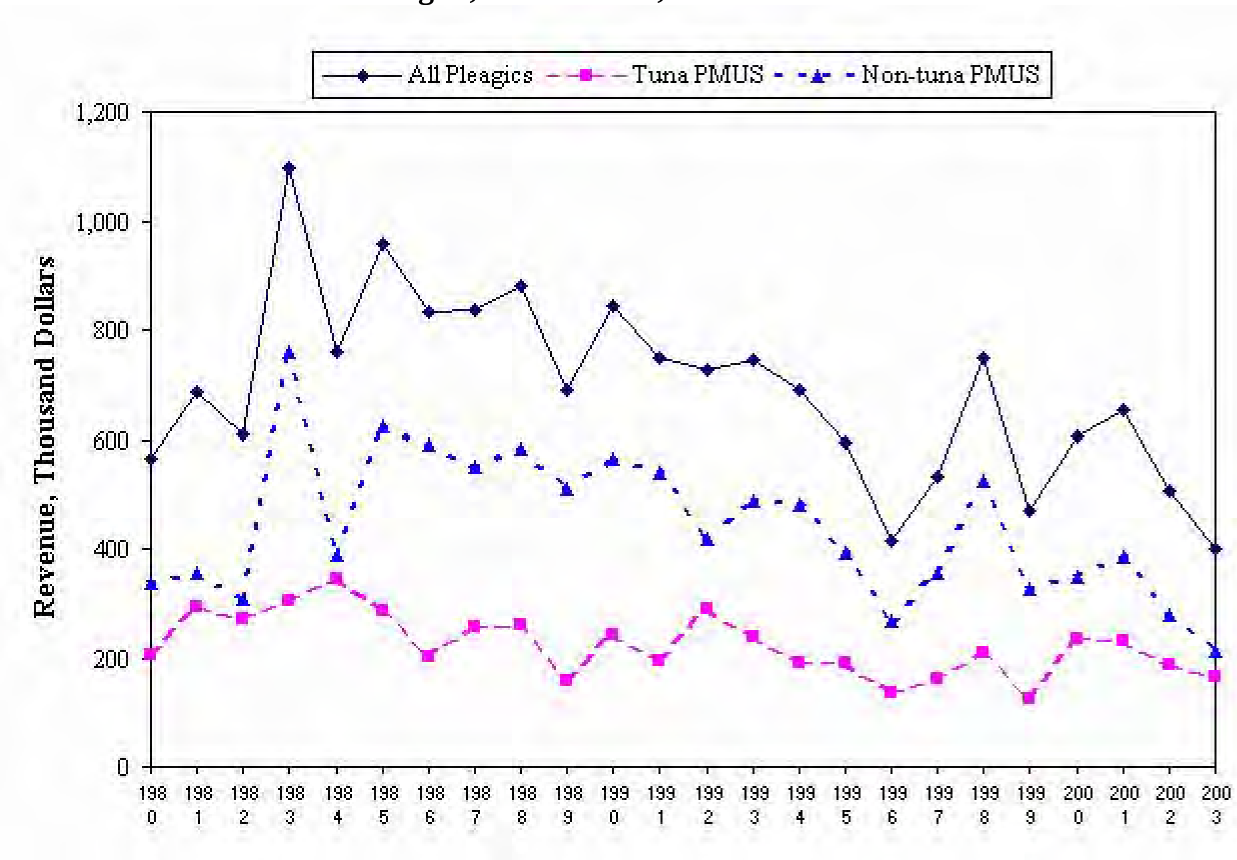
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files.

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	5.8	3.7
1984	4.9	4.9	4.9
1985	5.0	5.0	5.0
1986	5.5	5.7	4.1
1987	5.1	5.4	3.8
1988	4.9	5.2	3.6
1989	4.7	5.1	3.6
1990	4.5	5.1	3.6
1991	4.5	4.9	3.7
1992	4.3	4.8	3.7
1993	4.2	4.5	3.6
1994	4.1	4.4	3.6
1995	3.7	3.9	3.3
1996	4.0	4.4	3.4
1997	4.0	4.5	3.0
1998	4.2	4.5	3.2
1999	3.9	4.1	2.9
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**
Average	4.6	4.9	3.8
Standard Deviation	0.6	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 2003 decreased for all pelagics (21%), for tunas PMUS (13%), and for other non-tuna PMUS (23%). Commercial revenues slightly increased in 2001, but two severe supertyphoons and a significant number of bad weather days may have been a factor in decreases in 2002 and 2003. Overall, commercial revenues have shown a gradual decrease since the early 1980's.

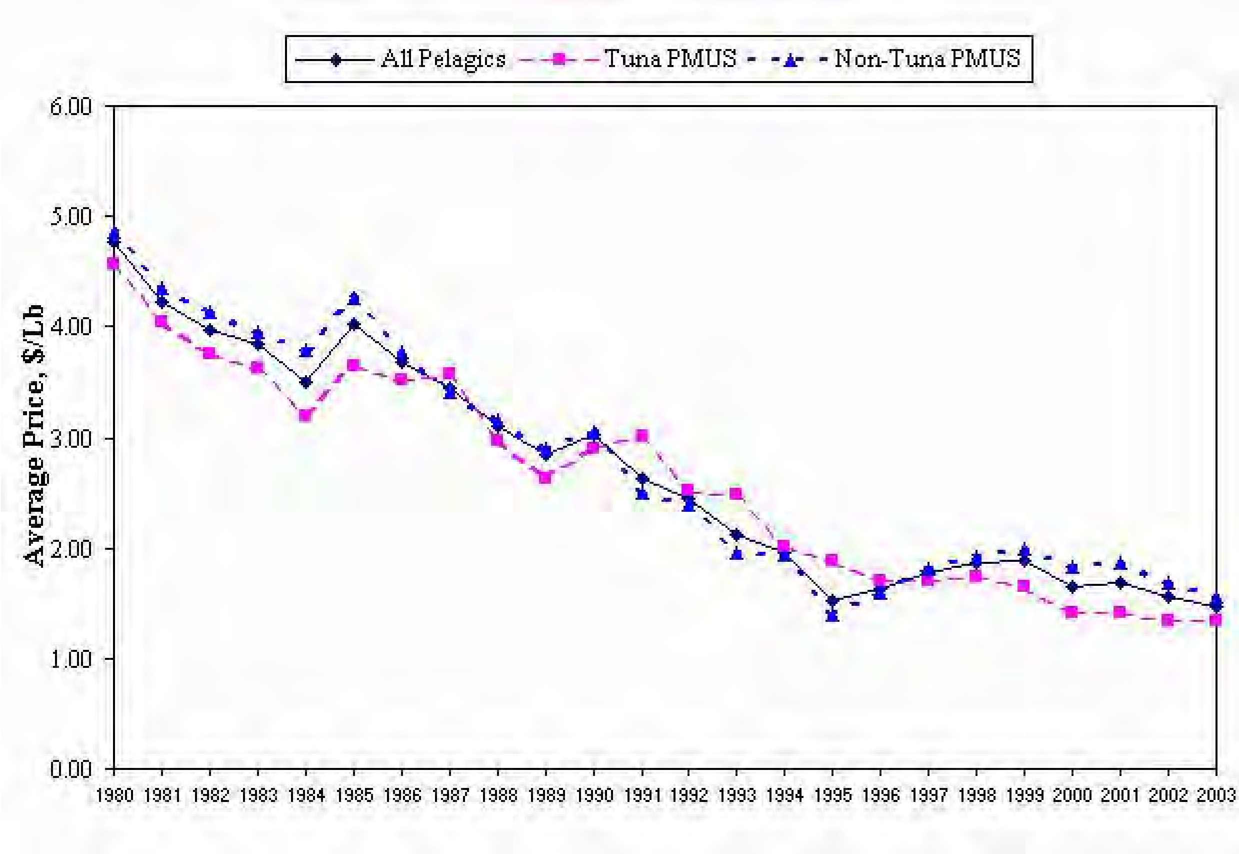
Source: The WPacFIN-sponsored commercial landings system.

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	564,434	54,353	205,724	88,775	336,015
1981	218,384	686,382	92,914	292,030	113,212	355,826
1982	203,847	609,300	90,719	271,159	103,459	309,239
1983	380,231	1,098,106	105,308	304,130	262,817	759,015
1984	286,490	761,204	129,389	343,787	146,339	388,824
1985	373,796	956,169	112,286	287,226	244,423	625,235
1986	334,955	834,038	81,299	202,435	237,826	592,187
1987	350,828	836,724	107,642	256,727	231,451	552,010
1988	388,630	880,635	115,243	261,141	258,203	585,089
1989	337,586	690,026	76,865	157,113	249,421	509,816
1990	471,241	843,051	136,321	243,878	316,491	566,202
1991	462,191	750,135	119,640	194,176	333,096	540,615
1992	492,707	726,251	195,547	288,236	284,546	419,421
1993	547,835	745,056	175,360	238,490	358,592	487,685
1994	593,838	690,634	165,296	192,239	411,832	478,960
1995	537,889	594,367	173,629	191,860	356,256	393,663
1996	392,442	412,849	127,375	133,999	254,063	267,274
1997	515,007	533,547	154,819	160,392	344,972	357,391
1998	718,169	747,614	201,639	209,906	502,801	523,416
1999	458,638	469,186	122,023	124,830	319,342	326,687
2000	603,370	605,180	234,735	235,440	349,312	350,360
2001	643,219	653,510	228,652	232,310	379,174	385,241
2002	500,777	505,784	184,705	186,552	274,929	277,679
2003	**399,989**	**399,989**	**163,423**	**163,423**	**214,143**	**214,143**
Average	431,716	691,424	139,549	224,050	276,478	441,750
Standard Deviation	141,344	169,884	48,261	56,897	99,750	133,924

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 pelagic fish was collected in 1980. The average price for all pelagics, tuna PMUS, and non-tuna PMUS decreased 5%, increased slightly ($0.01), and decreased 8% respectively. The sale of locally caught pelagic fish continues to compete with cheaper pelagic fish caught by longliners and sold at several roadside stands.

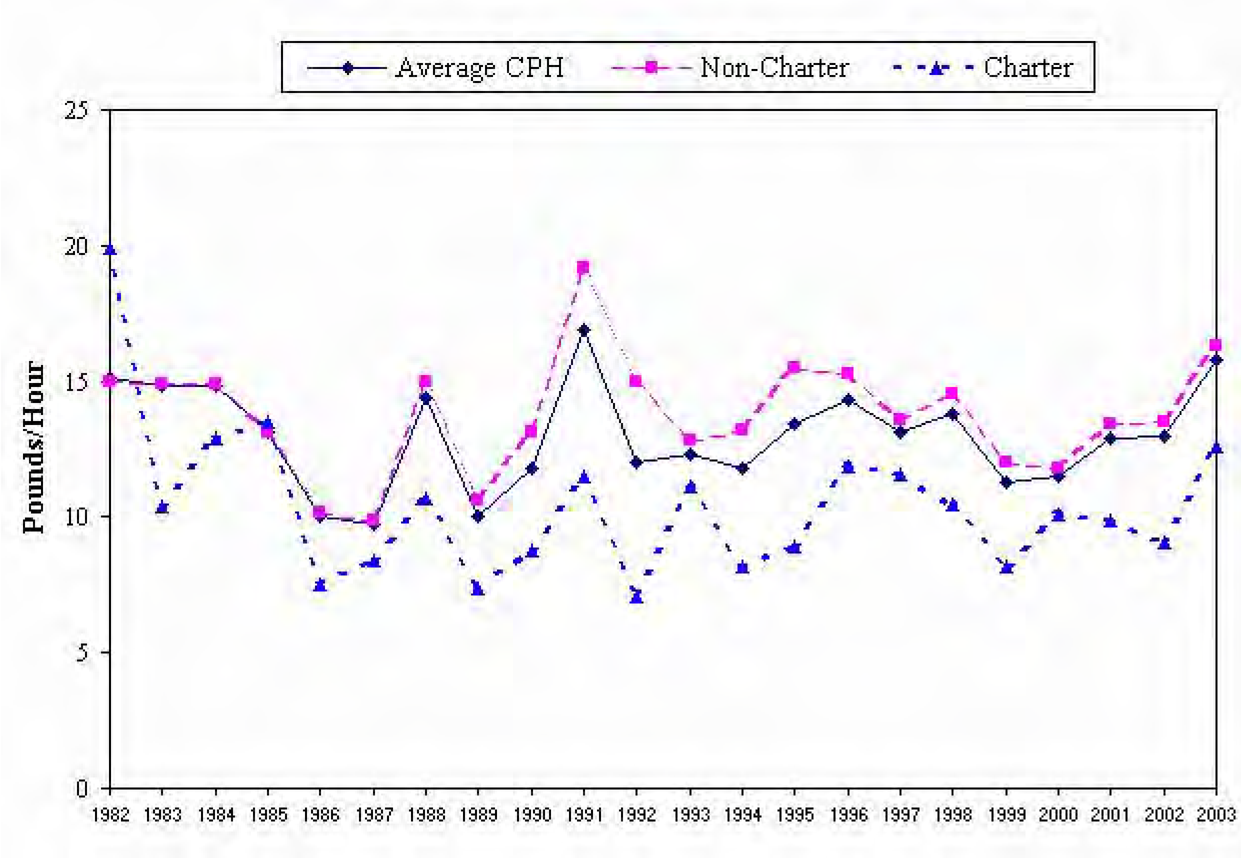
Source: The WPACFIN-sponsored commercial landings system.

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	4.77	1.21	4.57	1.29	4.87
1981	1.35	4.23	1.29	4.04	1.38	4.35
1982	1.33	3.97	1.25	3.75	1.38	4.13
1983	1.33	3.85	1.26	3.63	1.37	3.96
1984	1.31	3.49	1.20	3.20	1.43	3.80
1985	1.57	4.02	1.42	3.63	1.67	4.27
1986	1.48	3.69	1.41	3.51	1.51	3.76
1987	1.45	3.45	1.49	3.57	1.43	3.41
1988	1.37	3.10	1.31	2.96	1.39	3.15
1989	1.39	2.84	1.28	2.63	1.42	2.90
1990	1.69	3.02	1.62	2.90	1.70	3.05
1991	1.62	2.63	1.85	3.00	1.54	2.50
1992	1.66	2.45	1.70	2.51	1.62	2.39
1993	1.56	2.12	1.82	2.48	1.45	1.97
1994	1.69	1.97	1.73	2.02	1.67	1.94
1995	1.38	1.52	1.70	1.88	1.26	1.39
1996	1.56	1.64	1.62	1.70	1.52	1.60
1997	1.71	1.78	1.65	1.71	1.76	1.82
1998	1.79	1.87	1.68	1.75	1.84	1.92
1999	1.85	1.89	1.62	1.66	1.95	1.99
2000	1.64	1.65	1.41	1.42	1.83	1.84
2001	1.66	1.69	1.40	1.42	1.84	1.87
2002	1.54	1.55	1.33	1.34	1.67	1.68
2003	**1.47**	**1.47**	**1.35**	**1.35**	**1.55**	**1.55**
Average	1.53	2.69	1.48	2.61	1.56	2.75
Standard Deviation	0.17	1.03	0.20	0.98	0.19	1.07

**Figure 10a. Guam Trolling Catch Rates (Pounds/Hour):
Average CPH, 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 2003, total overall, non-charter, and charter trolling catch rate increased 22%, 21%, and 38%. In general, trolling catch rates have not shown significant year-to-year fluctuations. Charter catch rates have generally been less 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.

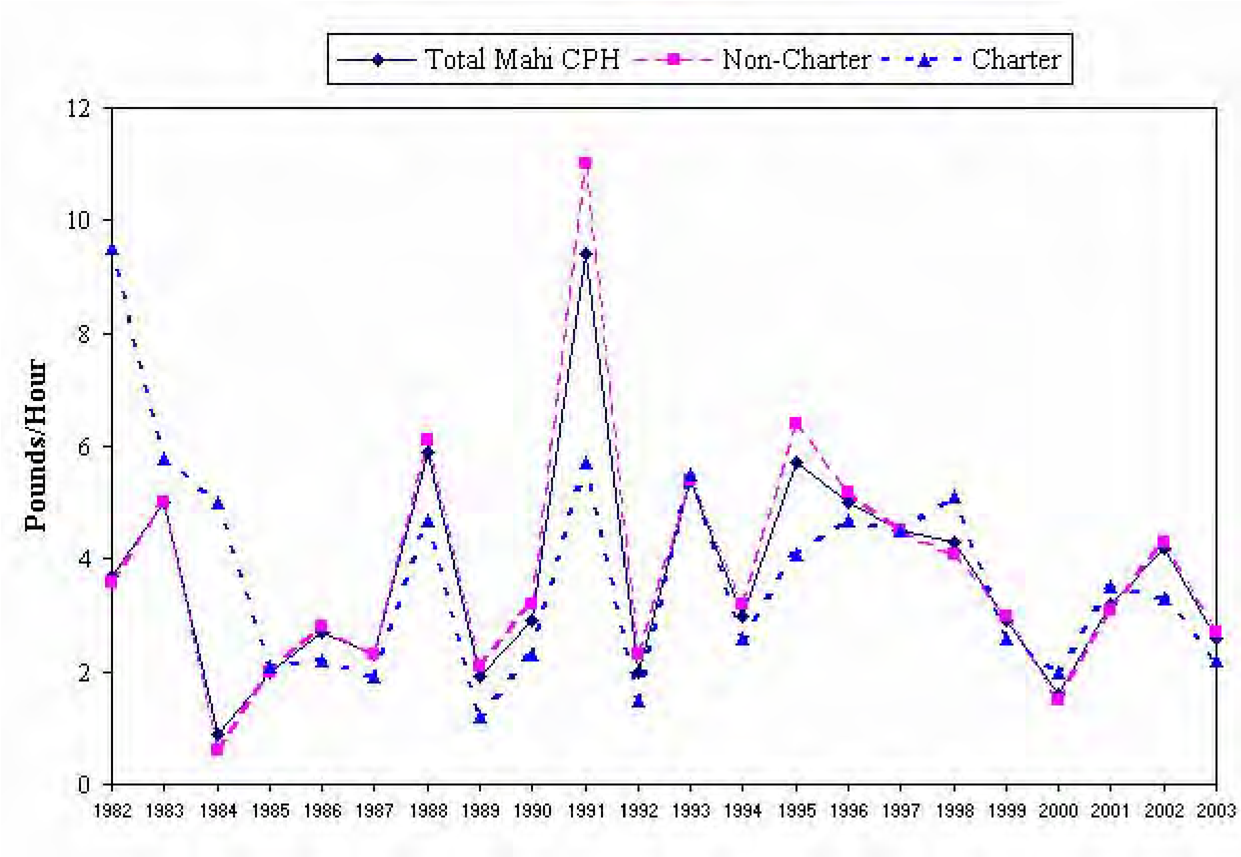
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files.

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	19.9
1983	14.8	14.9	10.4
1984	14.8	14.9	12.9
1985	13.1	13.1	13.5
1986	10.0	10.2	7.5
1987	9.7	9.9	8.4
1988	14.4	15.0	10.7
1989	10.0	10.6	7.4
1990	11.8	13.1	8.8
1991	16.9	19.2	11.5
1992	12.0	15.0	7.1
1993	12.3	12.8	11.1
1994	11.8	13.2	8.2
1995	13.4	15.5	8.9
1996	14.3	15.3	11.9
1997	13.1	13.6	11.6
1998	13.8	14.5	10.5
1999	11.3	12.0	8.2
2000	11.5	11.8	10.1
2001	12.9	13.4	9.9
2002	13.0	13.5	9.1
2003	**15.8**	**16.3**	**12.6**
Average	13.0	13.8	10.5
Standard Deviation	1.9	2.1	2.8

Figure 10b. Guam Trolling Catch Rates (Pounds/Hour): Mahimahi: 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 2003, the catch rate for total, non-charter, and charter mahimahi all decreased significantly, decreasing 38%, 37%, and 33% respectively.

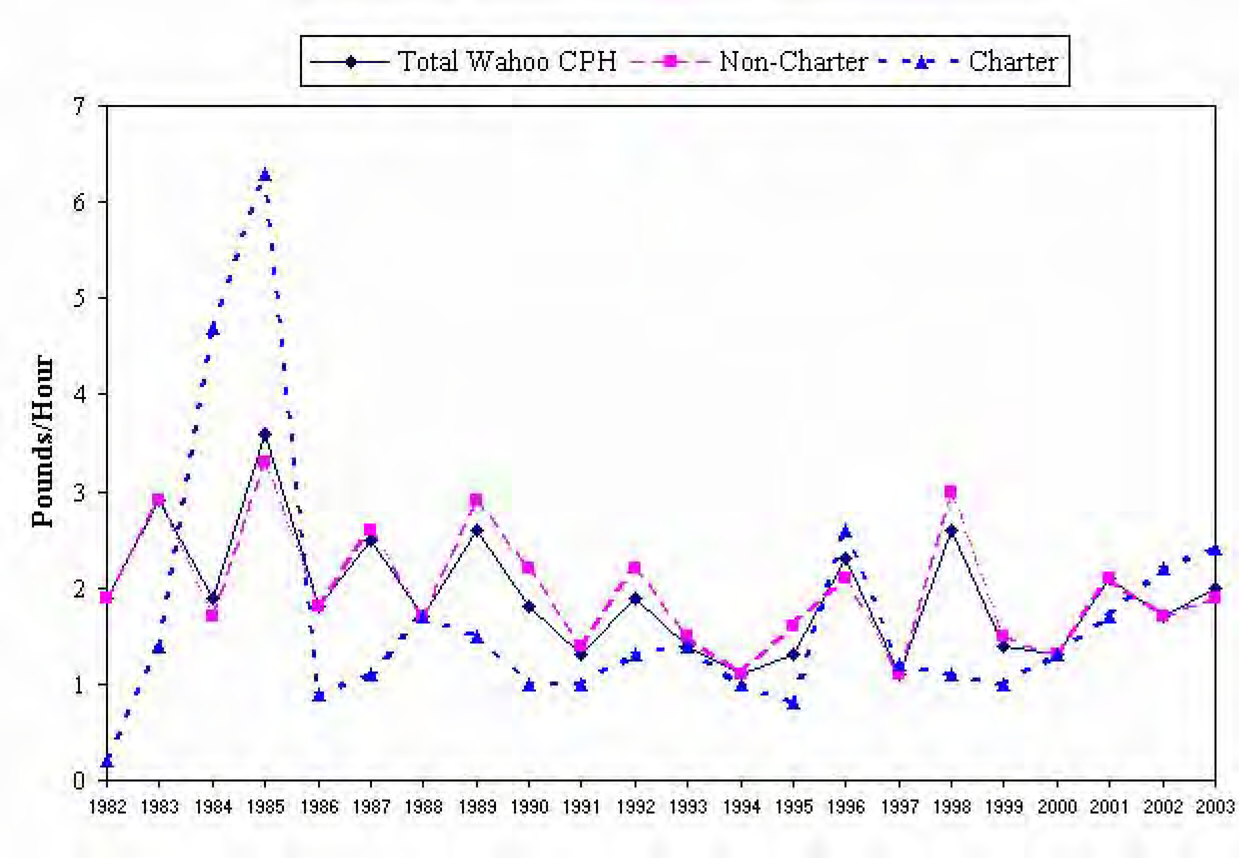
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files.

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	3.7	3.6	9.5
1983	5.0	5.0	5.8
1984	0.9	0.6	5.0
1985	2.0	2.0	2.1
1986	2.7	2.8	2.2
1987	2.3	2.3	1.9
1988	5.9	6.1	4.7
1989	1.9	2.1	1.2
1990	2.9	3.2	2.3
1991	9.4	11.0	5.7
1992	2.0	2.3	1.5
1993	5.4	5.4	5.5
1994	3.0	3.2	2.6
1995	5.7	6.4	4.1
1996	5.0	5.2	4.7
1997	4.5	4.5	4.5
1998	4.3	4.1	5.1
1999	2.9	3.0	2.6
2000	1.6	1.5	2.0
2001	3.2	3.1	3.5
2002	4.2	4.3	3.3
2003	**2.6**	**2.7**	**2.2**
Average	3.7	3.8	3.7
Standard Deviation	1.9	2.2	2.0

Figure 10c. Guam Trolling Catch Rates (Pounds/Hour):
Wahoo: 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. However, it is not possible to allocate species-specific effort, since effort used to target other species can result in artificially high or low catch rates for a given species. In 2003, the total non-charter, and charter catch rates for wahoo all increased, increasing, 18%, 12%, and 9% respectively.

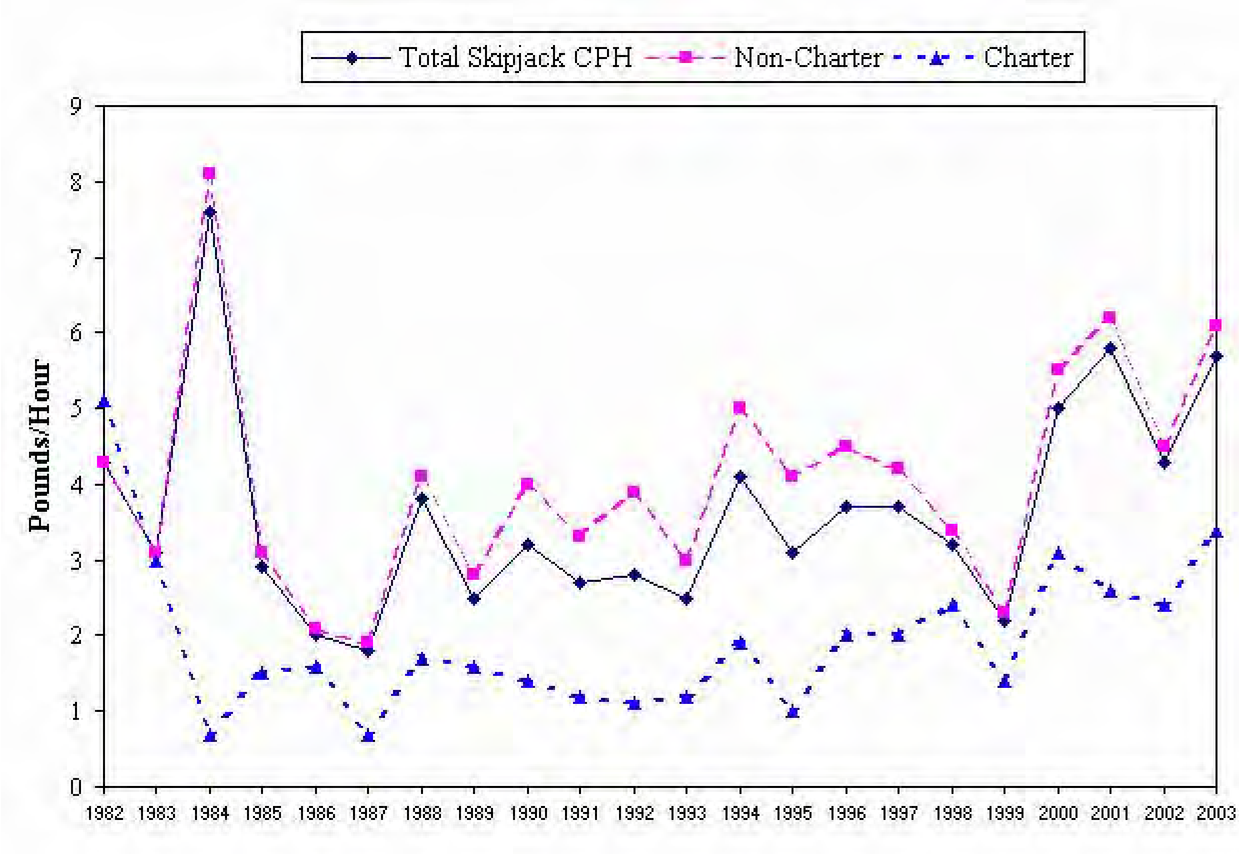
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files.

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	2.9	2.9	1.4
1984	1.9	1.7	4.7
1985	3.6	3.3	6.3
1986	1.8	1.8	0.9
1987	2.5	2.6	1.1
1988	1.7	1.7	1.7
1989	2.6	2.9	1.5
1990	1.8	2.2	1.0
1991	1.3	1.4	1.0
1992	1.9	2.2	1.3
1993	1.4	1.5	1.4
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	2.6	3.0	1.1
1999	1.4	1.5	1.0
2000	1.3	1.3	1.3
2001	2.1	2.1	1.7
2002	1.7	1.7	2.2
2003	**2.0**	**1.9**	**2.4**
Average	1.9	2.0	1.7
Standard Deviation	0.6	0.6	1.4

Figure 11a. Guam Trolling Catch Rates (Pounds/Hour):
Skipjack: 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 2003, the catch rates for total, non-charter, and charter skipjack tuna increased 33%, 36%, and 42% respectively.

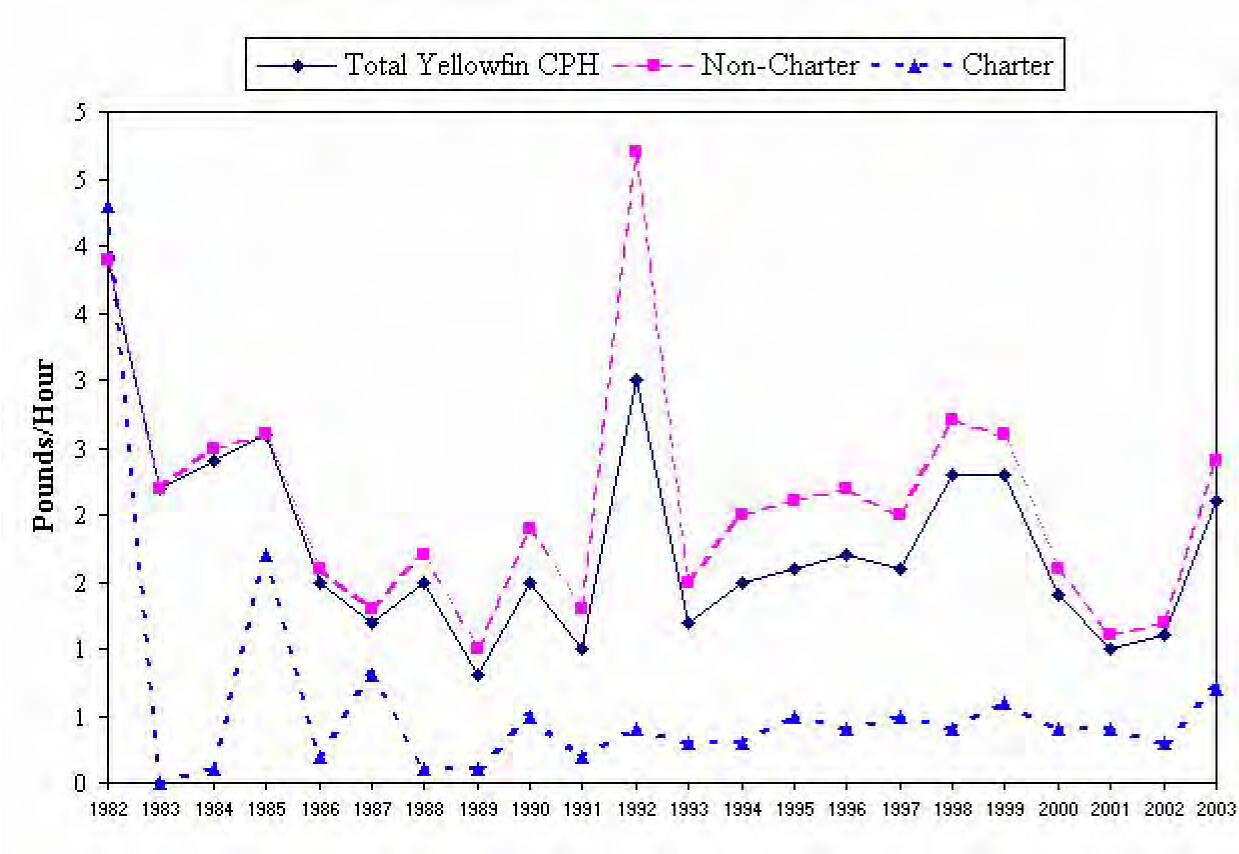
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files, expanded with the assistance of NMFS.

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	5.1
1983	3.1	3.1	3.0
1984	7.6	8.1	0.7
1985	2.9	3.1	1.5
1986	2.0	2.1	1.6
1987	1.8	1.9	0.7
1988	3.8	4.1	1.7
1989	2.5	2.8	1.6
1990	3.2	4.0	1.4
1991	2.7	3.3	1.2
1992	2.8	3.9	1.1
1993	2.5	3.0	1.2
1994	4.1	5.0	1.9
1995	3.1	4.1	1.0
1996	3.7	4.5	2.0
1997	3.7	4.2	2.0
1998	3.2	3.4	2.4
1999	2.2	2.3	1.4
2000	5.0	5.5	3.1
2001	5.8	6.2	2.6
2002	4.3	4.5	2.4
2003	**5.7**	**6.1**	**3.4**
Average	3.6	4.1	2.0
Standard Deviation	1.4	1.5	1.0

Figure 11b. Guam Trolling Catch Rates (Pounds/Hour):
Yellowfin: 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 2003, the yellowfin catch rates for total, non-charter, and charter catch increased 91%, 100%, and 133% respectively.

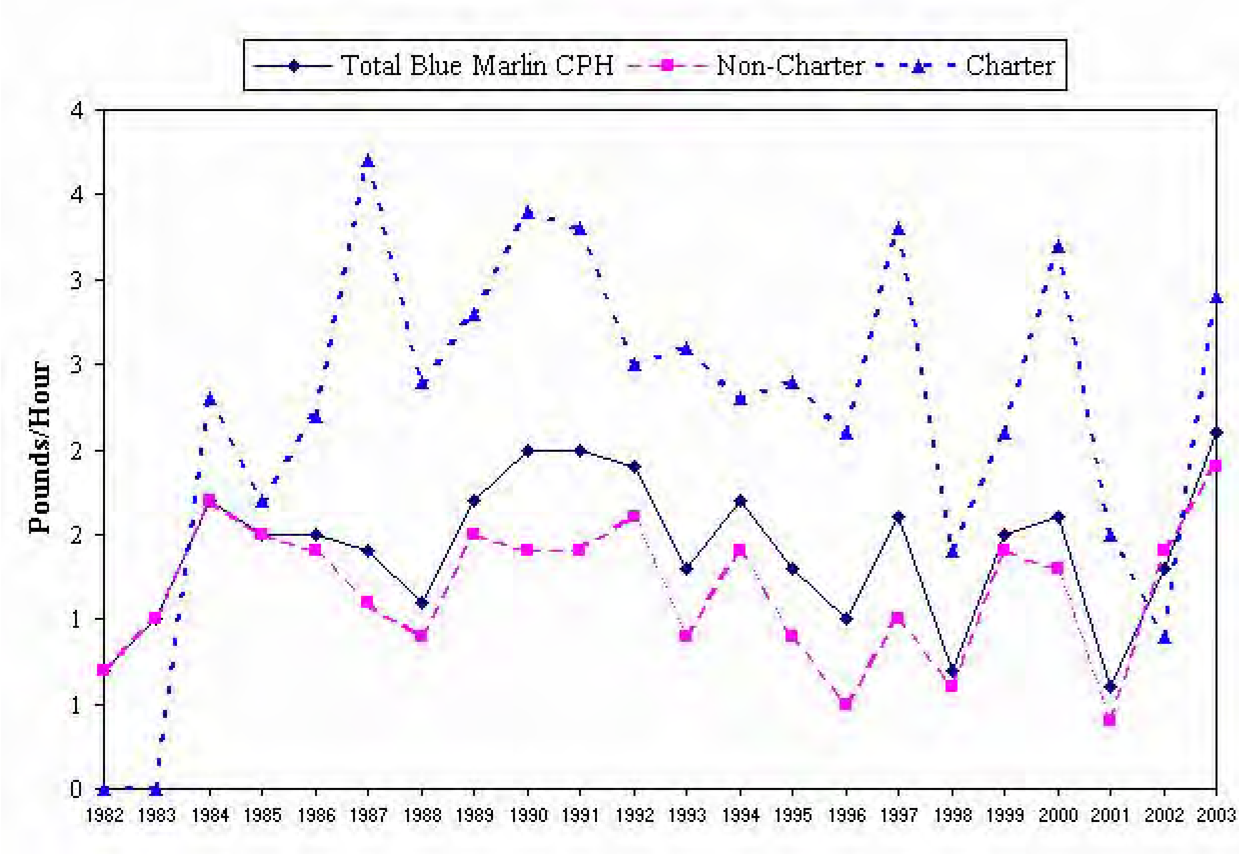
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files, expanded with the assistance of NMFS.

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	3.9	3.9	4.3
1983	2.2	2.2	0.0
1984	2.4	2.5	0.1
1985	2.6	2.6	1.7
1986	1.5	1.6	0.2
1987	1.2	1.3	0.8
1988	1.5	1.7	0.1
1989	0.8	1.0	0.1
1990	1.5	1.9	0.5
1991	1.0	1.3	0.2
1992	3.0	4.7	0.4
1993	1.2	1.5	0.3
1994	1.5	2.0	0.3
1995	1.6	2.1	0.5
1996	1.7	2.2	0.4
1997	1.6	2.0	0.5
1998	2.3	2.7	0.4
1999	2.3	2.6	0.6
2000	1.4	1.6	0.4
2001	1.0	1.1	0.4
2002	1.1	1.2	0.3
2003	**2.1**	**2.4**	**0.7**
Average	1.8	2.1	0.6
Standard Deviation	0.7	0.9	0.9

Figure 11c. Guam Trolling Catch Rates (Pounds/Hour):
Blue Marlin: 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. Except for charter trolling, the blue marlin catch rates increased for a second year in a row. The catch rates for total, non-charter, and charter blue marlin increased 62%, 36%, and 222% respectively in 2003. All catch rates were above the 22-year average.

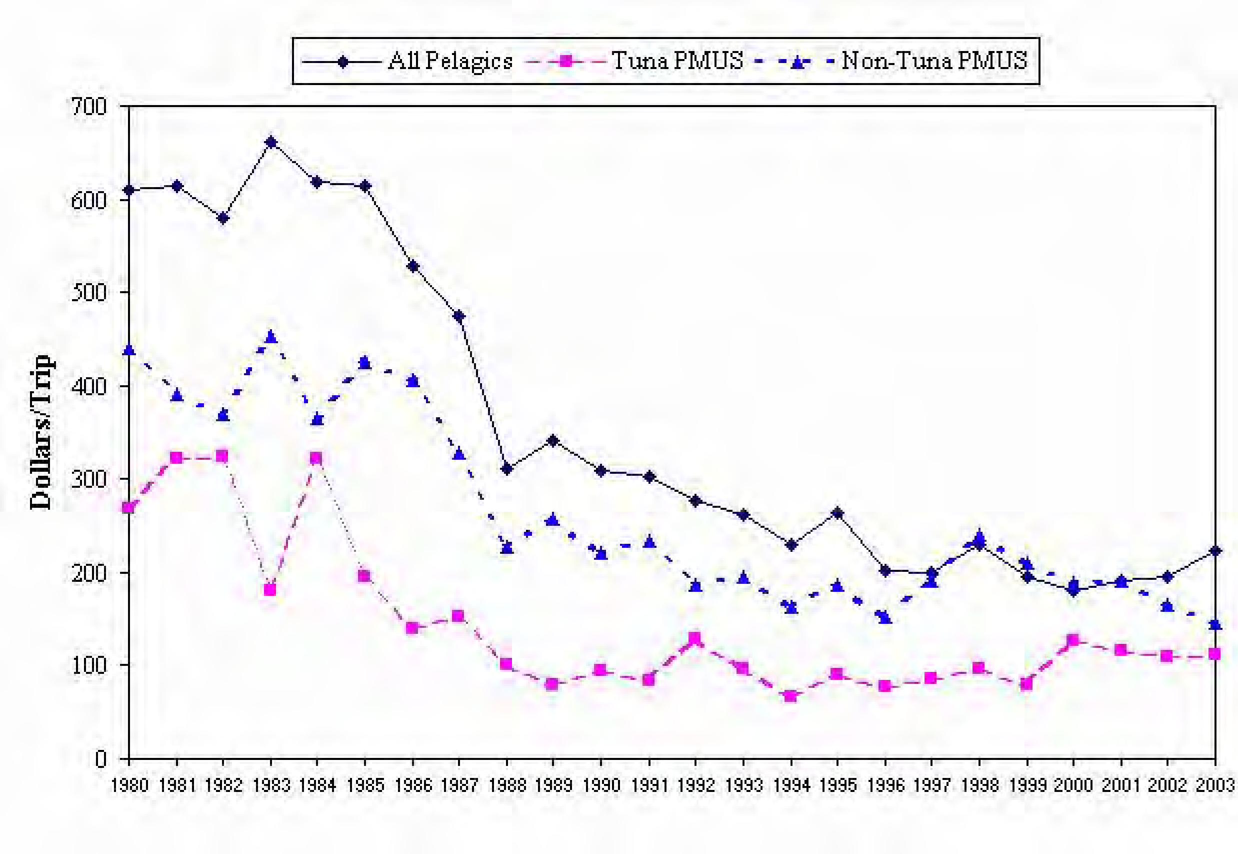
Source: The Division of Aquatic and Wildlife Resources (DAWR) offshore creel sampling program and its associated computerized data expansion system files, expanded with the assistance of NMFS.

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	0.0
1983	1.0	1.0	0.0
1984	1.7	1.7	2.3
1985	1.5	1.5	1.7
1986	1.5	1.4	2.2
1987	1.4	1.1	3.7
1988	1.1	0.9	2.4
1989	1.7	1.5	2.8
1990	2.0	1.4	3.4
1991	2.0	1.4	3.3
1992	1.9	1.6	2.5
1993	1.3	0.9	2.6
1994	1.7	1.4	2.3
1995	1.3	0.9	2.4
1996	1.0	0.5	2.1
1997	1.6	1.0	3.3
1998	0.7	0.6	1.4
1999	1.5	1.4	2.1
2000	1.6	1.3	3.2
2001	0.6	0.4	1.5
2002	1.3	1.4	0.9
2003	**2.1**	**1.9**	**2.9**
Average	1.4	1.2	2.2
Standard Deviation	0.4	0.4	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 revenue values have remained fairly constant for past 7 years. In 2003, the adjusted revenue per trip increased 15% for all pelagics, increased <1% ($0.45) for tuna PMUS, and decreased 12% for non-tuna PMUS. Despite overall declines in revenue, fishing effort still occur. Most charter and non-charter trolling boats do not rely on selling their fish for their primary source of income, and a reliable market for members of the local fishermen's cooperative provides additional income. Fishermen also combine trolling effort with other fishing methods, such as bottomfishing, spearfishing, and jigging to offset fishing-related expenses.

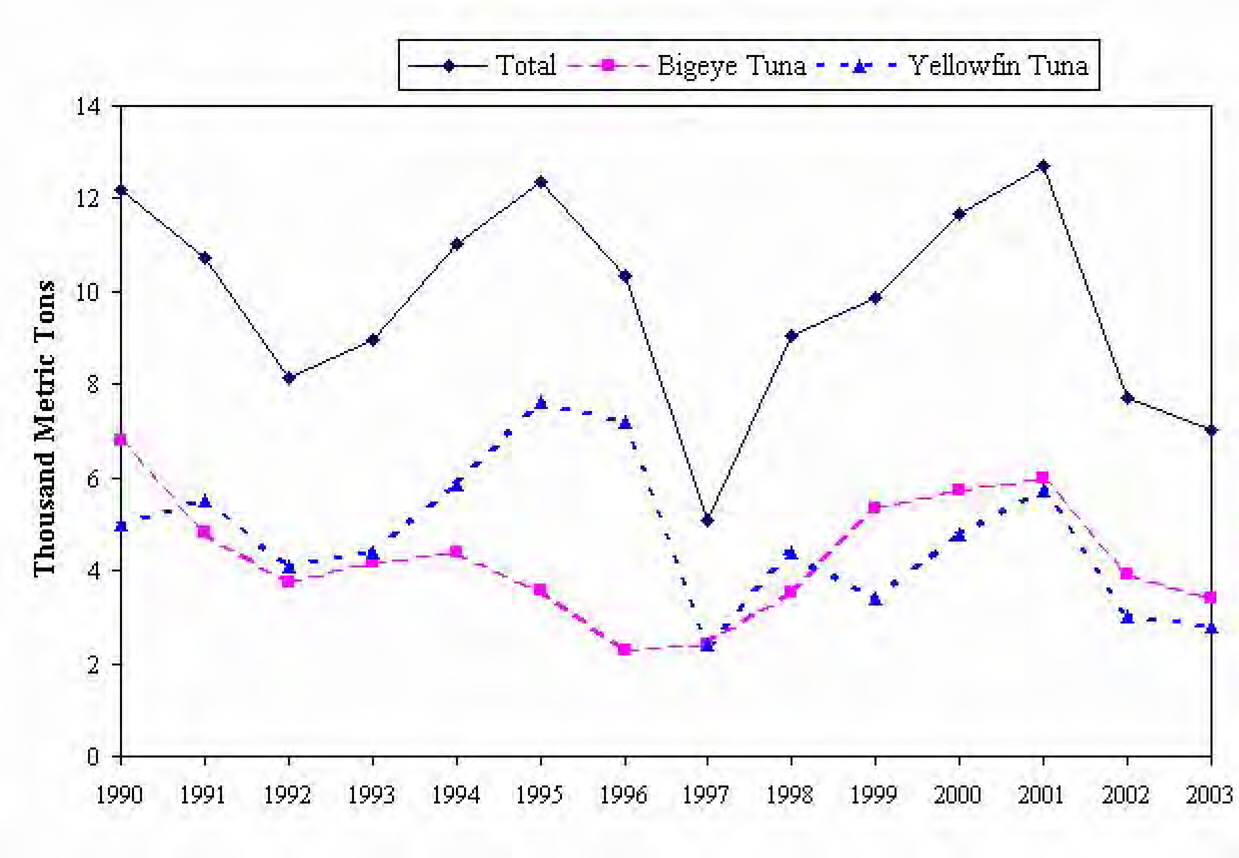
Source: The WPacFIN-sponsored commercial landings system.

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	610.56	71.14	269.26	116.20	439.82
1981	195.29	613.80	102.24	321.34	124.58	391.55
1982	194.29	580.73	108.45	324.16	123.68	369.68
1983	229.26	662.10	62.81	181.40	156.75	452.69
1984	233.01	619.11	121.56	322.98	137.48	365.28
1985	240.34	614.79	76.21	194.95	165.90	424.37
1986	212.25	528.50	55.68	138.64	162.89	405.60
1987	199.18	475.04	64.07	152.81	137.77	328.58
1988	137.30	311.12	44.98	101.92	100.78	228.37
1989	166.79	340.92	38.89	79.49	126.20	257.95
1990	172.68	308.92	53.19	95.16	123.50	220.94
1991	185.96	301.81	51.79	84.06	144.20	234.04
1992	188.33	277.60	86.72	127.83	126.18	185.99
1993	191.92	261.01	70.60	96.02	144.36	196.33
1994	197.09	229.22	56.32	65.50	140.32	163.19
1995	239.79	264.97	82.55	91.22	169.38	187.16
1996	191.10	201.04	72.55	76.32	144.71	152.23
1997	192.95	199.90	82.74	85.72	184.35	190.99
1998	221.01	230.07	92.81	96.62	231.44	240.93
1999	190.05	194.42	78.35	80.15	205.04	209.76
2000	179.42	179.96	127.01	127.39	189.00	189.57
2001	188.68	191.70	113.92	115.74	188.92	191.94
2002	193.42	195.35	109.41	110.50	162.85	164.48
2003	**223.73**	**223.73**	**110.95**	**110.95**	**145.38**	**145.38**
Average	196.88	359.02	80.62	143.76	152.16	264.03
Standard Deviation	25.23	173.70	25.37	82.55	30.95	102.35

Figure 13. Annual Guam Longline Landings
from Primarily Foreign Longliners Fishing Outside the Guam EEZ



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 tranship their catch through Guam. The dramatic drop observed in 1997 was due to foreign fleets leaving the western Pacific, usually due to available fish stocks and fishing licenses with neighboring Pacific island nations. Compared with 2002, the 2003 total longline landings decreased 9%, with bigeye landings decreasing 13% and yellowfin landings decreasing 7%. Landings from this fishery have declined 45% since 2001, with the Japanese fleet landings declining 39% and the Taiwanese landings declining 53%. Other pelagics, including marlin, swordfish, mahimahi and other species, are also caught and landed by this fishery but are not reported separately in this module.

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	7,703	3,922	3,015
2003	**7,004**	**3,416**	**2,792**
Average	9,776	4,293	4,730
Standard Deviation	2,241	1,317	1,572

Table 4: Offshore Creel Survey Bycatch Number Summary-Trolling

Species		Number Released Alive	Number Released Dead/Injd	Number Released Both	Caught All	BC %	Interviews With BC	Interviews All	Interviews BC %
Method: Trolling									
Non Charter									
31501	Coryphaena hippurus	5		5	258	1.94			
	Total	*5*		*5*	*258*	*1.94*	*2*	*178*	*1.12*
	Compare with All Species				*2729*	*0.18*			
Charter									
	Compare with All Species				*297*	*0.00*			
Total in Trolling		**5**		**5**	**258**	**1.94**	**2**	**178**	**1.12**
Compare with All Species					**3026**	**0.17**			

Interpretation: For 2003, the total estimated number of pelagic by-catch was 5 pieces or 1.94% of the total number of trolling fish caught. The bycatch consisted only of five mahimahi's released alive on two interviews out of a total of 178 total trolling interviews. The number of pieces of pelagic bycatch is not an expanded value, but are taken directly from the actual interviews. In addition to the mahimahi reported during creel survey days, fishermen have told Fisheries staff of releasing sharks as bycatch, both alive and killed.

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

Appendix 3

Hawaii

Introduction

Hawaii's pelagic fisheries, which include the longline, main Hawaiian Island (MHI) troll and handline, offshore handline, and the aku boat (pole and line) fisheries; are the state's largest and most valuable. The target species are tunas and billfish, but a variety of other species are also caught with some regularity. The longline, MHI troll and handline, and aku boat fisheries have a long history, whereas the offshore handline fishery is relatively new and dates back to only 1990. Collectively, these pelagic fisheries caught[1] an estimated 23 million pounds worth an estimated ex-vessel value of $48 million in 2003.

The largest component of pelagic catch in 2003 was tunas. The trend for tuna catches is, in general, increasing and represented 65% of the total pelagic catch in 2003. Bigeye tuna was the largest component of the tuna and has increased almost five-fold from its catch in 1987. Billfish catch dominated catch in the early 1990s making up about half of the total pelagic catch during that period but has declined to represent only 15% of the total catch in 2003. Swordfish was the largest component of the billfish catch from 1990 through 2000, was replaced by blue marlin in the next two years, and followed by striped marlin in 2003. Other pelagic Management Unit Species (PMUS) catch rose from 970 thousand pounds in 1988 to 3.8 million pounds in 1999 and remained at about 3 million pounds in the following three years and rose to a record 4.2 milion pounds in 2003. Mahimahi was the largest component of other pelagic catch though ono (wahoo) and moonfish catches rose to comparable levels of mahimahi catch.

The longline catch was the largest of all pelagic fisheries in Hawaii and represented 77% of the total commercial pelagic catch in 2003. There were 110 active Hawaii-based longline vessels in 2003. Participation in the Hawaii-based longline fishery rose rapidly from 37 vessels in 1987 and peaked at 141 vessels in 1991 decreased to 103 vessels in 1996 as vessels left for the U.S. mainland (primarily California) and Fiji. The number of vessels gradually increased to 125 vessels in 2000 with the return of the vessels that had migrated to the mainland and the arrival of new participants from the U.S. west coast and Alaska. Court-ordered regulations limiting swordfish-directed effort implemented in 2000 and regulations in the Fishery Management Plan (FMP) for Pelagic Fisheries of the Western Pacific Region implemented in 2001 either forced vessels to convert and target tunas or leave Hawaii to fish for swordfish. Because the restriction prohibiting shallow sets (<15 hooks between floats) occurred in 2001 the only summary statistics were for deep set ($\geq$ 15 hooks between floats) tuna fishing thereafter. Many of those longline vessels that left Hawaii continued to target swordfish out of California. Twenty-two California-based longline vessels submitted federal longline logbook data in 2003.

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[1] This module reports "catch", as opposed to "landings" in most cases. Catch is that identified as *Pounds Caught* on HDAR commercial catch reports or the volume estimated from the longline logbook's number caught (x estimated round weight of fish kept). In some cases *Pounds Sold* are used in a market sense (i.e., number kept x estimated round weight).

The total number of longline trips out of Hawaii has remained relatively stable over the past ten years. However, there has been a significant change with a shift of longline effort from swordfish to tunas. The number of swordfish-directed trips has declined from 319 in 1993 to 0 in 2003. In contrast, tuna-directed effort has increased during this period, from 458 trips in 1992 to 1,215 trips in 2003.

Pelagic landings of the main Hawaiian Islands (MHI) troll and handline fisheries were relatively stable throughout the late 1980s into 2003. Catch by the aku boat fleet (pole-and-line for skipjack tuna) has been on a declining trend down to a historic low in 2002 and increasing 50% in 2003. The offshore handline fishery has grown into a fishery with catches that rivals and often exceeds catches of the established aku boat fishery. However, the offshore handline landings were off by 70% in 2003.

Information & Sources

This report contains the most recently available information on Hawaii's commercial pelagic fisheries. Commercial fisheries reports are compiled from four data sources: The State of Hawaii's Division of Aquatic Resources (HDAR) commercial fish catch data, HDAR fish dealer data, the National Marine Fisheries Service (NMFS) Pacific Islands Fisheries Science Center’s (PIFSC) longline logbook data, and joint NMFS and HDAR marketing monitoring data.[2] Detailed data are not available for recreational fishers because they are not required to file catch reports (if they sell no fish during the year) and there is no comprehensive creel survey of Hawaii anglers. Recent 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.[3] The NMFS Marine Recreational Fisheries Statistical Survey (MRFSS) has reinitiated operations in Hawaii after a 20 year absence with the first full year of fielding 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.

The Council’s annual report module for Hawaii was prepared using final 2001 and 2002 NMFS data tabulations and preliminary 2002 HDAR data. Final HDAR commercial catch reports for 2002, which include the troll, handline, pole-and-line, and other gears data, were not available when the bulk of this report was prepared. These data will be updated in the next annual report. Finally, total catch and CPUE analyses do not necessarily equal overall catch tables by fishery and species presented in this report due to compilations based on separate versions of the HDAR data sets.

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2 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.

3 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.

This module was prepared by Russell Ito of NMFS and reviewed by Bill Walsh PFRP, JIMAR. Information from NMFS longline logbooks was provided by Frederick Dowdell of NMFS. HDAR commercial catch and fish dealer data used in the NMFS time-series were compiled by Craig Graham from UH, JIMAR. Information on HDAR Commercial Marine Licenses (CMLs) was provided by Reginald Kokubun, HDAR.

Hawaii commercial marine license information[4]

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 Commercial Marine License at time of licensing. This does not preclude fishermen from using other gears or methods.

A total of 3,219 fishermen were licensed in 2003, including 2,037 (67%) who indicated that their primary fishing method and gear were intended to catch pelagic fish. Most licenses that indicated pelagic fishing as their primary method were issued to trollers (73%) and longline fishermen (17%). The remainder was issued to ika shibi and palu ahi (handline) (8%) and aku boat fishers (2%).

Primary fishing method	**Number of licenses required to report**	
	2002	**2003**
Trolling	1,451	1,494
Longline	367	356
Ika Shibi & Palu Ahi	164	156
Aku Boat (pole and line)	43	31
Total pelagic	**2,025**	**2,037**
Total all methods	**3,195**	**3,219**

2003 Plan Team Recommendations:

1. **Develop compendium of configurations of Hawaii longline gears. Timing of sets and hauls maybe critical.**

2. **Workshop on HDAR data useage in fishery dynamics and analyses**

3. **Recommend review of commercial fisheries under-reporting with special focus on offshore handline fishery.**

[4] Information provided by the Hawaii Division of Aquatic Resources (HDAR).

Tables

Figures

Figures (continued)

Table 1. Hawaii commercial pelagic catch, revenue, and average price by species, 2002-2003.

	2002			2003		
Species	**Pounds caught (1000 lbs)**	**Ex-vessel revenue ($1000)**	**Average price ($/lb)**	**Pounds caught (1000 lbs)**	**Ex-vessel revenue ($1000)**	**Average price ($/lb)**
Tuna PMUS						
Albacore	1,670	$1,930	$1.17	1,340	$1,560	$1.16
Bigeye tuna	10,970	$28,480	$2.68	8,350	$25,780	$3.12
Bluefin tuna	2	$4	$8.22	1	$5	$9.64
Skipjack tuna	1,160	$1,210	$1.27	1,580	$1,330	$1.00
Yellowfin tuna	2,680	$5,960	$2.27	3,420	$8,620	$2.52
Other tunas	10	$9	$1.01	10	$4	$1.02
Tuna PMUS subtotal	**16,500**	**$37,600**	**$2.37**	**14,700**	**$37,300**	**$2.60**
Billfish PMUS						
Swordfish	720	$1,380	$1.96	320	$690	$2.22
Blue marlin	1,040	$1,020	$1.17	1,160	$820	$0.86
Striped marlin	610	$980	$1.60	1,370	$1,160	$0.84
Other marlins	390	$290	$0.88	580	$270	$0.52
Billfish PMUS subtotal	**2,800**	**$3,700**	**$1.45**	**3,400**	**$2,900**	**$0.93**
Other PMUS						
Mahimahi	1,420	$2,620	$1.91	1,340	$2,910	$2.22
Ono (wahoo)	690	$1,450	$2.20	1,000	$1,900	$1.94
Opah (moonfish)	920	$1,220	$1.34	1,090	$1,510	$1.38
Pomfrets	500	$680	$1.38	460	$780	$1.69
Oilfish	200	$290	$1.43	280	$420	$1.50
Sharks (whole weight)	350	$110	$0.41	340	$110	$0.37
Other pelagics	20	$10	$0.85	20	$20	$0.88
Other PMUS subtotal	**4,100**	**$6,400**	**$1.63**	**4,500**	**$7,700**	**$1.72**
Total pelagics	**23,400**	**$47,700**	**$2.14**	**22,600**	**$47,900**	**$2.18**

Interpretation: The total commercial pelagic catch was 22.6 million pounds in 2003, down 3% (-800 thousand pounds) from 2002. Tunas represented 65% of the total catch. Although bigeye tuna catch was down 24% from a record catch observed in the previous year, it was still the largest component representing about 37% of the total catch. Yellowfin tuna was the next largest component. Striped marlin was the largest component of the billfish catch, while mahimahi, opah, and ono were the largest components of the other PMUS category in 2003.

Total Hawaii commercial ex-vessel revenue ($47.9 million) was about the same in 2003 as in the previous year. Tunas comprised 78% of this total. Bigeye tuna alone accounted for 54% of the total revenue at $25.8 million. Yellowfin tuna was the next highest contributor to total revenue at $8.6 million. Billfish revenue decreased 22% in 2003. Other pelagic catch was up 20%, with the highest revenue coming from mahimahi.

The total pelagic fish price increased slightly in 2003. The average price for tuna was 10% higher in 2003. The overall increase in tuna price was related to a moderate gain in bigeye tuna and yellowfin tuna prices, the two largest components of the catch. Billfish prices dropped 36% due to lower marlin prices. The increase in other PMUS is attributed to higher mahimahi and pomfret prices in 2003.

Source and Calculations: Longline logbook data are collected and processed by NMFS while longline market data are summarized from HDAR fish dealer reports. Total catch for the longline fishery was estimated by multiplying the number of fish kept from the NMFS longline logbook summaries with average weights from the fish dealer reports. Estimated total ex-vessel revenue was calculated by multiplying the estimated total catch by the average price from the fish dealer reports. Average weights and prices were used from HDAR fish dealer reports. Catch, revenue, and prices for the troll, handline, and aku boat fisheries were produced from HDAR commercial catch reports and fish dealer reports.

Table 2. Hawaii commercial pelagic catch, revenue, and average price by gear, 2002-2003.

	2002			2003		
Gear	**Pounds caught (1000 lbs)**	**Ex-vessel revenue ($1000)**	**Average price ($/lb)**	**Pounds caught (1000 lbs)**	**Ex-vessel revenue ($1000)**	**Average price ($/lb)**
Longline	17,500	$37,500	$2.26	17,400	$38,600	$2.31
MHI trolling	2,390	$4,520	$1.97	2,690	$5,480	$2.05
MHI handline	1,770	$3,010	$1.71	1,150	$2,200	$1.92
Offshore handline	990	$1,500	$1.62	300	$430	$1.45
Aku boat	680	$880	$1.35	1,020	$1,000	$0.99
Other gear	110	$240	$2.30	70	$140	$2.22
Total	**23,400**	**$47,700**	**$2.14**	**22,600**	**$47,900**	**$2.18**

Interpretation: The longline fishery is the largest commercial fishery in Hawaii. Longline catch and revenue were 17.4 million pounds and $38.6 million, respectively. Catch remained constant while revenue increased by $1 million. Average price paid for longline catch increased by $0.05 per pound in 2003.

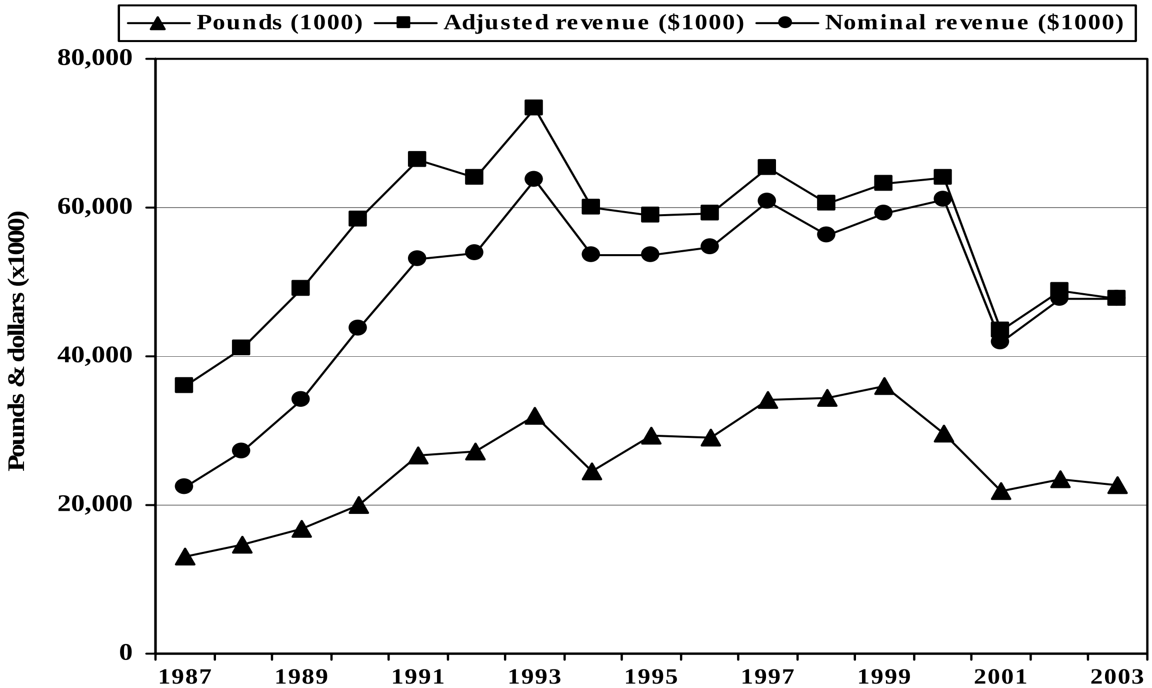
The Main Hawaiian Island troll fishery is the second largest commercial fishery. It produced 2.7 million pounds worth $5.5 million in 2003. Catch and revenue rose from 2002 by 300,000 pounds and $800,000 in 2003. Average price paid for the troll catch increased by $0.08 in 2003.

The Main Hawaiian Island handline fishery produced 1.2 million pounds of pelagic catch worth $2.2 million while the offshore handline fishery total catch was 300,000 pounds worth $430,000 in 2003. Catch and revenue for both these fisheries decreased in 2003.

Catch and revenue for the aku boat fishery increased to 1 million pounds worth $1 million in 2003 and represents an increase of 340,000 pounds and $120,000 from the record lows observed in the previous year. Average price was $.036 lower than in 2002.

Source and Calculations: Longline logbook data is collected and processed by NMFS while longline market data is summarized from market sample data collected jointly by HDAR and NMFS. HDAR also collects fish dealer data. Total catch, revenue, and average price for the longline fishery were produced by the number of fish kept from the NMFS longline logbook summaries with average weights and prices from the market sampling data in 2001. Average weights and prices were used from HDAR fish dealer reports in 2002. Catch, revenue, and prices for the troll, handline, and aku boat fisheries were summarized from HDAR commercial catch reports and fish dealer reports. Some rounding errors may be apparent in the tables.

Figure 1. Hawaii total commercial catch and revenue, 1987-2003.

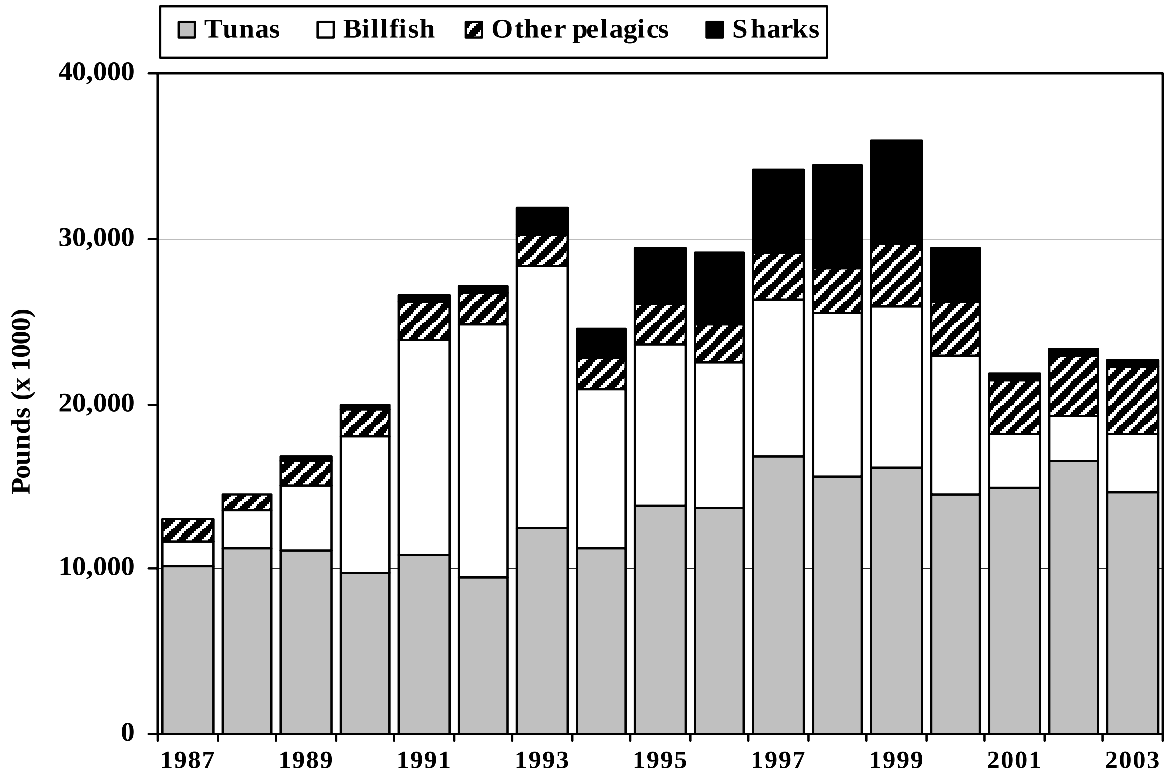


<u>Interpretation</u>: Pelagic catch and revenue grew from the late 1980s into the early 1990's. Revenue peaked at $73 million in 1993 but the total catch peaked later at 36 million pounds in 1999. Both catch and revenue declined sharply in 2001 but remained stable in 2002 and 2003. Gear and species specific changes are explained in greater detail in the following figures and tables.

<u>Source and Calculations</u>: Longline catches and revenue were calculated by combining NMFS logbook data with market sample data or HDAR fish dealer data. Troll, handline, and aku boat catches and revenue were compiled from HDAR commercial catch reports and fish dealer data. Catches from these fisheries were then grouped into PMUS categories.

	Hawaii pelagic catch and revenue			
Year	**Pounds (1000)**	**Nominal revenue ($1000)**	**Adjusted revenue ($1000)**	**Honolulu CPI**
1987	13,000	22,500	36,100	114.9
1988	14,600	27,100	41,080	121.7
1989	16,800	34,200	49,030	128.7
1990	19,900	43,800	58,520	138.1
1991	26,600	53,200	66,320	148.0
1992	27,200	53,800	64,000	155.1
1993	31,900	63,700	73,410	160.1
1994	24,600	53,600	60,120	164.5
1995	29,400	53,700	58,940	168.1
1996	29,100	54,700	59,120	170.7
1997	34,200	60,800	65,260	171.9
1998	34,400	56,200	60,460	171.5
1999	36,000	59,300	63,130	173.3
2000	29,500	61,200	64,050	176.3
2001	21,800	42,000	43,440	178.4
2002	23,400	47,700	48,810	180.3
2003	22,700	47,800	47,800	184.5
Average	**25,594.1**	**49,135.3**	**56,446.5**	
SD	**6,906.0**	**11,880.3**	**10,238.1**	

Figure 2. Hawaii commercial tuna, billfish, shark, and other pelagic PMUS catches, 1987-2003.



<u>Interpretation</u>: Pelagic catch grew from the late 1980s to a peak at 36 million pounds in 1999. Catches have since declined due to lower billfish and shark catches. Tuna catches grew by 45% compared to 1987 comprising 65%of the catch in 2003. They were the largest PMUS group during 1987-1990 and 1994-2003. Most of this increase results from increased catches by the longline fishery.

Billfish catches rose rapidly in the early 1990s due to increased longline catches of swordfish. Billfish catches dropped in 1994 and remained fairly constant until declining sharply again in 2000 due to regulations prohibiting targeting swordfish to reduce interactions between longline gear and sea turtles. Billfish catches have remained at relatively low levels since 2001.

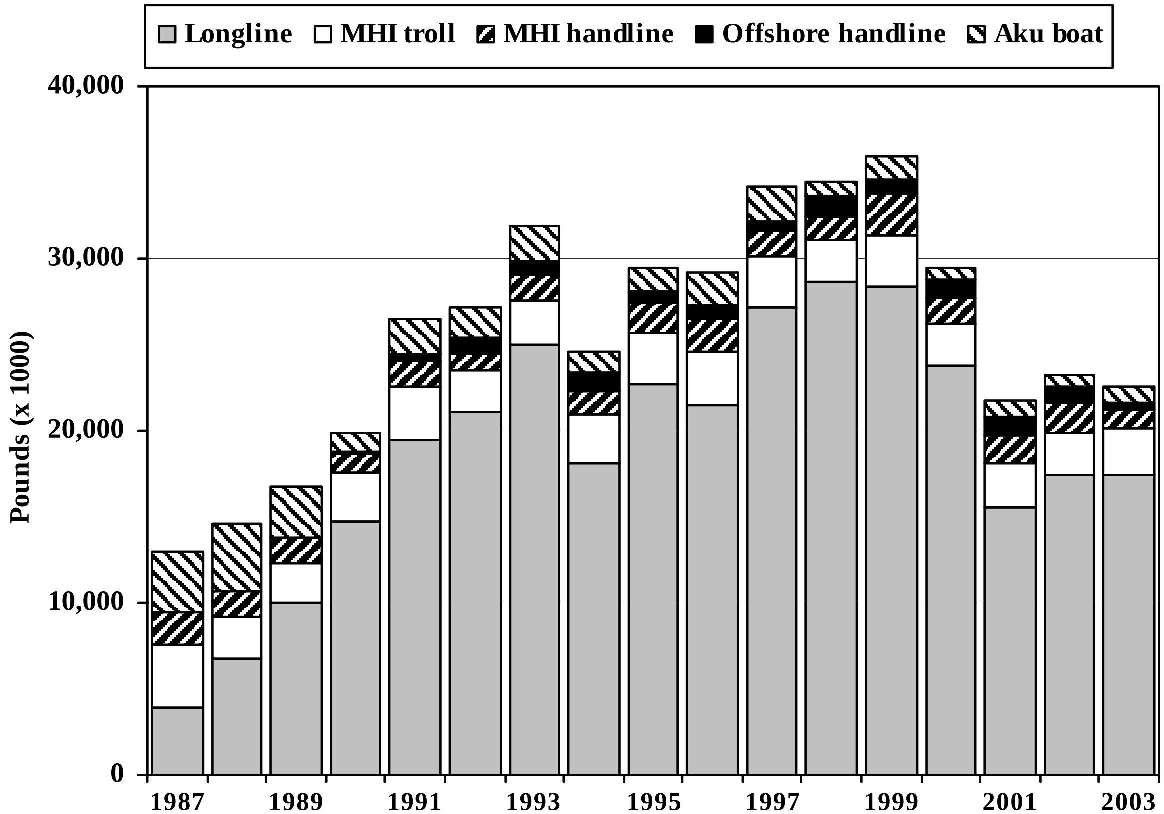
Other pelagic PMUS included mahimahi, ono (wahoo), moonfish, pomfrets and other miscellaneous pelagic species. Catches from this category have quadrupled over the 15 year period to become the second largest PMUS group. However, catches of other PMUS are still relatively small to total catch.

Shark catches grew in the mid-1990s and peaked in 1999 as a result of the increasing practice of finning sharks by the longline fishery. This practice was prohibited by State and Federal law in 2000. Sharks catches dropped after these regulations were implemented.

Source and Calculations: Longline catches were calculated on a species specific basis by multiplying the total number of fish kept by species from the NMFS logbook summaries by the corresponding average weights from the market sample data. Troll, handline, and aku boat catches were compiled from HDAR commercial catch reports and fish dealer data. Catches from these fisheries were then grouped into PMUS categories.

	Hawaii pelagic catch (1000 pounds)				
Year	**Tunas**	**Billfish**	**Other pelagics**	**Sharks**	**Total**
1987	10,120	1,560	1,290	40	13,000
1988	11,200	2,300	970	90	14,600
1989	11,180	3,880	1,530	200	16,800
1990	9,720	8,280	1,650	220	19,900
1991	10,790	13,130	2,300	320	26,500
1992	9,460	15,360	1,930	410	27,200
1993	12,420	15,920	1,850	1,740	31,900
1994	11,310	9,530	1,970	1,760	24,600
1995	13,820	9,730	2,420	3,470	29,400
1996	13,690	8,790	2,340	4,330	29,200
1997	16,810	9,490	2,830	5,010	34,100
1998	15,560	9,930	2,750	6,210	34,500
1999	16,150	9,760	3,800	6,270	36,000
2000	14,460	8,480	3,240	3,300	29,500
2001	14,950	3,220	3,270	330	21,800
2002	16,490	2,770	3,690	350	23,300
2003	14,690	3,430	4,150	340	22,600
Average	**13,107.1**	**7,974.1**	**2,469.4**	**2,022.9**	**25,582.4**
SD	**2,489.1**	**4,475.9**	**925.1**	**2,262.9**	**6,913.3**

Figure 3. Total commercial pelagic catch by gear type 1987-2003.

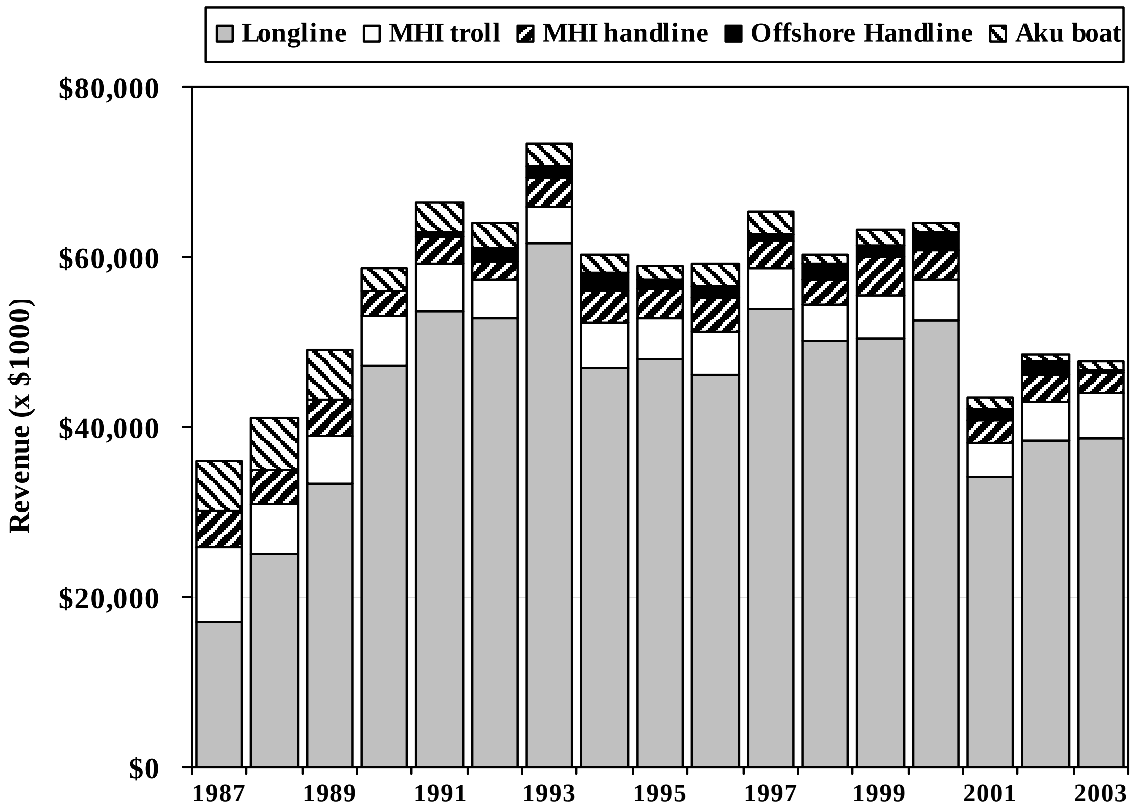


Interpretation: Hawaii commercial pelagic catch was dominated by longline catch. This fishery was responsible for 77% of the catch in 2003. This began to rise in the late 1980s as the number of participants increased. Two additional factors contributed to growth in the 1990s. The first was caused by growing swordfish catches and the second was due to the increase practice of finning sharks. Prohibitions on finning sharks and targeting swordfish into 2000 are the reasons for the recent decline in this fishery. Catches by the MHI troll and MHI handline fisheries are the next two largest fisheries in Hawaii. Catch from these fisheries have remained relatively constant since 1987. The offshore handline fishery grew in the early 1990s with catches leveling off thereafter. In contrast, aku boat catches have declined from the late 1980s due to attrition of an aging fleet.

Source and Calculations: Longline catches were calculated on a species specific basis by multiplying the total number of fish kept from the NMFS logbook summaries by the corresponding average weights from the market sample data. Troll, handline, and aku boat catches were complied from HDAR commercial catch reports and fish dealer data.

	Hawaii pelagic total catch (1000 pounds)					
Year	**Longline**	**MHI troll**	**MHI handline**	**Offshore handline**	**Aku boat**	**Total**
1987	3,890	3,710	1,910	-	3,500	13,000
1988	6,710	2,450	1,470	-	3,940	14,600
1989	9,940	2,400	1,490	-	2,960	16,800
1990	14,730	2,900	1,060	70	1,120	19,900
1991	19,490	3,100	1,480	330	2,150	26,600
1992	21,110	2,390	950	990	1,730	27,200
1993	25,010	2,580	1,530	680	2,140	31,900
1994	18,140	2,810	1,290	1,170	1,160	24,600
1995	22,730	2,970	1,730	710	1,290	29,400
1996	21,550	2,990	1,960	790	1,840	29,100
1997	27,150	3,020	1,480	560	1,950	34,200
1998	28,630	2,470	1,370	1,130	840	34,400
1999	28,350	3,010	2,410	890	1,310	36,000
2000	23,810	2,460	1,410	1,100	710	29,500
2001	15,560	2,610	1,600	1,010	990	21,800
2002	17,480	2,390	1,770	930	680	23,400
2003	17,440	2,690	1,150	300	1,020	22,700
Average	**18,924.7**	**2,761.8**	**1,532.9**	**761.4**	**1,725.3**	**25,594.1**
SD	**7,193.0**	**353.6**	**354.9**	**340.2**	**967.9**	**6,906.0**

Figure 4. Total commercial pelagic ex-vessel revenue by gear type 1987-2003.

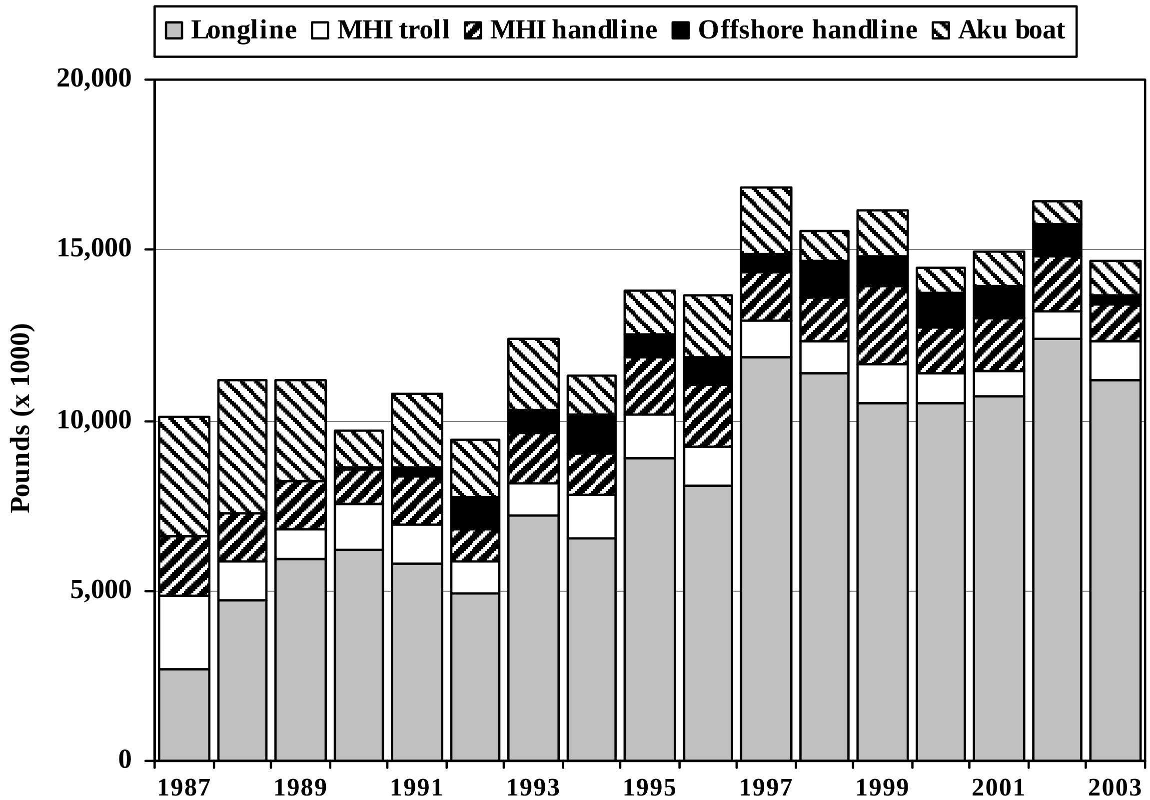


Interpretation: Ex-vessel revenue from Hawaii's pelagic fisheries was adjusted for inflation. Hawaii commercial pelagic catch is dominated by longline revenue. Longline revenue began to increase in the late 1980s as the fishery expanded. Longline revenue grew in the early 1990s due to growing swordfish catches peaking in 1993, dropping the next year, stabilizing up until restrictions and closure of the swordfish fishery in 2001. The MHI troll and MHI handline fisheries were ranked as the next two fisheries with the highest revenue. Revenue from these fisheries have remained relatively constant during the fifteen year period. The offshore handline fishery grew in the early 1990s with revenue leveling off thereafter. In contrast, aku boat revenue have declined from the late 1980s due fleet attrition and lower catches.

Source and Calculations: Longline revenue were calculated by multiplying the estimated total catch by the average price from the market sample data. Troll, handline, and aku boat revenue were summarized from HDAR commercial catch reports and fish dealer reports. Ex-vessel revenue was then adjusted for inflation using the Honolulu Consumer Price Index (HCPI).

	Hawaii pelagic total revenue ($1000)					
Year	**Longline**	**MHI troll**	**MHI handline**	**Offshore Handline**	**Aku boat**	**Total**
1987	$ 17,000	$ 8,890	$ 4,180	$ -	$ 6,020	$ 36,100
1988	$ 25,000	$ 5,870	$ 4,020	$ -	$ 6,160	$ 41,100
1989	$ 33,300	$ 5,590	$ 4,190	$ -	$ 5,940	$ 49,000
1990	$ 47,200	$ 6,000	$ 2,780	$ 130	$ 2,500	$ 58,600
1991	$ 53,500	$ 5,610	$ 3,160	$ 660	$ 3,370	$ 66,300
1992	$ 52,800	$ 4,480	$ 2,090	$ 1,760	$ 2,870	$ 64,000
1993	$ 61,500	$ 4,400	$ 3,370	$ 1,300	$ 2,780	$ 73,400
1994	$ 46,900	$ 5,490	$ 3,520	$ 2,180	$ 2,060	$ 60,200
1995	$ 47,900	$ 4,910	$ 3,450	$ 1,060	$ 1,700	$ 59,000
1996	$ 46,200	$ 5,030	$ 3,970	$ 1,410	$ 2,580	$ 59,200
1997	$ 53,800	$ 4,820	$ 3,270	$ 870	$ 2,570	$ 65,300
1998	$ 50,100	$ 4,320	$ 2,970	$ 1,820	$ 1,190	$ 60,400
1999	$ 50,500	$ 4,990	$ 4,580	$ 1,340	$ 1,780	$ 63,200
2000	$ 52,500	$ 4,890	$ 3,470	$ 2,030	$ 1,140	$ 64,000
2001	$ 34,100	$ 3,980	$ 2,830	$ 1,110	$ 1,410	$ 43,400
2002	$ 38,400	$ 4,620	$ 3,080	$ 1,540	$ 900	$ 48,800
2003	$ 38,600	$ 5,480	$ 2,200	$ 430	$ 1,000	$ 47,900
Average	**$ 44,076.5**	**$ 5,257.1**	**$ 3,360.6**	**$ 1,260.0**	**$ 2,704.1**	**$ 56,464.7**
SD	**$ 11,808.0**	**$ 1,132.4**	**$ 639.1**	**$ 598.2**	**$ 1,745.9**	**$ 10,327.3**

Figure 5. Hawaii commercial tuna catch by gear type, 1987-2003.

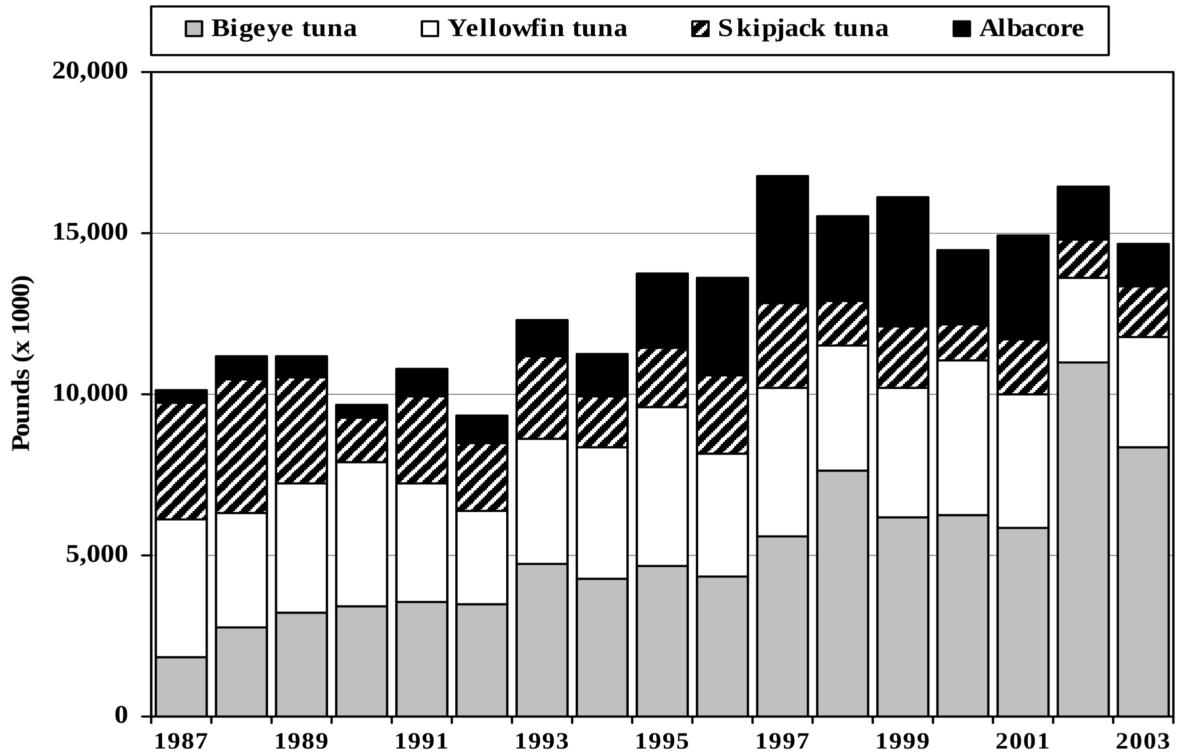


Interpretation: Longline gear has been the largest single contributor to Hawaii commercial tuna catch since1988 and was on a upward trend up until 1997. Tuna catch was steady thereafter with a peak in 2002. Tuna catches by the MHI troll fishery were highest in 1987 and were relatively stable from then on. The MHI handline fishery peaked in 1999 with fairly steady annual catches. Offshore handline tuna catches rose rapidly from 1990 to 1992 and varied substantially thereafter. Offshore handline tuna catch dropped substantially in 2003. The aku boat fishery was on a declining trend with its lowest catch in 2002. Aku boat catch rebounded in 2003

Source and Calculations: Longline tuna catches were calculated by multiplying the number of fish kept from NMFS logbook data and average weight summaries from market sample data. Troll, handline, and aku boat tuna catches were compiled from HDAR commercial catch reports and fish dealer data.

	Hawaii tuna catch 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	10,125
1988	4,725	1,141	1,395	-	3,936	11,197
1989	5,921	904	1,393	-	2,961	11,179
1990	6,162	1,401	981	66	1,116	9,725
1991	5,797	1,145	1,380	326	2,146	10,794
1992	4,908	980	885	967	1,721	9,461
1993	7,205	964	1,458	655	2,134	12,417
1994	6,540	1,239	1,213	1,157	1,158	11,307
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	553	1,942	16,813
1998	11,359	933	1,298	1,121	845	15,555
1999	10,529	1,135	2,302	868	1,312	16,146
2000	10,534	845	1,324	1,050	707	14,460
2001	10,720	754	1,518	971	990	14,953
2002	12,368	810	1,665	904	677	16,488
2003	11,183	1,132	1,058	280	1,010	14,686
Average	**8,203.2**	**1,121.6**	**1,442.5**	**611.1**	**1,723.0**	**13,106.5**
SD	**2,948.5**	**315.3**	**343.1**	**418.8**	**967.9**	**2,487.8**

Figure 6. Species composition of the tuna catch, 1987-2003.



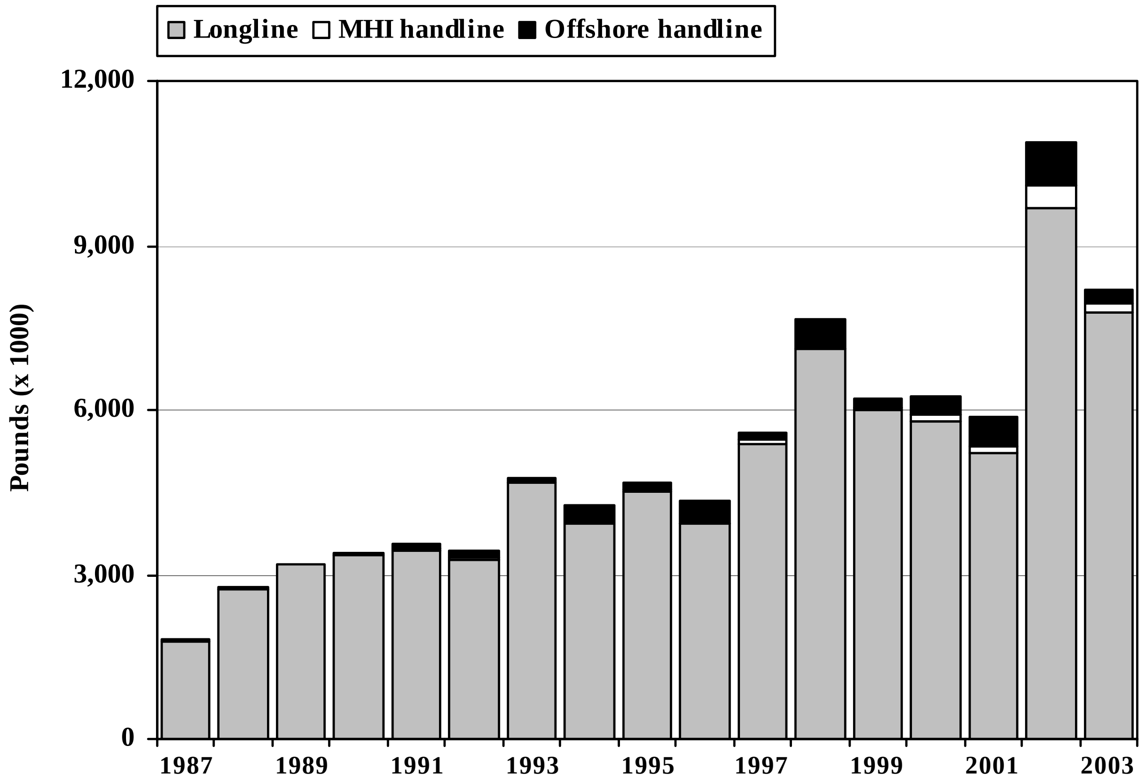
Interpretation: Bigeye tuna was the largest component of the tuna catch since 1996 and averaged about 39% of the tuna catch during 1987-2003. The bigeye tuna composition was higher than usual in the past two years (67% and 57% respectively) due to larger than average catches. The longline fishery accounted for majority of the bigeye tuna catches. The composition of yellowfin tuna averaged 30% over the 17 year period. The composition of yellowfin tuna declined due to growing catches of bigeye tuna. The MHI troll and handline (both MHI and offshore) fisheries accounted for most of the yellowfin tuna catch until 1999 with the longline fishery contributing the highest catches from 2000. Skipjack tuna made up 17% of the tuna catches with the highest composition in the late 1980s. The aku boat (pole and line) fishery was the largest skipjack tuna fishery in Hawaii. The composition of albacore grew rapidly peaking in 1999 and declining thereafter. The longline fishery was responsible for these rising catches.

Source and Calculations: Longline tuna catches were calculated by multiplying the number of fish kept from NMFS logbook data and average weight summaries from market sample data. Troll, handline, and aku boat tuna catches were compiled

	Hawaii tuna catch (1000 pounds)				
Year	Bigeye tuna	Yellowfin tuna	Skipjack tuna	Albacore	Total
1987	1,814	4,310	3,633	345	10,125
1988	2,770	3,550	4,156	695	11,197
1989	3,208	4,020	3,298	626	11,179
1990	3,425	4,460	1,389	421	9,725
1991	3,572	3,663	2,690	846	10,794
1992	3,455	2,943	2,098	855	9,461
1993	4,768	3,871	2,546	1,122	12,417
1994	4,279	4,105	1,554	1,292	11,307
1995	4,667	4,941	1,814	2,327	13,820
1996	4,331	3,851	2,425	3,021	13,685
1997	5,596	4,628	2,608	3,920	16,813
1998	7,641	3,896	1,326	2,645	15,555
1999	6,212	4,012	1,909	3,979	16,146
2000	6,243	4,806	1,104	2,290	14,460
2001	5,873	4,145	1,696	3,229	14,953
2002	10,968	2,677	1,163	1,667	16,488
2003	8,346	3,415	1,581	1,344	14,693
Average	**5,127.5**	**3,958.5**	**2,175.9**	**1,801.4**	**13,106.9**
SD	**2,291.6**	**602.9**	**889.2**	**1,208.7**	**2,488.1**

from HDAR commercial catch reports and fish dealer data.

Figure 7. Hawaii bigeye tuna catch, 1987-2003.

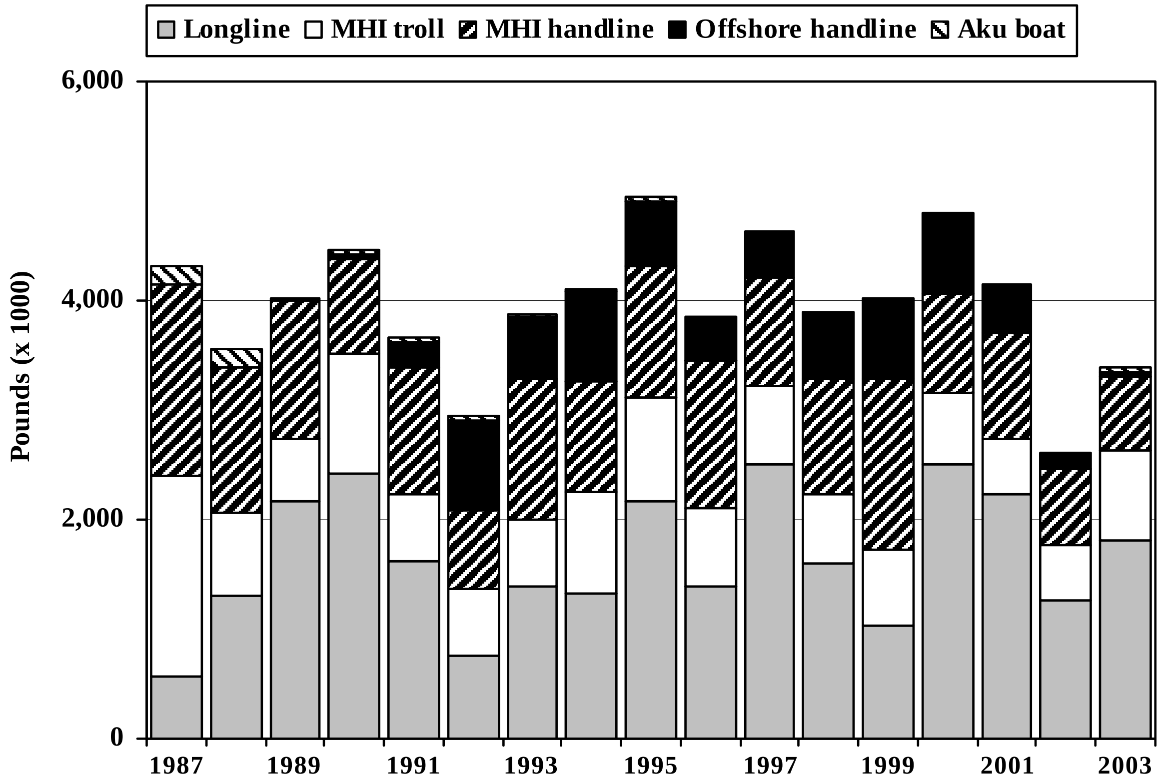


Interpretation: Annual bigeye tuna catches have increased more than five-fold during 1987-2002. Bigeye catches by all fisheries in 2003 were down from record catches in 2002. The longline fishery typically produces more than 90% of the total bigeye tuna catch. Bigeye catch by this fishery was a record 9.7 million pounds in 2002 and decreased to 7.8 million pounds in 2003. The offshore handline fishery is currently the second largest producer of bigeye tuna in Hawaii and was followed by the MHI handline and MHI troll fisheries, respectively. The MHI troll catches of bigeye tuna reached a record 145,000 pounds in 2003.

Source and Calculations: Longline bigeye tuna catches were calculated by multiplying the number of fish kept from NMFS logbook data by the average weight summaries from market sample data. Troll and handline bigeye tuna catches were compiled from HDAR commercial catch reports and fish dealer data.

	Hawaii bigeye tuna catch (1000 pounds)				
Year	Longline	MHI troll	MHI handline	Offshore handline	Total
1987	1,796	11	6	-	1,814
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	3,572
1992	3,277	9	19	151	3,455
1993	4,677	4	2	85	4,768
1994	3,940	6	10	324	4,279
1995	4,522	10	33	102	4,667
1996	3,940	4	11	375	4,331
1997	5,399	6	52	138	5,596
1998	7,113	5	15	508	7,641
1999	5,995	7	46	164	6,212
2000	5,788	6	133	317	6,243
2001	5,217	9	117	530	5,873
2002	9,679	100	427	762	10,968
2003	7,770	145	180	244	8,346
Average	**4,810.8**	**21.7**	**69.6**	**273.1**	**5,127.5**
SD	**2,011.9**	**38.9**	**104.7**	**210.5**	**2,291.6**

Figure 8. Hawaii yellowfin tuna catch, 1987-2003.

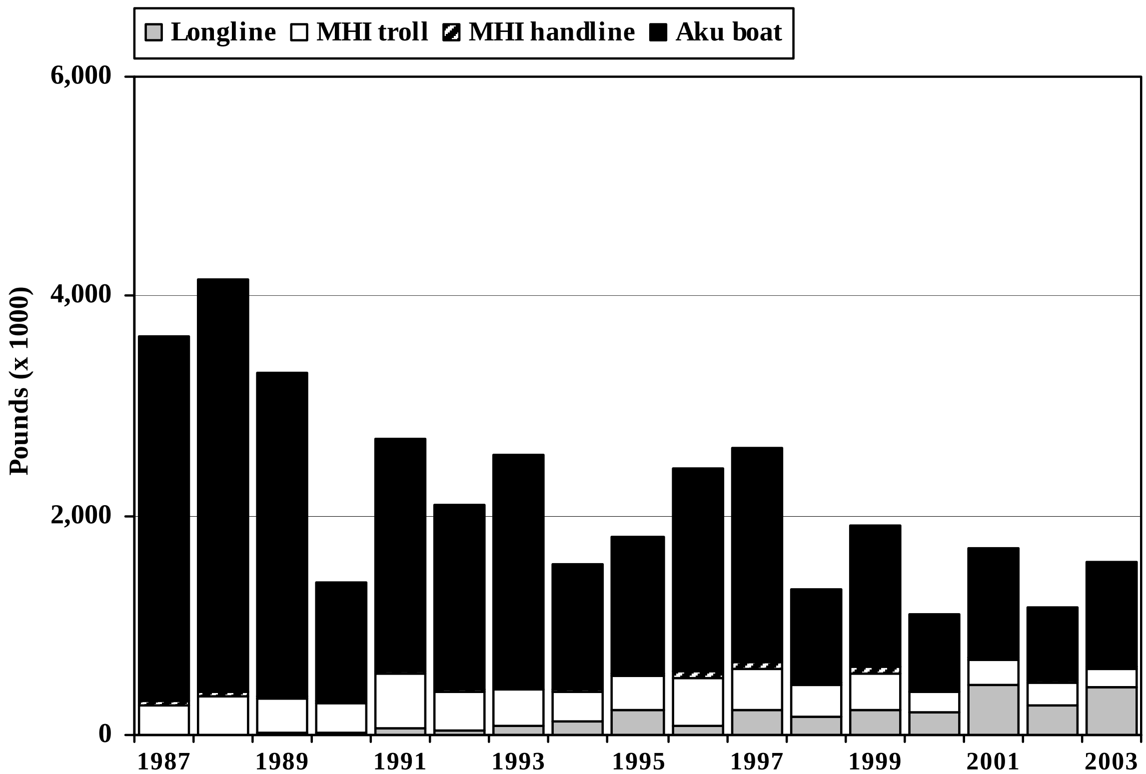


Interpretation: Annual catches of yellowfin tuna averaged 4 millions pounds and varied from 2.7 million pounds to 4.9 million pounds during 1987-2003. The longline fishery typically had the highest yellowfin tuna catch. The MHI handline fishery usually was the second largest producer, followed by MHI troll and offshore handline fisheries, respectively. The aku boat fishery (pole and line) had small catches of yellowfin tuna. This species is usually caught by the aku boat fishery when catches of skipjack tuna are poor.

Source and Calculations: Longline yellowfin tuna catches were calculated by multiplying the number of fish kept from NMFS logbook data and average weight summaries from market sample data. Troll, handline, and aku boat yellowfin tuna catches were compiled from HDAR commercial catch reports and fish dealer data.

	Hawaii yellowfin tuna catch (1000 pounds)					
Year	**Longline**	**MHI troll**	**MHI handline**	**Offshore handline**	**Aku boat**	**Total**
1987	575	1,828	1,734	-	173	4,310
1988	1,309	764	1,310	-	168	3,550
1989	2,174	559	1,266	-	21	4,020
1990	2,421	1,089	876	35	39	4,460
1991	1,617	615	1,154	232	44	3,663
1992	763	606	722	816	36	2,943
1993	1,392	616	1,283	571	10	3,871
1994	1,336	914	1,003	834	19	4,105
1995	2,159	949	1,207	591	34	4,941
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	2,506	649	916	734	2	4,806
2001	2,233	514	952	442	4	4,145
2002	1,258	503	711	142	4	2,677
2003	1,820	805	687	36	50	3,415
Average	**1,653.0**	**773.7**	**1,104.2**	**468.9**	**37.0**	**3,958.5**
SD	**601.9**	**314.1**	**294.8**	**273.3**	**52.7**	**602.9**

Figure 9. Hawaii skipjack tuna catch, 1987-2003.

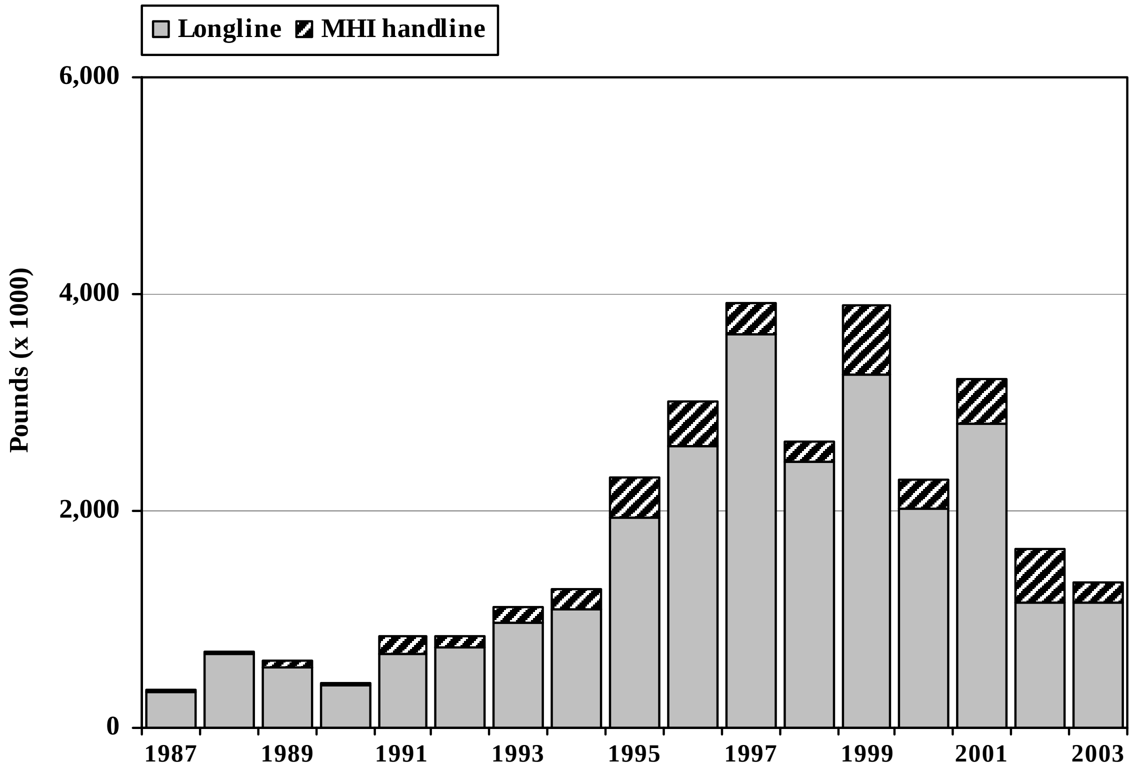


Interpretation: The trend for skipjack tuna catch is declining. Skipjack tuna catch is dominated by the aku boat (pole and line) fishery. Though catches by this fishery have decreased, they accounted for 77% of the total skipjack tuna catch. The MHI troll fishery was usually the second largest contributor to skipjack tuna catch but was replaced by the longline fishery from 2000.

Hawaii skipjack tuna catch (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	1,389
1991	66	504	19	2,102	2,690
1992	49	347	21	1,682	2,098
1993	79	332	14	2,121	2,546
1994	116	283	21	1,133	1,554
1995	223	318	17	1,256	1,814
1996	91	424	69	1,842	2,425
1997	234	376	56	1,942	2,608
1998	168	278	38	842	1,326
1999	219	347	52	1,291	1,909
2000	206	181	13	704	1,104
2001	466	216	28	986	1,696
2002	276	195	18	672	1,163
2003	435	169	12	960	1,581
Average	**157.2**	**305.5**	**28.0**	**1,684.7**	**2,175.9**
SD	**141.6**	**87.3**	**16.5**	**928.6**	**889.2**

Source and Calculations: Longline skipjack tuna catches were calculated by multiplying the number of fish kept from NMFS logbook data and average weight summaries from market sample data. Troll, handline, and aku boat skipjack tuna catches were compiled from HDAR commercial catch reports and fish dealer data.

Figure 10. Hawaii albacore catch, 1987-2003.

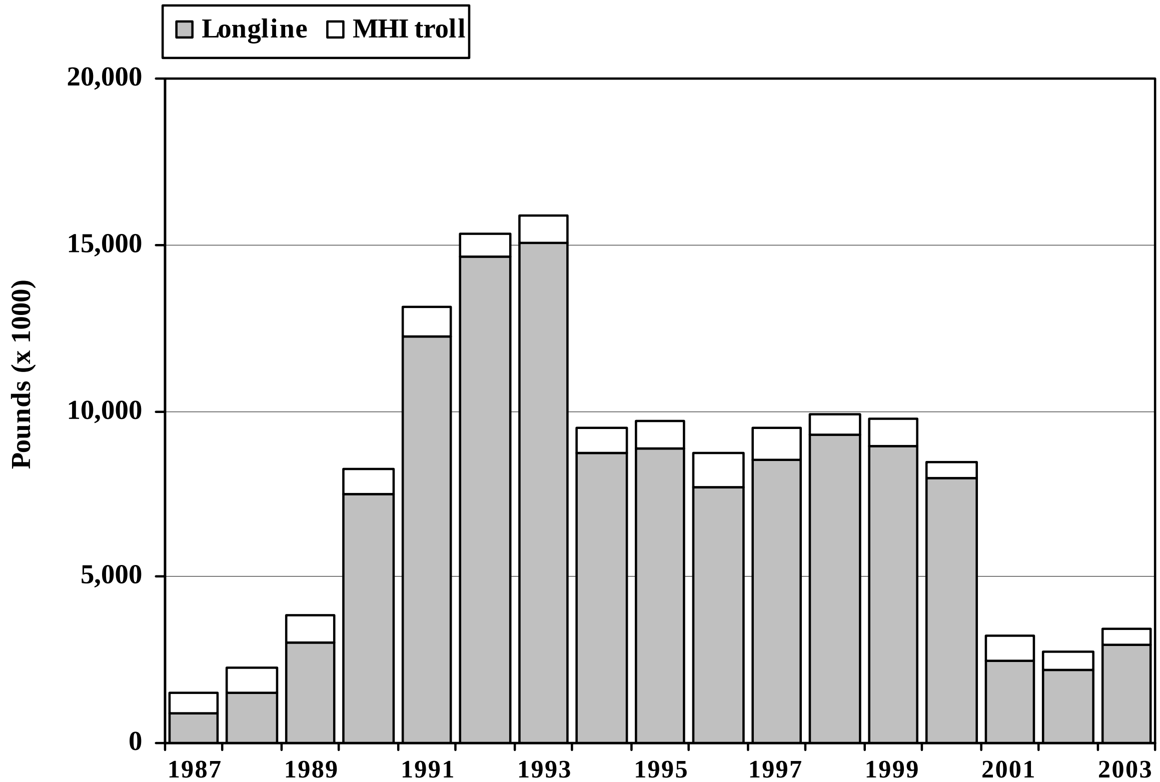


<u>Interpretation</u>: Albacore catch increased more than 11-fold from 1987 to 1999 and declined substantially thereafter. The longline fishery typically produces more than 80% of the albacore catch. Albacore catch by the MHI handline fishery was relatively small but grew over the 17-year period peaking at 642,000 pounds in 1999. On rare occasions, the MHI troll fishery has encountered short "runs" of albacore but those catches were negligible in comparison.

<u>Source and Calculations</u>: Longline albacore catches were calculated by multiplying the number of fish kept from NMFS logbook data by the average weight summaries from market sample data. Troll and handline albacore catches were compiled from HDAR commercial catch reports and fish dealer data.

Hawaii albacore catch (1000 pounds)				
Year	**Longline**	**MHI troll**	**MHI handline**	**Total**
1987	331	1	12	345
1988	676	1	18	695
1989	547	1	78	626
1990	390	1	31	421
1991	687	2	157	846
1992	735	3	116	855
1993	965	3	154	1,122
1994	1,095	22	176	1,292
1995	1,938	10	380	2,327
1996	2,606	5	409	3,021
1997	3,626	7	287	3,920
1998	2,450	4	191	2,645
1999	3,250	87	642	3,979
2000	2,026	4	260	2,290
2001	2,802	10	417	3,229
2002	1,152	8	507	1,667
2003	1,157	8	179	1,344
Average	**1,554.9**	**10.4**	**236.1**	**1,801.4**
SD	**1,058.9**	**20.4**	**181.3**	**1,208.7**

Figure 11. Hawaii commercial billfish catch by gear type, 1987-2003.

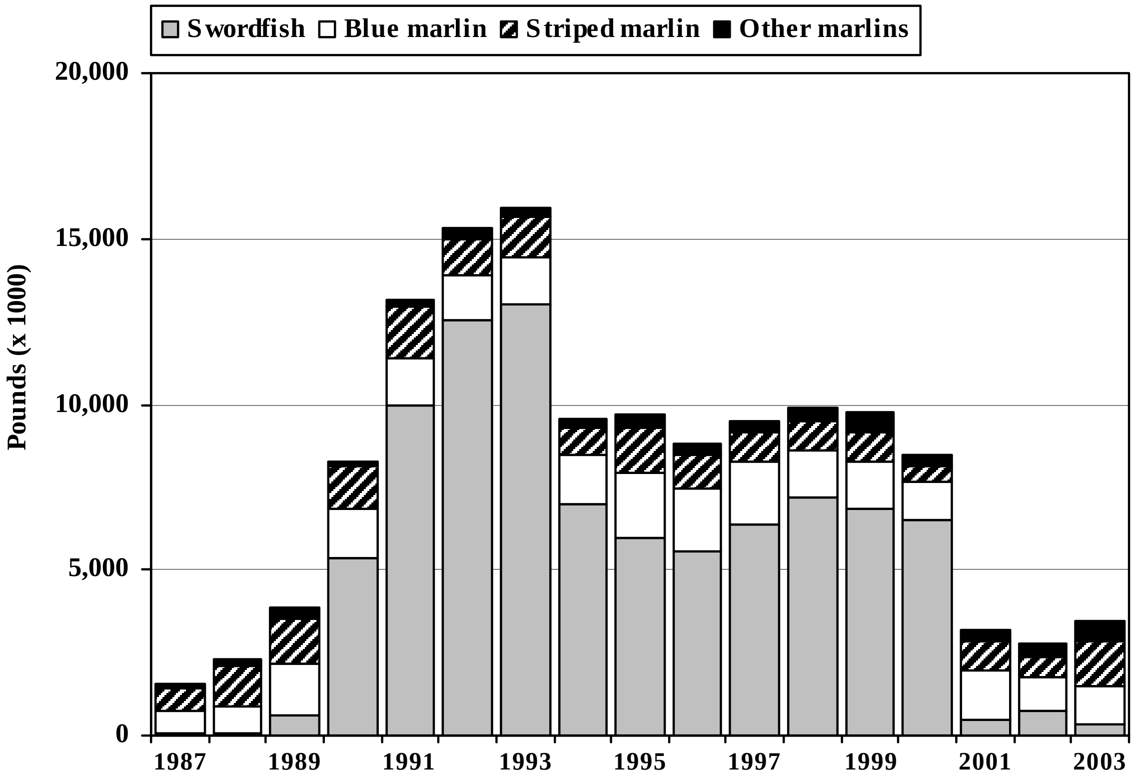


<u>Interpretation</u>: Billfish catch grew 10-fold from 1987 to 1993, but then dropped 40% the following year. Catch remained relatively unchanged through 2000, but then fell again by 602 in 2001, and remained low thereafter. The rapid rise and decline in billfish catch by the longline fishery from 1987-1994 was directly attributed to swordfish catch. The decline in billfish catch in 2001 was due to lower swordfish catches from regulations imposed on the longline fishery prohibiting targeting swordfish. Billfish catches by the MHI troll fishery were relatively stable up to the 1990s, with a peak in 1996, and with lower catches in the 2000s. The MHI handline fishery consistently had relatively low catches. Most of the billfish caught by this fishery was blue marlin.

<u>Source and Calculations</u>: Longline billfish catches were calculated by multiplying the number of fish kept from NMFS logbook data by the average weight summaries from market sample data. Troll and handline billfish catches were compiled from HDAR commercial catch reports and fish dealer data.

	Hawaii billfish catch (1000 lbs)			
Year	**Longline**	**MHI troll**	**MHI handline**	**Total**
1987	860	666	30	1,555
1988	1,540	736	29	2,304
1989	3,040	805	31	3,877
1990	7,520	732	28	8,280
1991	12,210	890	31	13,131
1992	14,660	683	15	15,358
1993	15,030	870	23	15,923
1994	8,740	770	19	9,529
1995	8,840	856	30	9,727
1996	7,720	1,042	32	8,794
1997	8,520	935	39	9,494
1998	9,280	626	21	9,927
1999	8,960	769	31	9,760
2000	7,970	489	24	8,482
2001	2,440	756	25	3,221
2002	2,210	533	28	2,771
2003	2,930	478	25	3,433
Average	**7,204.1**	**743.4**	**27.1**	**7,974.5**
SD	**4,420.0**	**155.0**	**5.7**	**4,475.9**

Figure 12. Species composition of the billfish catch, 1987-2003.

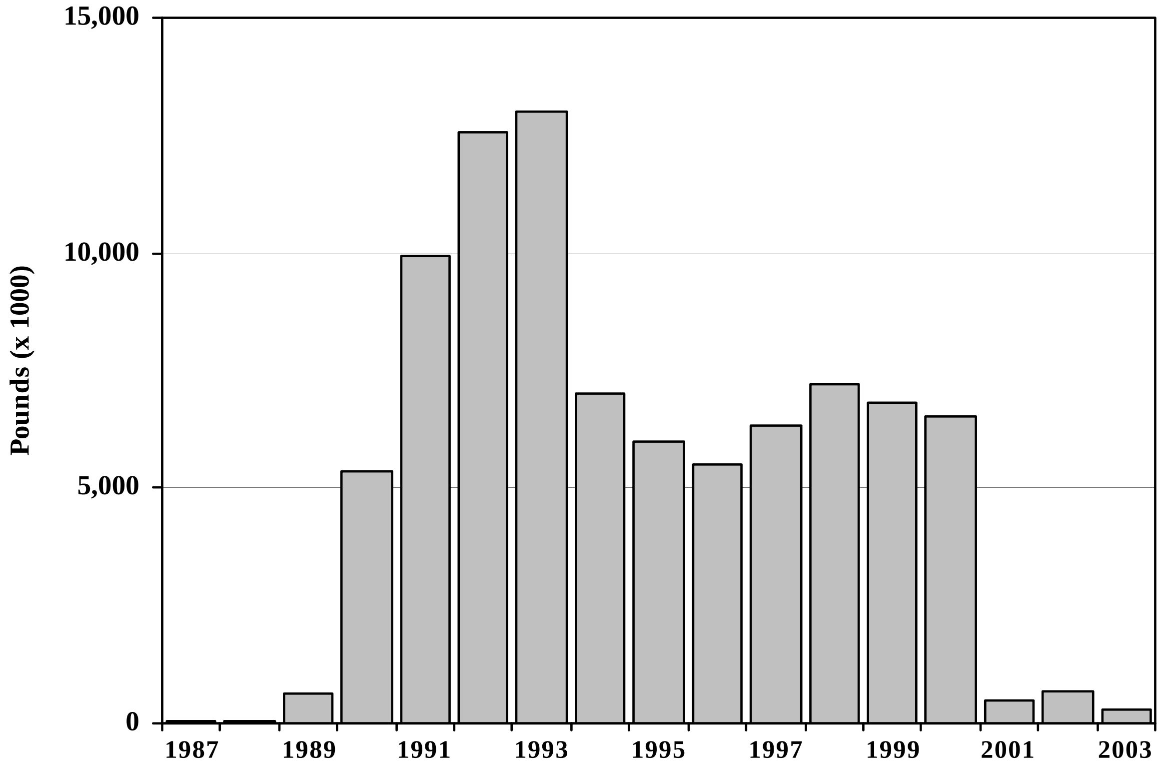


Interpretation: The billfish catch consisted mostly of marlins and small catches of swordfish from 1987 through 1989. However, in 1990 the composition changed and catch more than doubled as longline vessels began to target swordfish. Swordfish catches continued to dominate billfish catch from 1990 through 2000 despite a 46% decrease in 1994. Swordfish catches dropped 92% in 2001 from regulatory actions and remained low through 2003. Billfish composition in 2001 and 2002 resembled the billfish composition of the late 1980s, with marlins as the largest component. Blue marlin composed 34% of the billfish catch in 2003 with the highest catches during 1995-1997. Striped marlin made up 40% of the billfish catch in 2003. Striped marlin catches peaked in 1991 and declined to a low in 2000 with above average catch in 2003.

Source and Calculations: Longline billfish catches were calculated by multiplying the number of fish kept from NMFS logbook data and average weight summaries from market sample data. Troll and handline billfish catches were compiled from HDAR commercial catch reports and fish dealer data.

	Hawaii billfish catch (1000 lbs)				
Year	**Swordfish**	**Blue marlin**	**Striped marlin**	**Other marlins**	**Total**
1987	60	686	667	144	1,557
1988	65	812	1,231	194	2,301
1989	635	1,502	1,403	340	3,880
1990	5,383	1,485	1,247	164	8,279
1991	9,953	1,418	1,551	208	13,129
1992	12,569	1,339	1,097	349	15,354
1993	13,036	1,434	1,191	266	15,927
1994	7,010	1,454	796	267	9,526
1995	5,994	1,952	1,313	464	9,724
1996	5,529	1,931	1,044	292	8,797
1997	6,368	1,908	861	354	9,491
1998	7,208	1,403	891	421	9,924
1999	6,856	1,432	866	605	9,758
2000	6,520	1,121	472	371	8,482
2001	500	1,494	873	352	3,219
2002	725	1,043	614	387	2,768
2003	323	1,162	1,369	581	3,435
Average	**5,219.7**	**1,386.8**	**1,028.6**	**338.6**	**7,973.7**
SD	**4,270.2**	**353.1**	**305.7**	**131.2**	**4,475.6**

Figure 13. Hawaii swordfish catch, 1987-2003.

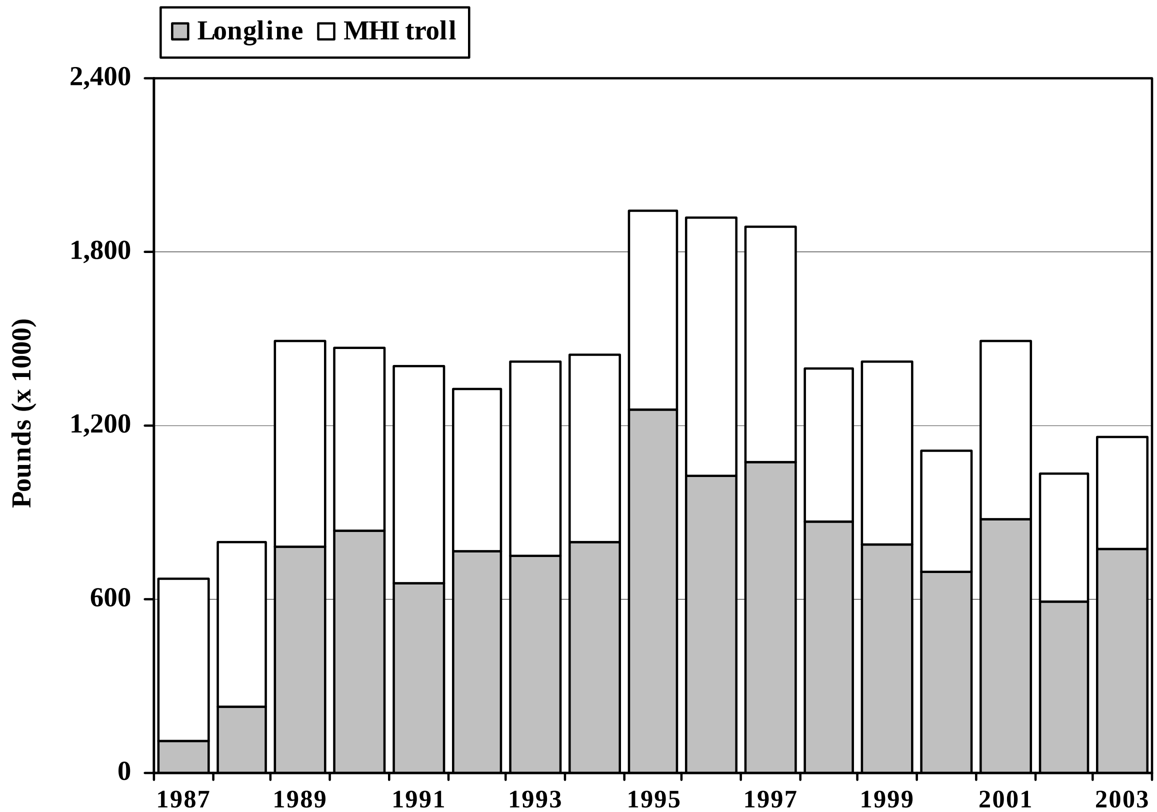


Interpretation: The trend in swordfish catches reflected both an increase in the number of vessels in the longline fishery and widespread targeting of swordfish by the fishery. Swordfish catches rose rapidly from 1988, peaked in 1993, and fell the following year. Catches remained relatively steady up to 2000 but dropped dramatically by 93% the following year and remained low through 2003. The low catch level reflected the aforementioned regulations on shallow-set longline gear. Swordfish catch by the MHI handline fishery was low and probably caught on ika shibi handliners (night handline).

Source and Calculations: Longline swordfish catches were calculated by multiplying the number of fish kept from NMFS logbook data by the average weight summaries from market sample data. Troll and handline swordfish catches were compiled from HDAR commercial catch reports and fish dealer data.

	Swordfish catch (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	6,856
2000	6,502	1	16	6,520
2001	485	1	14	500
2002	699	5	21	725
2003	301	1	21	323
Average	**5,205.5**	**1.3**	**12.8**	**5,219.7**
SD	**4,272.8**	**1.0**	**4.9**	**4,270.2**

Figure 14. Hawaii blue marlin catch, 1987-2003.

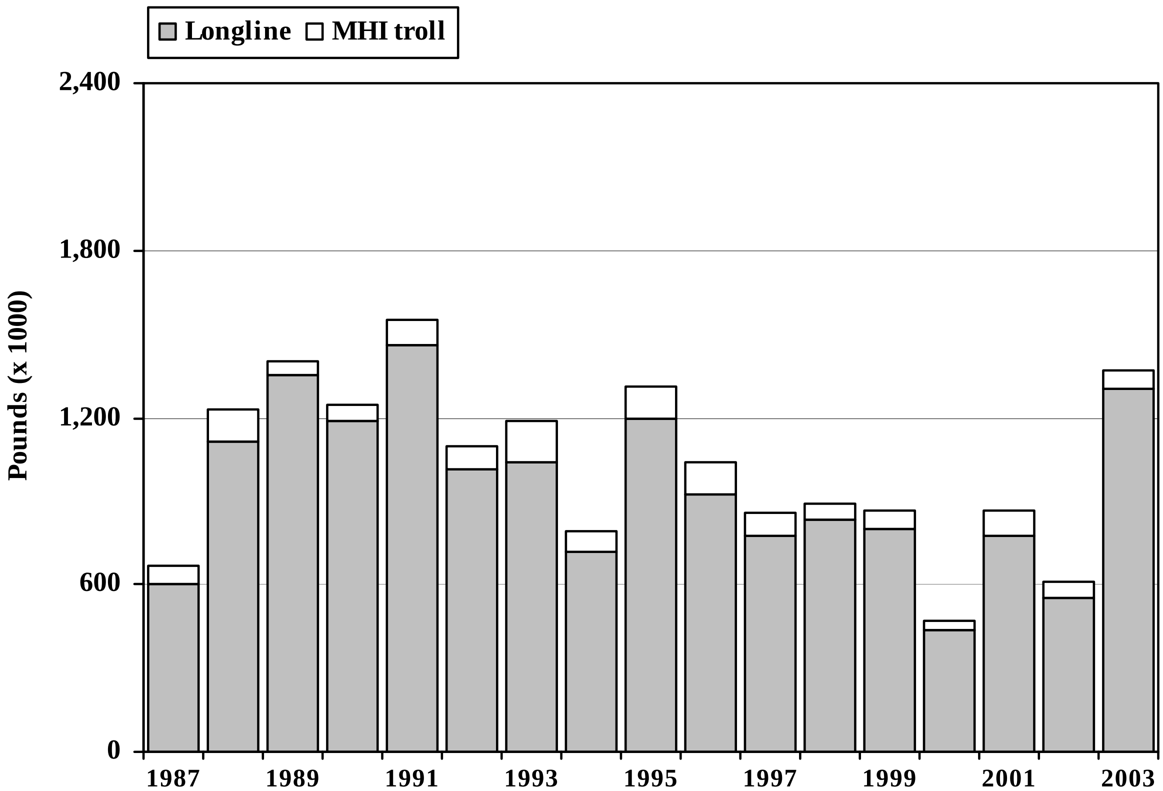


Interpretation: Total blue marlin catch rose from 1987 to a peak in 1995, and has since been on a generally declining trend. The MHI troll fishery had the largest catches early in the 17-year period but longline catches have consistently been the largest from 1992. Both fisheries had high blue marlin catches during 1989-90, 1995-97, and in 2001 (see below regarding species ID problems).

Source and Calculations: Longline blue marlin catches were calculated by multiplying the number of fish kept from NMFS logbook data by the average weight summaries from market sample data. These marlin catches by the longline fishery are nominal estimates which do not account for marlin ID problems (Walsh et al., in press Fisheries Research) Troll and handline blue marlin catches were compiled from HDAR commercial catch reports and fish dealer data.

	Blue marlin catch (1000 lbs)			
Year	**Longline**	**MHI troll**	**MHI handline**	**Total**
1987	112	557	18	686
1988	225	575	12	812
1989	784	704	14	1,502
1990	834	638	12	1,485
1991	654	749	14	1,418
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	692	423	5	1,121
2001	879	610	5	1,494
2002	594	443	6	1,043
2003	771	387	4	1,162
Average	**757.3**	**618.9**	**10.6**	**1,386.8**
SD	**274.2**	**132.9**	**4.7**	**353.1**

Figure 15. Hawaii striped marlin catches, 1987-2003.

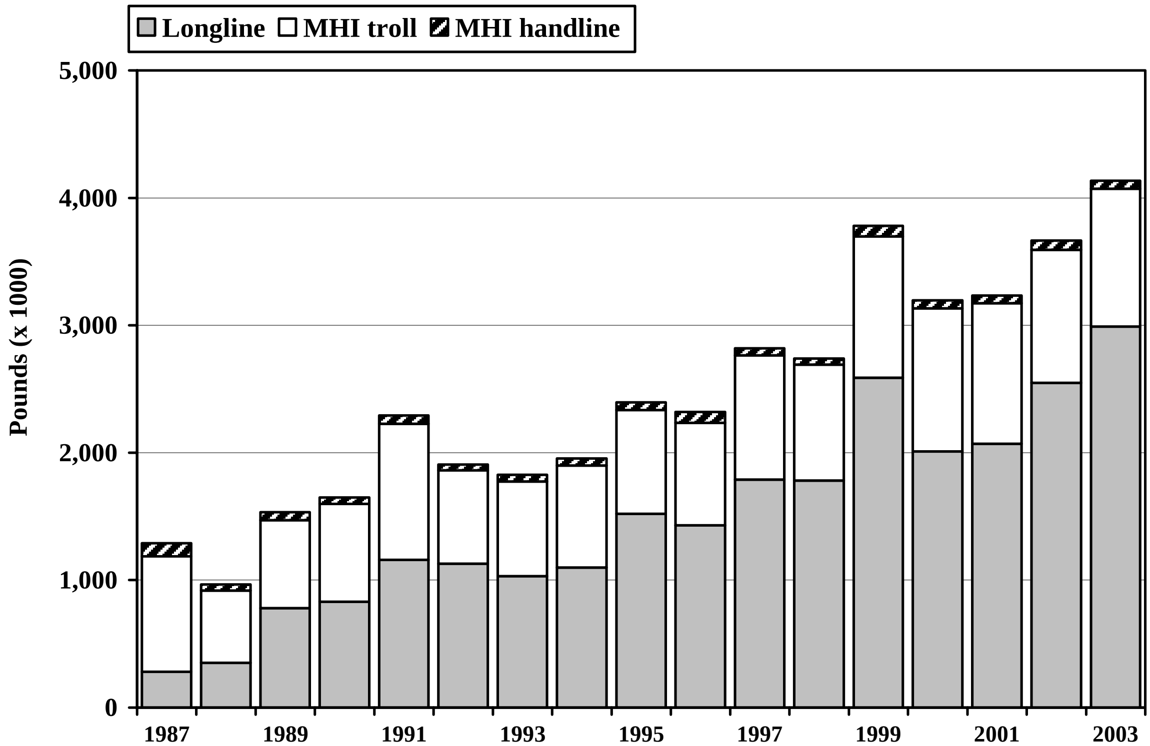


<u>Interpretation</u>: Total catch of striped marlin has been on a declining trend since the early 1990's with a significantly high catch in 2003. The longline fishery typically produces more than 90% of the total striped marlin catch. The MHI troll fishery was the second largest producer of striped marlin in Hawaii. There was no clear trend in catches of striped marlin by the MHI troll fishery.

<u>Source and Calculations</u>: Longline striped marlin catches were calculated by multiplying the number of fish kept from NMFS logbook data by the average weight summaries from market sample data. These marlin catches by the longline fishery are nominal estimates which do not account for marlin ID problems. The latter is currently being studied in a Pelagic Fisheries Research Project (PFRP) project (see PFRP newsletter 7(10), 1-4). Troll and handline striped marlin catches were compiled from HDAR commercial catch reports and fish dealer data.

	Striped marlin catch (1000 lbs)			
Year	**Longline**	**MHI troll**	**MHI handline**	**Total**
1987	599	66	2	667
1988	1,110	118	2	1,231
1989	1,350	52	1	1,403
1990	1,186	59	1	1,247
1991	1,462	89	1	1,551
1992	1,013	83	2	1,097
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	441	30	1	472
2001	775	94	5	873
2002	549	64	1	614
2003	1,306	63	0	1,369
Average	**946.0**	**81.1**	**1.5**	**1,028.6**
SD	**295.5**	**30.3**	**1.1**	**305.7**

Figure 16. Hawaii commercial catch of other pelagic PMUS by gear type, 1987-2003.

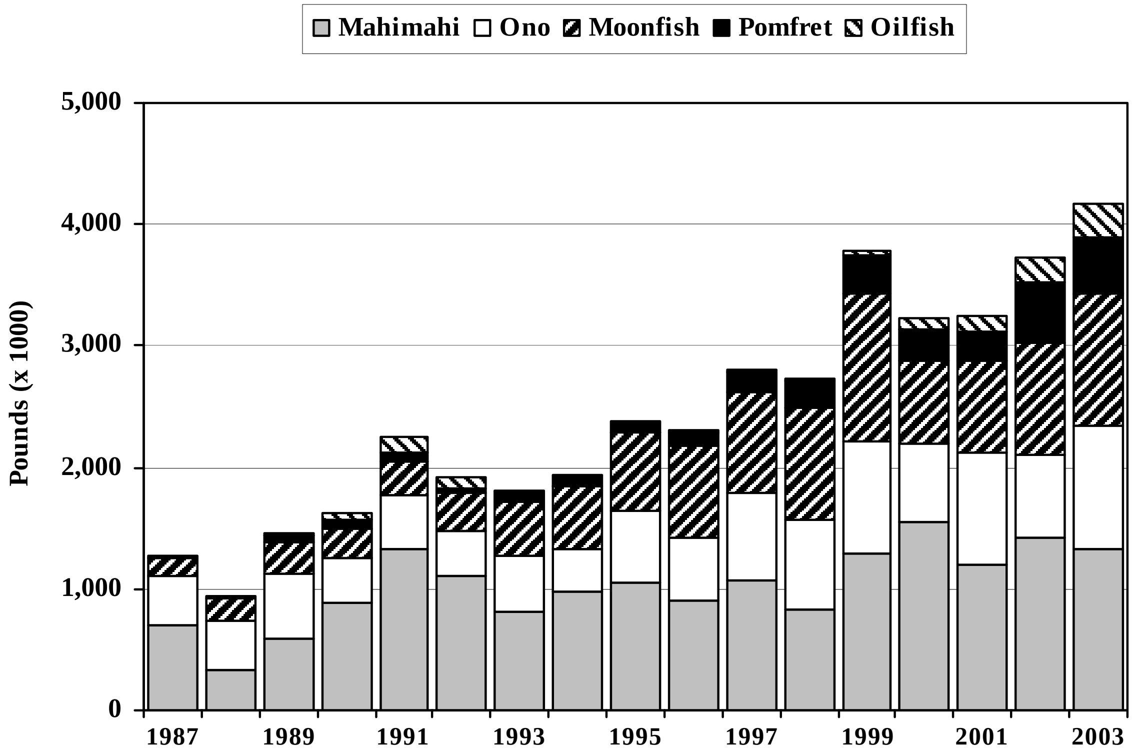


Interpretation: The total commercial catch of other pelagic PMUS showed an upward trend over the 17-year period, with more than a 4-fold increase from 1987 through 2003. The MHI troll fishery was the second largest producer, with catches exceeding 1 million pounds consistently from 1999. The MHI handline, offshore handline and aku boat fishery had relatively small catches of other pelagic PMUS.

Source and Calculations: Longline catches of other PMUS were calculated by multiplying the number of fish kept from NMFS logbook data by the average weight summaries from market sample data. Catch of other pelagic PMUS by the troll, handline, and aku boat fisheries were compiled from HDAR commercial catch reports and fish dealer data.

	Catch of other pelagic PMUS (1000 lbs)					
Year	**Longline**	**MHI troll**	**MHI handline**	**Offshore handline**	**Aku boat**	**Total**
1987	280	907	102	-	2	1,289
1988	350	569	48	-	4	967
1989	780	691	63	-	1	1,534
1990	830	768	51	0	0	1,650
1991	1,160	1,067	66	5	0	2,298
1992	1,130	731	46	21	14	1,927
1993	1,030	744	51	23	3	1,849
1994	1,100	800	55	18	0	1,973
1995	1,520	815	61	20	0	2,416
1996	1,430	806	85	17	0	2,338
1997	1,790	974	56	9	5	2,830
1998	1,780	912	49	13	0	2,753
1999	2,590	1,109	82	20	0	3,801
2000	2,010	1,122	64	46	0	3,243
2001	2,070	1,104	61	36	0	3,271
2002	2,550	1,043	71	21	0	3,686
2003	2,990	1,082	62	19	2	4,153
Average	**1,400.0**	**885.1**	**63.2**	**15.6**	**1.9**	**2,363.9**
SD	**697.4**	**170.3**	**15.5**	**13.2**	**3.6**	**844.5**

Figure 17. Species composition of other PMUS catch, 1987-2003.

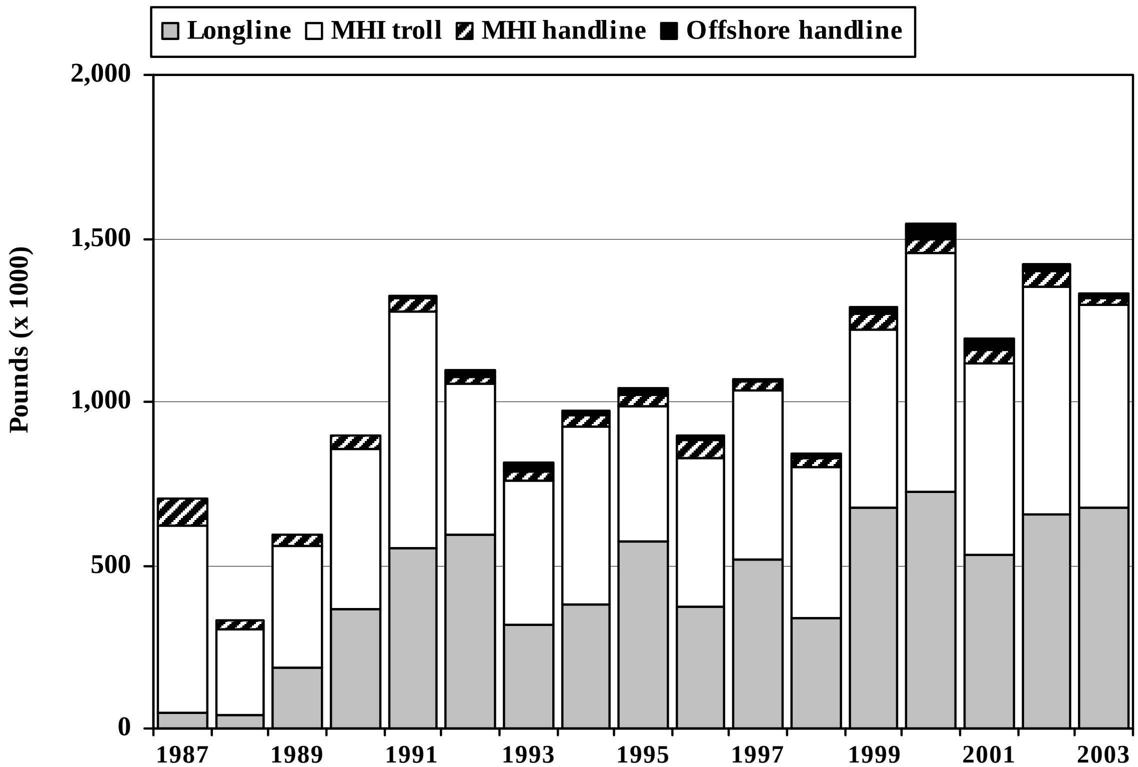


Interpretation: Mahimahi was the largest component of other pelagic catch at 42%. Although mahimahi catch was consistently above 1 million pounds from 1999, the relative composition was usually lower than the long-term average. To a lesser extent, the pattern of ono composition was similar to mahimahi. Although ono catches increased over the time period, the relative composition was lower. In contrast, catch and composition of moonfish and miscellaneous pelagic catch (primarily pomfrets) was generally higher in the latter years of the time series.

Source and Calculations: Longline catches of other PMUS were calculated by multiplying the number of fish kept from NMFS logbook data by the average weight summaries from market sample data. Catch of other pelagic PMUS by the troll, handline, and aku boat fisheries were compiled from HDAR commercial catch reports and fish dealer data.

	Catch of other pelagic PMUS (1000 lbs)						
Year	**Mahimahi**	**Ono**	**Moonfish**	**Pomfret**	**Oilfish**	**Misc**	**Total**
1987	704	400	152	23	2	11	1,292
1988	332	406	182	18	3	34	975
1989	596	522	274	49	24	64	1,529
1990	894	352	253	66	52	32	1,649
1991	1,321	456	270	75	130	41	2,293
1992	1,113	365	320	37	85	22	1,942
1993	814	451	454	92	0	42	1,852
1994	974	351	524	85	8	31	1,973
1995	1,044	606	629	93	10	34	2,416
1996	899	514	760	121	11	31	2,337
1997	1,077	715	823	178	15	29	2,837
1998	839	725	922	225	26	18	2,754
1999	1,293	929	1,210	313	29	26	3,800
2000	1,543	650	693	257	85	17	3,245
2001	1,191	922	756	255	119	26	3,270
2002	1,425	687	916	496	201	23	3,747
2003	1,335	1,001	1,092	458	278	21	4,185
Average	**1,003.6**	**565.8**	**571.1**	**148.9**	**50.0**	**29.9**	**2,369.4**
SD	**316.3**	**190.6**	**315.0**	**130.6**	**58.4**	**12.3**	**849.9**

Figure 18. Hawaii mahimahi catch, 1987-2003.

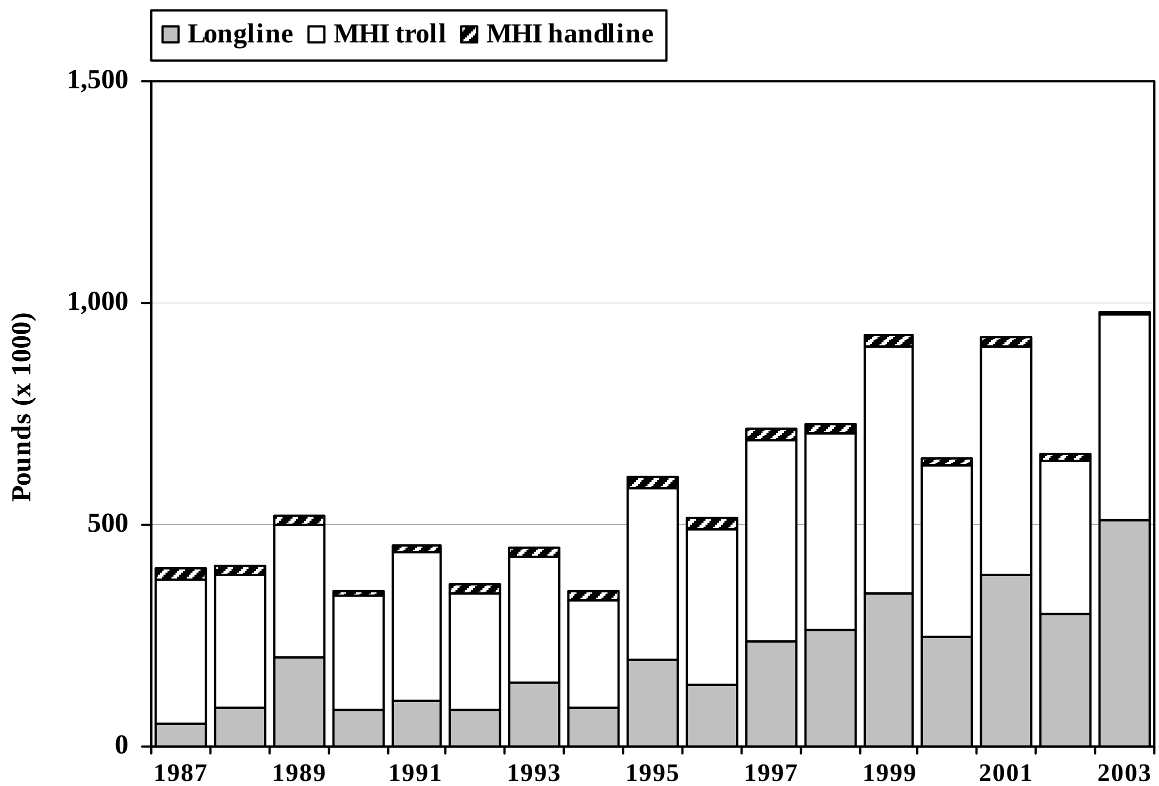


Interpretation: Total catch of mahimahi varied substantially over the 17-year period. The MHI troll fishery usually had the highest mahimahi catches, although this fishery showed no clear trend. In contrast, catches by the longline fishery were much higher from 1999. There were also small catches of mahimahi by the MHI handline, offshore handline, and aku boat fisheries.

Source and Calculations: Longline mahimahi catches were calculated by multiplying the number of fish kept from NMFS logbook data by the average weight summaries from market sample data. Mahimahi catch by the troll, handline, and aku boat fisheries were compiled from HDAR commercial catch reports and fish dealer data.

	Mahimahi catch (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	596
1990	366	491	37	0	0	894
1991	555	718	44	5	0	1,321
1992	593	461	24	21	14	1,113
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	721	731	45	46	0	1,543
2001	530	584	42	36	0	1,191
2002	655	695	49	21	0	1,425
2003	675	621	24	10	1	1,335
Average	**428.6**	**518.0**	**39.3**	**19.2**	**1.9**	**1,003.6**
SD	**211.5**	**125.5**	**14.2**	**12.0**	**3.6**	**316.3**

Figure 19. Hawaii ono catch, 1987-2003.

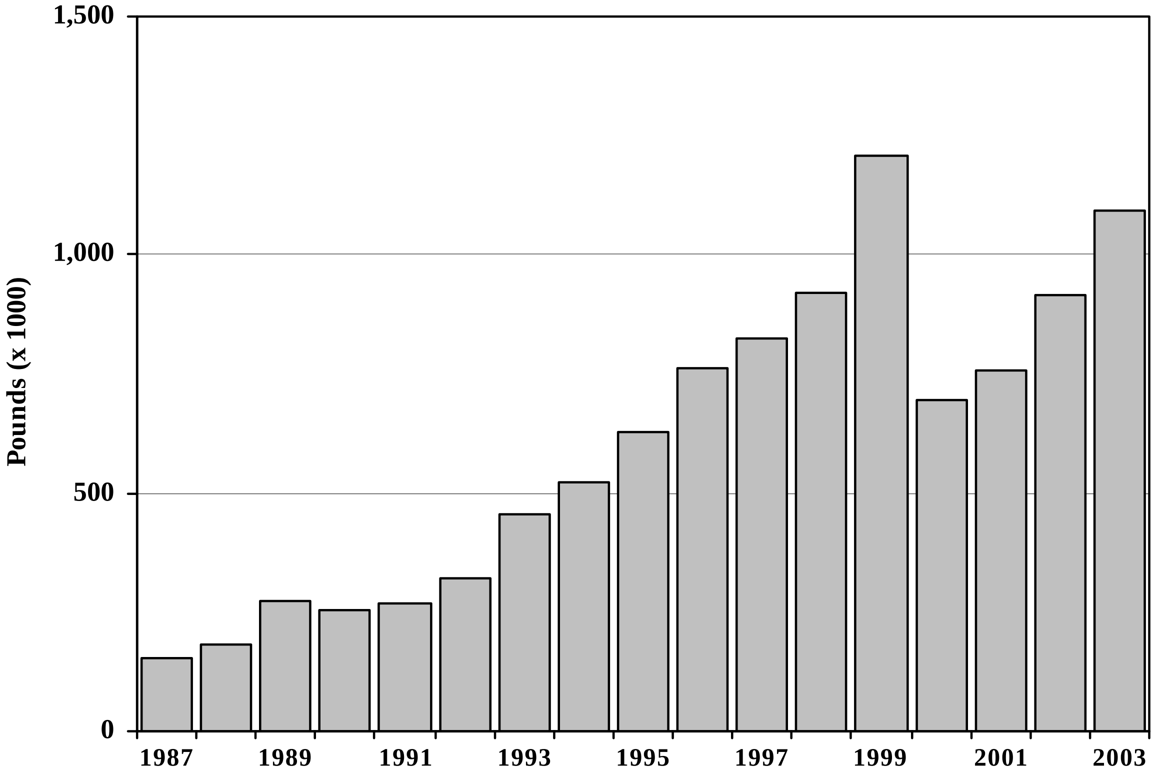


Interpretation: Ono catches were consistently above 500,000 pounds from 1995 with a record catch above 1 million pounds in 2003. Most of the ono catch was attributed to the longline and MHI troll fisheries. Ono catch by these two fisheries were almost always above their respective the long-term averages from 1997. Ono catch by the MHI troll fishery consistently had the largest catches up to 2002 and was replaced by the longline fishery as the largest contributor in 2003.

Source and Calculations: Longline ono catches were calculated by multiplying the number of fish kept from NMFS logbook data by the average weight summaries from market sample data. Ono catch by the troll and handline fisheries were compiled from HDAR commercial catch reports and fish dealer data.

	Ono catch (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	352
1991	101	337	18	456
1992	85	262	18	365
1993	142	286	22	451
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	246	387	17	650
2001	388	516	17	922
2002	298	346	15	687
2003	511	461	10	1,001
Average	**184.4**	**359.3**	**20.3**	**565.8**
SD	**103.2**	**92.4**	**4.5**	**190.6**

Figure 20. Hawaii moonfish catch, 1987-2003.

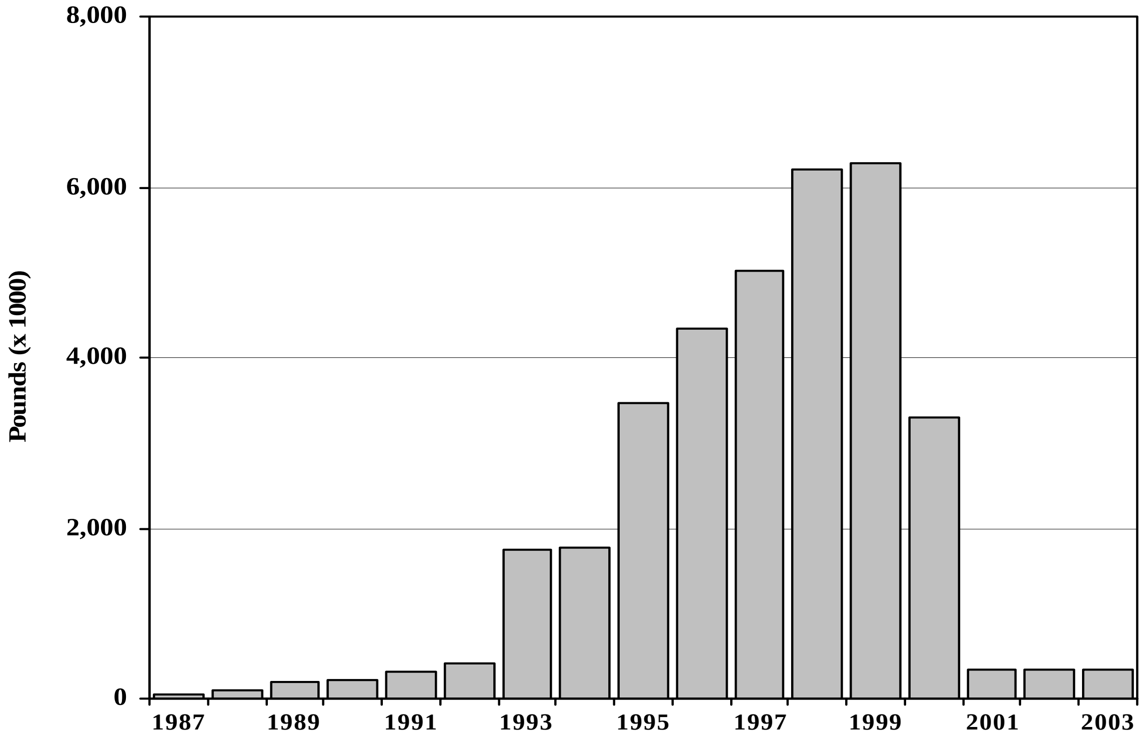


Interpretation: Moonfish catches rose and peaked at 1.2 million pounds in 1999; almost 8 times more than the catch observed in 1987. Moonfish catch exceeded 1 million pounds again in 2003. Moonfish is caught exclusively on longline gear.

Source and Calculations: Longline moonfish catches were calculated by multiplying the number of fish kept from NMFS logbook data by the average weight summaries from market sample data.

	Moonfish catch (1000 lbs)	
Year	**Longline**	**Total**
1987	152	152
1988	182	182
1989	274	274
1990	253	253
1991	270	270
1992	320	320
1993	454	454
1994	524	524
1995	629	629
1996	760	760
1997	823	823
1998	922	922
1999	1,210	1,210
2000	693	693
2001	756	756
2002	916	916
2003	1,092	1,092
Average	**571.1**	**571.1**
SD	**315.0**	**315.0**

Figure 21. Hawaii shark catch, 1987-2003.

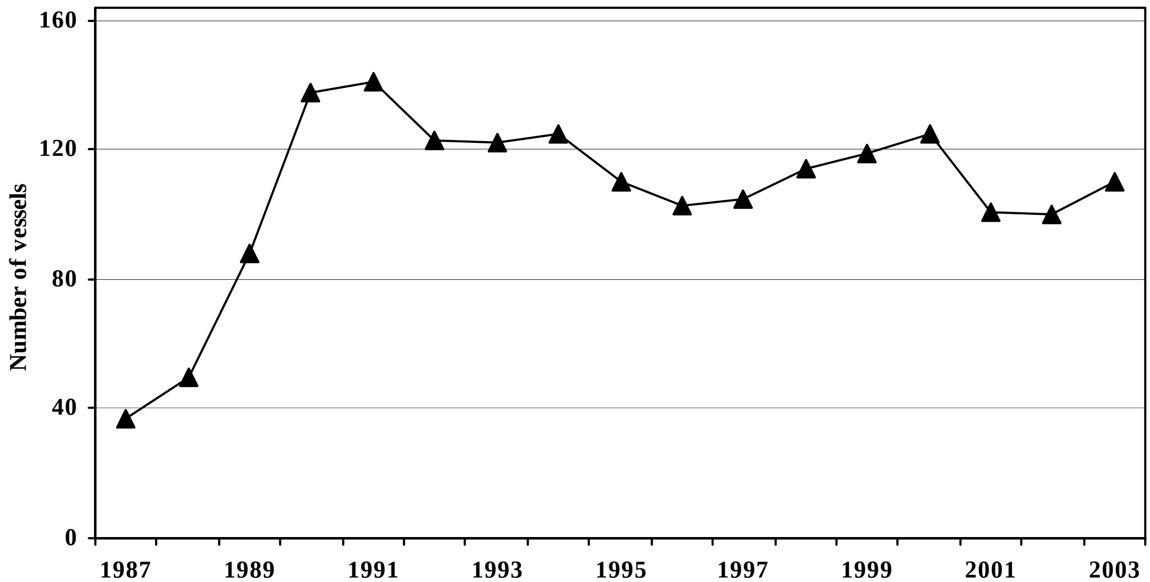


Interpretation: Sharks were caught and landed exclusively by the longline fishery. Shark catch increased dramatically from 1987 to a peak of 6.3 million pounds in 1999. Sharks were landed headed and gutted in the late 1980's but a market for shark fins began in the early 1990's. Finning sharks then became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

Source and Calculations: Mako and thresher shark catches were calculated by multiplying the number of fish kept from NMFS logbook data by the average weight summaries from market sample data. When the practice was allowed, blue and other sharks were finned. Although their carcasses were discarded at sea, these still represented a kept and landed fish. These finned shark catches were also extrapolated to whole weight by multiplying the number of sharks finned by an average weight from the observer data as a crude method to estimate shark biomass.

	Shark catch (1000 lbs)	
Year	**Longline**	**Total**
1987	40	40
1988	90	90
1989	200	200
1990	220	220
1991	320	320
1992	410	410
1993	1,740	1,740
1994	1,760	1,760
1995	3,470	3,470
1996	4,330	4,330
1997	5,010	5,010
1998	6,210	6,210
1999	6,270	6,270
2000	3,300	3,300
2001	330	330
2002	350	353
2003	340	341
Average	**2,128.1**	**2,128.3**
SD	**2,293.8**	**2,293.6**

Figure 22. Number of Hawaii-based longline vessels, 1987-2003.

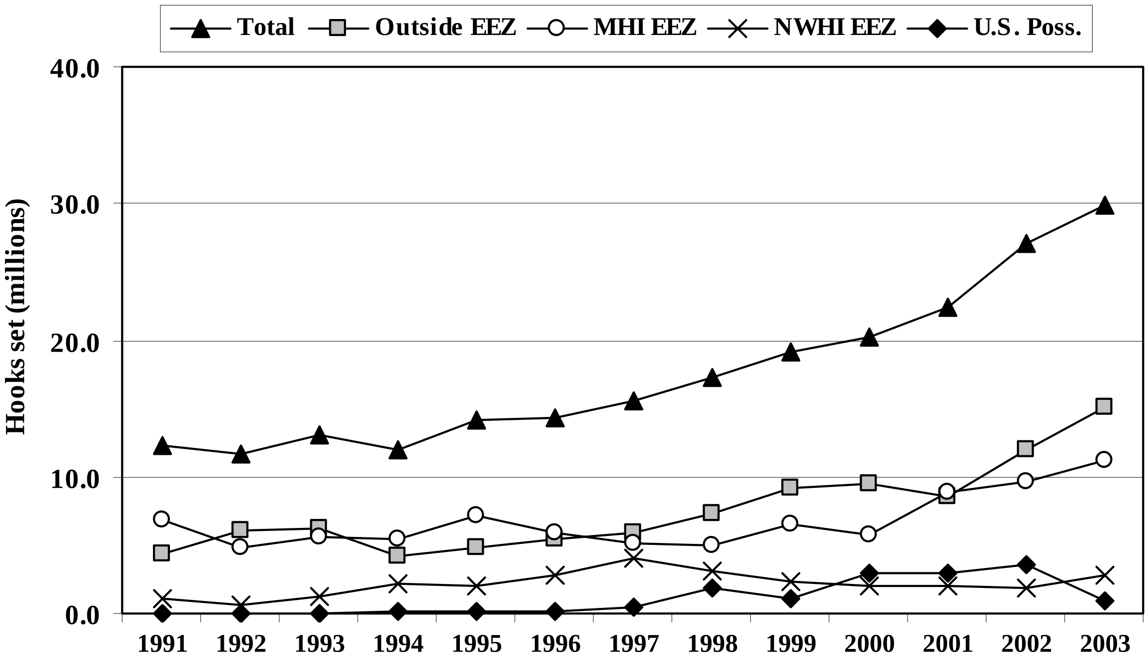


<u>Interpretation</u>: The number of active Hawaii-based longline vessels rose rapidly from 37 in 1987 to a peak at 141 vessels in 1991, followed by a decline to 103 vessels in 1996. The number of vessels then increased again to 125 in 2000 then dropped suddenly to 101 the following year. The drop observed in 2001 was due to Hawaii-based longline vessels leaving the fishery due to the prohibition of shallow-set gear,which caused vessels to move California, where they continued to target swordfish. Other vessels converted their gear and techniques to deep-set longline in order to target tuna.
There were 110 active Hawaii-based longline vessels in 2003.

<u>Source and Calculations</u>: The number of Hawaii-based longline vessels was compiled from the NMFS marketing monitoring data from 1987-1990 and the NMFS longline logbook data from 1991-2003.

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
Average	**106.5**
SD	**27.5**

Figure 23. Number of trips by the Hawaii-based longline fishery, 1991-2003.

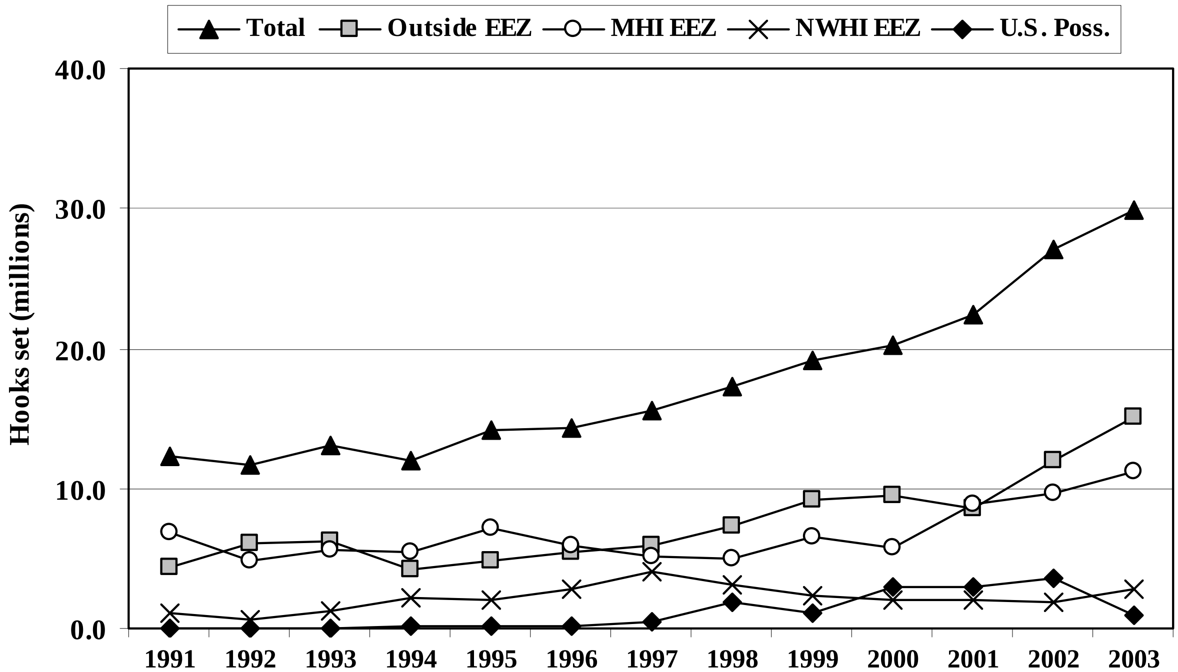


Interpretation: The first year in this 13-year time series, 1991, had significantly more trips than all subsequent years. The total number of Hawaii-based longline trips declined sharply in 1992 because a moratorium on new vessels from entering the fishery was implemented. Trip activity stabilized thereafter but there was a shift in effort from swordfish- and mixed- target trips toward tuna-targeted trips. The number of swordfish- and mixed-target trips was highest in 1991 and declined slowly thereafter through 2000. Swordfish- and mixed-target trips then dropped dramatically in 2001 due to the prohibition on shallow-set longline gear in that year. There were no swordfish trips in 2002 and 2003. In contrast, tuna trips increased from a low of 458 trips in 1992 to a record 1,215 trips made in 2003.

Source and Calculations: Number of trips was compiled from NMFS federal longline logbook data collected from 1991 to 2003. The trip type was determined by an interview with the vessel captain or assigned by FMEP staff on the basis of gear configuration, fishing locations, catch composition, and past targeting strategy.

	Hawaii longline trip activity			
Year	**Total trips**	**Tuna trips**	**Mixed trips**	**Swordfish trips**
1991	1,671	556	823	292
1992	1,266	458	531	277
1993	1,192	542	331	319
1994	1,106	568	228	310
1995	1,125	682	307	136
1996	1,100	657	351	92
1997	1,125	745	302	78
1998	1,140	760	296	84
1999	1,138	776	297	65
2000	1,103	814	252	37
2001	1,034	987	43	4
2002	1,165	1,163	2	---
2003	1,215	1,215	---	---
Average	**1,183.1**	**763.3**	**313.6**	**154.0**
SD	**157.7**	**234.2**	**211.2**	**120.3**

Figure 24. Number of hooks set by the Hawaii-based longline fishery, 1991-2003.



Interpretation: The total number of hooks set by the Hawaii-based longline fishery increased steadily from 12.0 million hooks in 1994 to a record 29.9 million hooks in 2003. 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 or mixed target set types. Most of the hooks set were in the areas outside the EEZ (50%) and MHI EEZ (37%) in 2003. Effort in the NWHI EEZ (9%), in the EEZ of U.S. possessions (3%) including the areas of Johnston Atoll, Kingman Reef and Palmyra Atoll was relatively low.

Source and Calculations: Number of hooks set was compiled from NMFS federal longline logbook data which were collected from 1991 to 2003.

	Number of hooks set by area (milions)				
Year	**Outside EEZ**	**MHI EEZ**	**NWHI EEZ**	**U.S. Poss.**	**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
Average	**7.6**	**6.8**	**2.2**	**1.1**	**17.6**
SD	**3.2**	**2.0**	**0.9**	**1.3**	**5.9**

Table 3. Distance traveled to first set by the Hawaii-based longline fleet, 1991-2003.

	Distance to first set (miles)							
	Average				Maximum			
Year	Tuna trips	Mixed trips	Sword trips	Fleet mean	Tuna trips	Mixed trips	Sword trips	Fleet maximum
1991	240	276	585	318	1,508	1,408	1,792	1,792
1992	260	404	733	424	1,156	1,543	1,871	1,871
1993	222	522	820	465	1,432	1,616	2,122	2,122
1994	252	323	833	430	945	1,298	2,814	2,814
1995	273	397	884	441	945	1,609	2,097	2,097
1996	284	410	790	367	1,866	1,547	2,037	2,037
1997	288	365	623	332	1,002	1,323	1,973	1,973
1998	384	439	708	422	1,154	1,611	1,522	1,611
1999	313	490	821	388	1,160	1,723	1,791	1,791
2000	472	674	879	557	1,461	1,747	1,945	1,949
2001	345	408	1,295	353	1,357	1,451	1,546	1,546
2002	370	---	---	370	1,378	---	---	1,378
2003	330	---	---	330	2,412	---	---	2,412
Average	**310.2**	**428.0**	**815.5**	**399.8**	**1,367.4**	**1,534.2**	**1,955.5**	**1,953.3**
SD	**69.5**	**106.6**	**186.6**	**66.5**	**407.9**	**149.2**	**347.6**	**374.3**

<u>Interpretation</u>: The average distance miles to first set traveled by the Hawaii-based longline fleet in 2003 was the second shortest distance during the 13-year period. Tuna trips showed a general increase with longest average distance traveled to first set at 472 miles in 2000 then declining to 330 miles in 2003. When longlining for swordfish was allowed, swordfish trips usually traveled the farthest average distance before making their first set while tuna trips traveled the shortest average distance.

The farthest distance traveled to first set for the Hawaii-based longline fleet was 2,814 miles in 1994. The maximum distance traveled to first set was in excess of 2000 miles from 1993 to 1996 due to the long distances traveled by vessels making swordfish trips. Maximum distance decreased thereafter but rose to 2,412 miles in 2003. In general, swordfish trips had the highest maximum distance to first set while tuna trips usually had the shortest maximum distance to first set.

<u>Source and Calculation</u>: The distance traveled to first set was calculated as the location of the first set on a trip recorded in the federal longline logbook from Honolulu. The average and maximum miles to first set must be interpreted with caution because they may include atypical trips such as those that departed from California and landed in Hawaii. This type of trip activity was included since these vessels were permitted to operate in the Hawaii-based longline fishery. In contrast, trips which vessels departed from Hawaii and landed in California were not included.

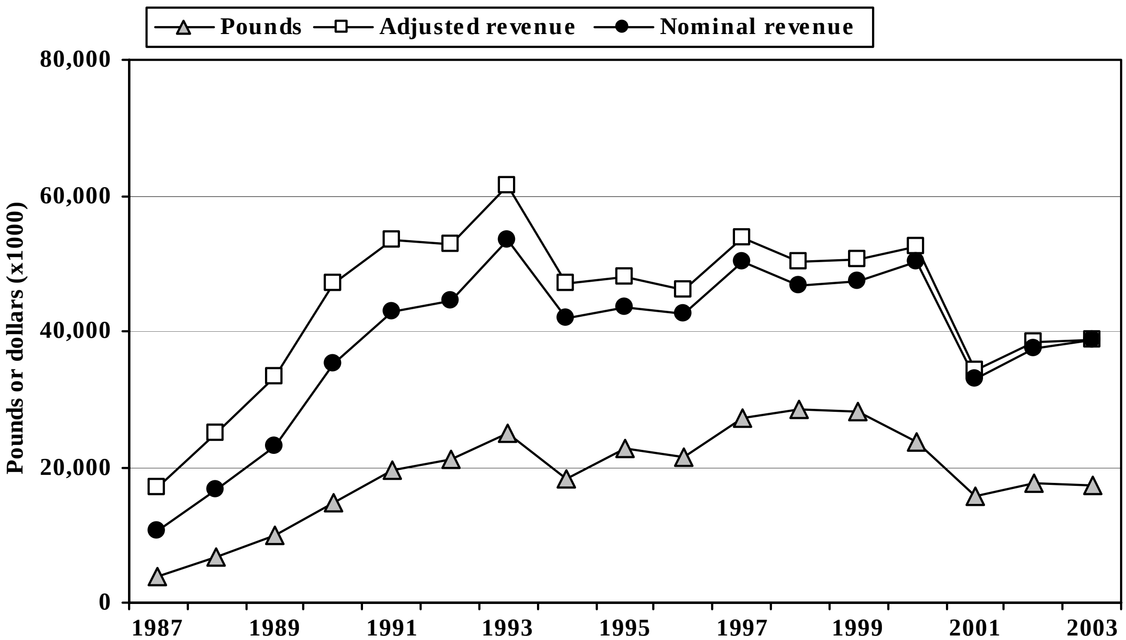
Table 4. Number of days fished per trip for the Hawaii-based longline fleet, 1991-2003.

	Days fished per trip							
	Average				Maximum			
Year	**Tuna trips**	**Mixed trips**	**Sword trips**	**Fleet mean**	**Tuna trips**	**Mixed trips**	**Sword trips**	**Fleet maximum**
1991	7.7	6.3	10.7	7.6	18	22	26	22
1992	8.4	7.8	12.7	9.1	14	21	26	26
1993	8.8	9.6	13.7	10.3	14	23	29	29
1994	8.9	8.0	13.4	10.0	16	19	26	26
1995	10.0	9.3	13.2	10.3	20	26	27	27
1996	10.3	10.3	12.7	10.5	28	30	28	30
1997	10.1	10.6	14.1	10.5	19	36	27	36
1998	10.3	11.9	14.5	10.9	17	24	24	24
1999	11.1	11.7	12.5	11.4	19	26	22	26
2000	11.0	13.3	15.5	11.7	19	29	25	29
2001	11.8	10.7	10.0	11.7	20	19	18	20
2002	12.1	---	---	12.1	21	---	---	21
2003	12.1	---	---	12.1	22	---	---	22
Average	**10.2**	**10.0**	**13.0**	**10.6**	**19.0**	**25.0**	**25.3**	**26.0**
SD	**1.4**	**2.0**	**1.6**	**1.3**	**3.7**	**5.2**	**3.1**	**4.4**

Interpretation: There was an increasing trend for average number of days fished per trip for the Hawaii-based longline fleet. The average number of days fished per trip increased from 7.6 days per trip to a record 12.1 days fished per trip in 2002 and 2003. This represents almost a 60% increase over the 13-year period. Swordfish trips or mixed target trips had the highest maximum number of fishing days per trip up to 2000.

Source and Calculation: Average and maximum number of days fished per trip were compiled from federal longline logbook data. The number of days fished per trip is a summary of number of sets and hauls occurred on an individual trip and does not include travel days or otherwise not fishing.

Figure 25. Hawaii longline catch and revenue, 1987-2003.



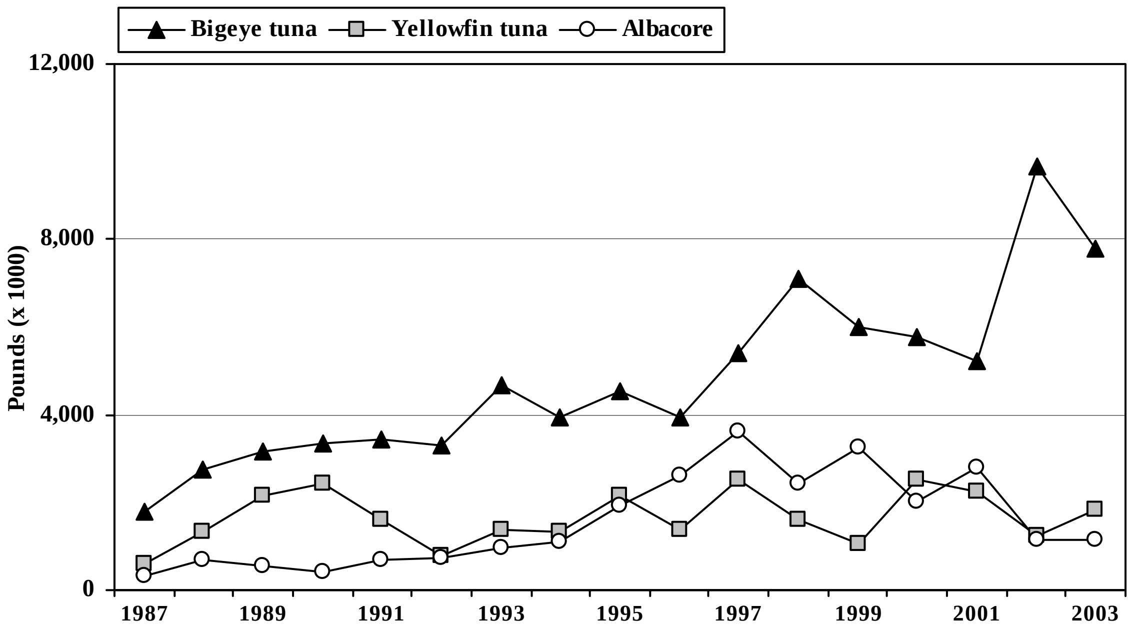
Interpretation: Total catch by the Hawaii-based longline fishery rose six-fold from 1987 to 1993. This was caused by increases in the number of vessels participating in the fishery and by growth in longline effort directed toward swordfish. Catch remained relatively stable until 1999 but decreased 45% over the next two years due to lower shark and swordfish catches. Catch increased 12% in 2002 and remained the same in 2003.

The pattern for revenue was similar to catch; it showed a rapid increase in the late 1980s and early 90s followed by a period of stability through 2000 and a 35% decline in 2001 largely due to lower swordfish revenue. Revenue in 2003 was up 13% from 2001.

Source and Calculations: Longline catch and ex-vessel revenue estimates were compiled by the NMFS Honolulu Laboratory. The catch and revenue estimates were calculated by extrapolating NMFS and HDAR market sampling data from 1987 through 1991, combining the number of fish from the federal logbook catch data with the average weight per fish and average price per pound from the market sample data during 1992 to 2001, and State electronic dealer data in 2002 and 2003.

		Revenue	
Year	**Pounds**	**Adjusted revenue**	**Nominal revenue**
1987	3,900	$ 17,000	$ 10,600
1988	6,700	$ 25,000	$ 16,500
1989	9,900	$ 33,300	$ 23,200
1990	14,700	$ 47,200	$ 35,300
1991	19,500	$ 53,500	$ 42,900
1992	21,100	$ 52,800	$ 44,400
1993	25,000	$ 61,500	$ 53,400
1994	18,100	$ 46,900	$ 41,800
1995	22,700	$ 47,900	$ 43,600
1996	21,600	$ 46,200	$ 42,700
1997	27,100	$ 53,800	$ 50,100
1998	28,600	$ 50,100	$ 46,600
1999	28,300	$ 50,500	$ 47,400
2000	23,800	$ 52,500	$ 50,200
2001	15,600	$ 34,100	$ 33,000
2002	17,500	$ 38,400	$ 37,500
2003	17,400	$ 38,600	$ 38,600
Average	**18,910.0**	**$ 44,080.0**	**$ 38,690.0**
SD	**7,190.0**	**$ 11,520.0**	**$ 11,950.0**

Figure 26. Hawaii longline tuna catch, 1987-2003.

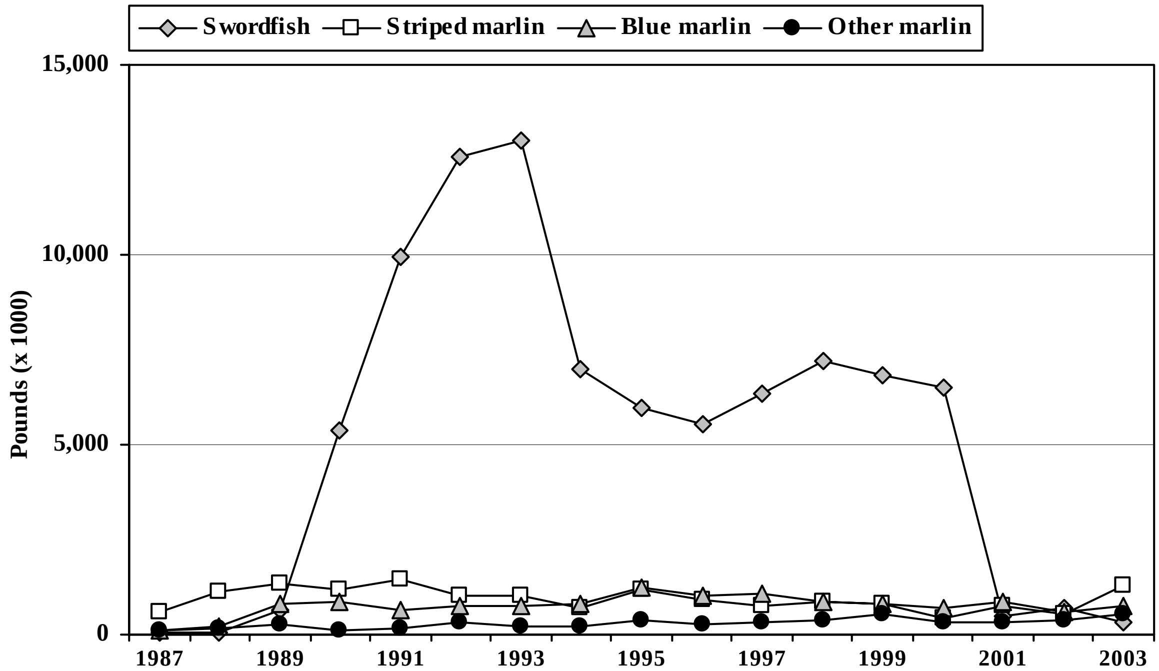


<u>Interpretation</u>: The three major tuna species caught by the Hawaii-based longline fishery are bigeye tuna, yellowfin tuna, and albacore. Bigeye tuna was the largest component of the longline catch and made up 69% of the tuna catch in 2003. Catches for bigeye tuna and albacore exhibited an upward trend during the late 1990s due to increased effort directed towards tunas, but then declined in the early 2000s. Bigeye tuna catch then rose to a record level in 2002 while albacore continued on a downward trend. Yellowfin catch increased from 1987 through 1990 and fluctuated thereafter. The longline fishery also caught small amounts of skipjack tuna and bluefin tuna.

<u>Source and Calculations</u>: Longline tuna catch estimates were compiled by the NMFS Honolulu Laboratory. The catch estimates were calculated by extrapolating NMFS and HDAR market sample data during 1987 through 1991 or combining number of fish from the federal logbook catch data with average weight per fish from the market sample data during 1992 to 2001, and State electronic dealer data in 2002 and 2003.

	Hawaii longline tuna catch (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	5,788	2,506	2,026	206	8	10,534
2001	5,217	2,233	2,802	466	2	10,720
2002	9,679	1,258	1,152	276	2	12,368
2003	7,770	1,820	1,157	435	1	11,183
Average	**4,810.8**	**1,653.0**	**1,554.9**	**157.2**	**27.2**	**8,203.2**
SD	**2,011.9**	**601.9**	**1,058.9**	**141.6**	**31.5**	**2,948.5**

Figure 27. Hawaii longline billfish catch, 1987-2003.



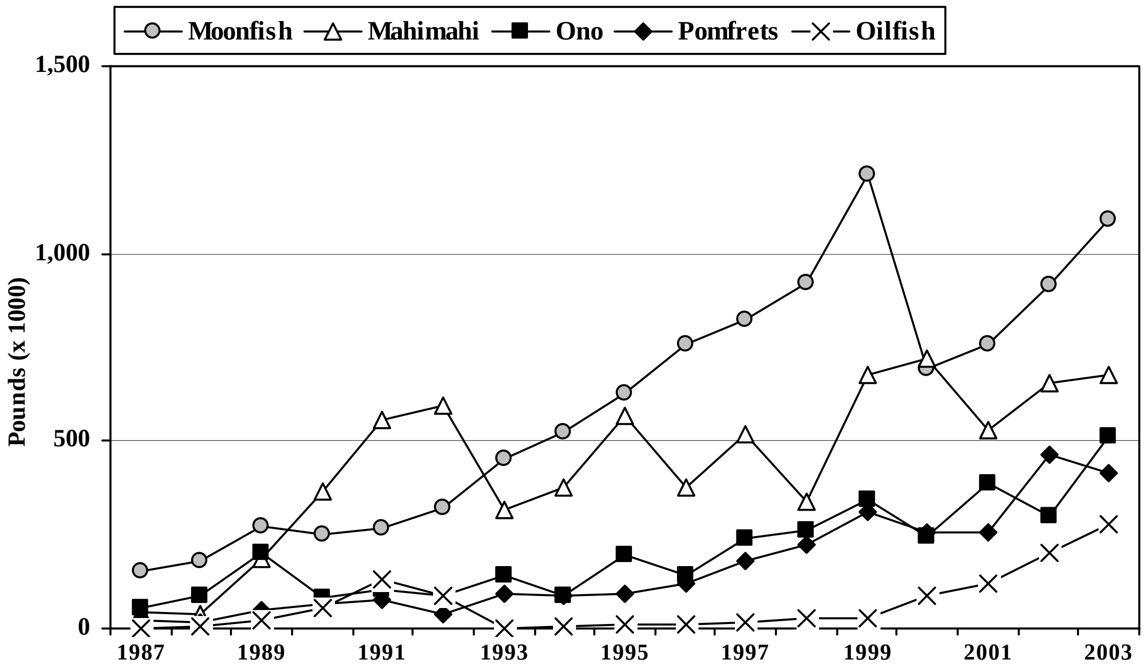
Interpretation: Swordfish was the dominant component of the billfish catch by the Hawaii-based longline fishery from 1990 through 2000. This catch rose rapidly in the early 1990s to a peak in 1993 as a result of increased effort directed towards swordfish. Swordfish catch dropped the following year and remained relatively stable through 2000 but decreased substantially in 2001 and remained low the following two years. The decrease in swordfish catch was caused by the prohibition of targeting swordfish to reduce the turtle interactions.

Marlins are caught incidentally by the longline fishery, but are retained because they sell for a moderate market price. Longline catch of blue marlin remained stable from 1989 with slightly higher catches in 1995 through 1997. Blue marlin was the largest component of the longline catch in 2001. Striped marlin catch has been on a downward trend with a record low catch in 2001 but was significantly higher in 2003.

Source and Calculations: Longline billfish catch estimates were compiled by the NMFS Honolulu Laboratory. The catch estimates were calculated by extrapolating NMFS and HDAR market sample data during 1987 through 1991 or combining number of fish from the federal logbook catch data with average weight per fish from the market sample data during 1992 to 2001, and State electronic dealer data in 2002 and 2003.

	Hawaii longline billfish catch (1000 lbs)				
Year	Swordfish	Striped marlin	Blue marlin	Other marlin	Total
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	6,502	441	692	335	7,970
2001	485	775	879	299	2,438
2002	699	549	594	365	2,207
2003	301	1,306	771	554	2,932
Average	**757.3**	**294.4**	**7,203.2**	**294.4**	**7,203.2**
SD	**274.2**	**130.0**	**4,419.7**	**130.0**	**4,419.7**

Figure 28. Hawaii longline of other pelagic PMUS catch, 1987-2003.

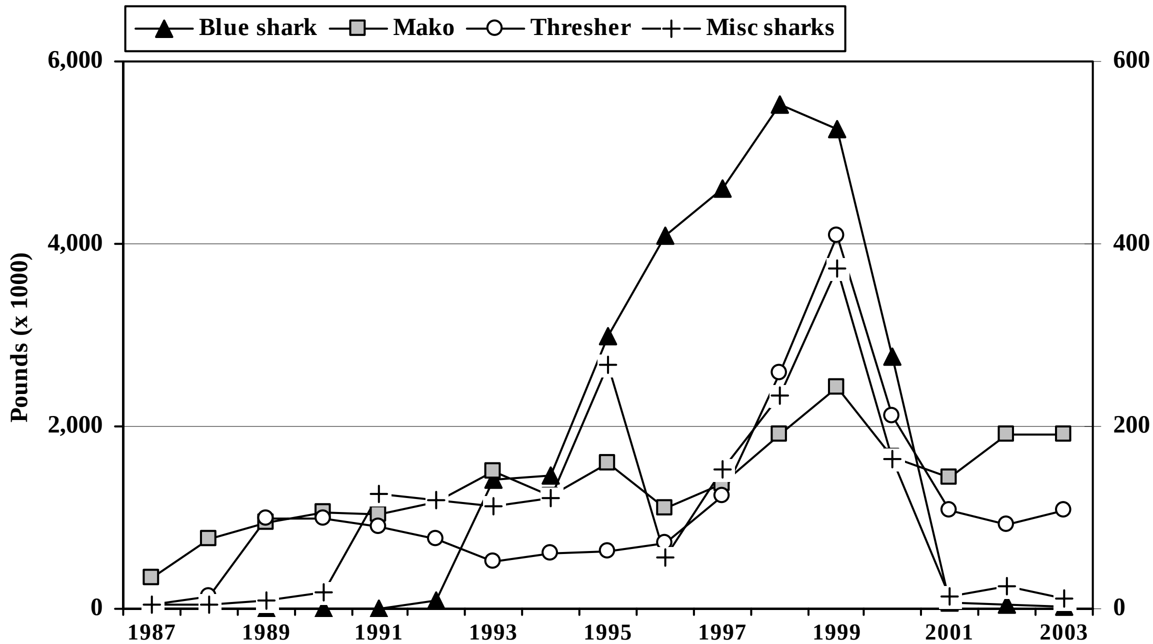


Interpretation: Longline landings of other pelagic species show a general increase. Moonfish was the dominant component in this category from 1993 peaking at 1.2 million pounds in 1999. Mahimahi was the second largest component and was followed by miscellaneous pelagic species (primarily pomfrets). Miscellaneous pelagics and ono increased to a record high in 2003.

Source and Calculations: Longline catches of other pelagic PMUS estimates were compiled by the NMFS Honolulu Laboratory. The catch estimates were calculated by extrapolating NMFS and HDAR market sample data during 1987 through 1991 or combining number of fish from the federal logbook catch data with average weight per fish from the market sample data during 1992 to 2001, and State electronic dealer data in 2002 and 2003.

	Hawaii longline catch of other pelagic fish (1000 lbs)					
Year	**Mahimahi**	**Moonfish**	**Ono**	**Pomfrets**	**Oilfish**	**Total**
1987	45	152	53	23	2	275
1988	39	182	90	18	3	332
1989	183	274	202	49	24	708
1990	366	253	80	66	52	817
1991	555	270	101	75	130	1,131
1992	593	320	85	37	85	1,120
1993	316	454	142	92	0	1,004
1994	377	524	87	85	8	1,081
1995	570	629	195	93	10	1,497
1996	375	760	140	121	11	1,407
1997	518	823	239	178	15	1,773
1998	336	922	262	225	26	1,771
1999	679	1,210	343	313	29	2,574
2000	721	693	246	257	85	2,002
2001	530	756	388	255	119	2,048
2002	655	916	298	466	200	2,535
2003	675	1,092	511	416	277	2,971
Average	**443.1**	**601.8**	**203.6**	**162.9**	**63.3**	**1,473.3**
SD	**213.3**	**330.1**	**127.5**	**137.9**	**78.8**	**780.5**

Figure 29. Hawaii longline shark catch, 1987-2003.



Interpretation: Blue shark catch increased in the 1990s due to retention for fins only. Blue shark catch dropped significantly from 1999 to 2001 after State and Federal laws prohibited the practice of finning and landing sharks without the associated carcass. Blue shark landings remained at negligible levels through 2003. Mako and thresher sharks were retained for their flesh as well as their fins. Catches of mako and thresher sharks were an order of magnitude lower, although also increasing in the 1990s (Y-2 axis). Like blue sharks, miscellaneous shark catches (Y-2 axis) were also retained for fins only. Miscellaneous shark catches increased as the practice of finning sharks became widespread in the longline fleet decreased when regulations prohibited finning.

Source and Calculations: Mako and thresher shark catches were calculated by multiplying the number of fish kept from NMFS logbook data and average weight summaries from market sample data. When the practice was allowed, blue and other sharks were finned. Although their carcasses were discarded at sea, these still represented a kept and landed fish. These finned shark catches were also extrapolated to whole weight by multiplying the number of sharks finned by an average weight from the observer data as a crude method to estimate shark biomass.

	Hawaii longline shark catch (1000 lbs)				
Year	**Blue shark**	**Mako**	**Thresher**	**Misc sharks**	**Total**
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	1,454	124	61	122	1,761
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	2,756	166	212	163	3,297
2001	62	143	108	14	327
2002	46	190	93	24	353
2003	24	192	107	12	335
Average	**1,664.9**	**137.5**	**113.9**	**106.5**	**2,022.8**
SD	**2,083.4**	**50.6**	**98.1**	**107.2**	**2,262.7**

Table 5. Hawaii-based longline catch (number of fish) by area, 1991-2003.

	Tunas			Billfish				Miscellaneous			
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	1,770	**12,207**	**8,288**	25,233	4,748	3,467	25,856
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	4,686	2,614	3,559	1,596	1,372	11,871
U.S. Possessions											
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
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	**56,173**	**12,942**	**13,778**	**1,777**	**2,437**	8,417	7,075	**25,691**	**10,963**	**6,943**	**29,085**
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	107,109	27,914	20,859	3,540	5,685	25,882	18,467	55,325	18,365	11,899	69,418

<u>Interpretation</u>: The bolded numbers in Table 5 show the areas with the highest catches. The highest bigeye tuna catches were observed in the MHI EEZ from 1991 to 1996. Catches remained high thereafter but bigeye tuna catch outside the EEZ was the most productive area for five of the past six years. A similar pattern occurred for yellowfin tuna catch also except the highest catches typically occur in the EEZ of U.S. possessions, primarily Kingman Reef and Palmyra Atoll. Albacore catches were consistently highest outside the EEZ.

Swordfish catch from outside the EEZ was consistently the predominant area of capture over the past thirteen years. Blue marlin catches was highest in the MHI EEZ up to 1997 and was replaced by outside the EEZ for the past six years. Striped marlin catch was highest in the MHI EEZ.

In general, high catches of mahimahi, ono, and moonfish were in the MHI EEZ but shifted outside the EEZ in the two most recent years. The highest catches of sharks always occurred outside the EEZ.

<u>Source and Calculations</u>: Catches by area were compiled from NMFS federal longline logbook data collected from 1991 to 2003.

Table 6. Average weight of the Hawaii-based longline catch by species, 1987-2003.

SPECIES	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Average	SD
TUNAS																			
Albacore	63	60	62	61	52	45	44	41	51	53	55	55	52	55	55	56	56	**53.8**	**6.1**
Bigeye tuna	77	83	77	81	85	77	88	81	79	64	71	74	75	80	69	71	77	**76.9**	**6.2**
Bluefin tuna				638	185	192	203	190	271	223	239	177	202	165	169	151	273	**234.1**	**122.0**
Skipjack tuna	18	19	19	21	20	17	17	18	18	17	20	20	20	17	18	16	19	**18.3**	**1.3**
Yellowfin tuna	82	103	104	122	118	99	93	97	95	80	89	76	62	67	63	62	68	**87.0**	**19.1**
BILLFISH																			
Blue marlin	161	157	165	199	173	175	157	171	156	154	134	165	164	158	139	149	144	**159.9**	**15.1**
Striped marlin	66	57	62	62	58	66	64	64	58	58	66	60	55	59	48	55	49	**59.1**	**5.3**
Black marlin	208	151	191	204	184	155	136	167	72		190	167	131	136	633	222	154	**193.8**	**122.7**
Sailfish	52	51	55	55	51	45	49	55	47	40	46	43	45	56	45	59	56	**49.9**	**5.5**
Spearfish	34	31	31	35	32	34	34	33	33	31	31	32	29	35	31	33	31	**32.2**	**1.5**
Swordfish	129	119	130	152	153	178	171	163	171	157	163	176	188	185	133	146	141	**156.1**	**20.7**
OTHER PMUS																			
Mahimahi	21	20	23	19	15	11	13	12	10	17	13	16	16	14	12	14	13	**15.1**	**3.7**
Ono (wahoo)	33	32	35	36	32	35	33	34	31	31	30	32	34	32	29	33	29	**32.3**	**2.0**
Moonfish	111	108	104	98	97	98	101	103	101	105	103	101	98	100	99	98	93	**101.0**	**4.3**
Oilfish	20	22	23	22	23	22	21	13	23					18	16	17	16	**19.7**	**3.4**
Pomfrets	15	18	18	18	17	16	16	17	16	15	17	15	14	14	13	13	12	**15.5**	**1.8**
SHARKS																			
Mako shark	124	137	161	162	135	144	147	153	178	177	161	177	177	182	181	na	185	**161.2**	**19.5**
Thresher shark	97	122	158	167	180	176	199	164	172	156	160	171	202	162	171	na	197	**165.8**	**26.7**

Interpretation: Longline fishing effort can cover a large area within a trip. The market data on individual fish 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, albacore, bigeye tuna, and yellowfin tuna, exhibited changes throughout 1987-2003. The average weight of albacore was about 60 pounds until 1990 then declined to less than 50 pounds during 1992-94. This decline was related to increasing incidental catches of small albacore north of the Hawaiian Islands by longliners targeting swordfish. The average weight of albacore then increased as a greater proportion of longline effort shifted further south to target tunas. The average weight of albacore was 56 pounds in 2003. The average weight of bigeye tuna showed the least amount of change of the three main tuna species, ranging from 64 pounds to 88 pounds. Bigeye tuna average weight was 77 pounds in 2003. In contrast, yellowfin tuna average weight showed the most variation ranging from 62 pounds to 122 pounds. The average weight of yellowfin tuna was more than 100 pounds during 1988-1991 and decreased to less than 70 pounds from 1999 with average weight at 67 pounds in 2003. This probably reflects a trend of increasing effort in the EEZ of Kingman Reef and Palmyra Atoll where relatively small yellowfin tuna are caught.

Swordfish caught on tuna target trips are biased towards small swordfish in comparison to swordfish target trips. Average weight for swordfish was lowest in the late 1980s when the longline fishery targeted tunas only. The average weight increased in the early 1990s with as the number of swordfish target trips grew. Average weight peaked at 188 pounds in 1999 and was about the same in the following year. Swordfish effort (shallow-set longlining) was restricted in 2001 and prohibited altogether in 2002 and 2003. As a result, effort was almost exclusively directed towards tuna target (deep-set longline) and swordfish average weight then dropped to 133 pounds in 2001 and was 141 pounds in 2003.

Average weight of blue marlin ranged from 199 pounds in 1990 to 134 pounds in 1997 and was 144 pounds in 2003. Average weight of striped marlin show very little variation over the 17-year period ranging from 48 pounds in 2001 to 66 pounds in 1987, 1992 and 1997 and was 49 pounds in 2003.

Source and Calculations: Average weight of the longline catch was summarized from the NMFS, Honolulu Laboratory and HDAR market sampling data. With the exception of swordfish and sharks, most of the longline catch was landed whole. 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.

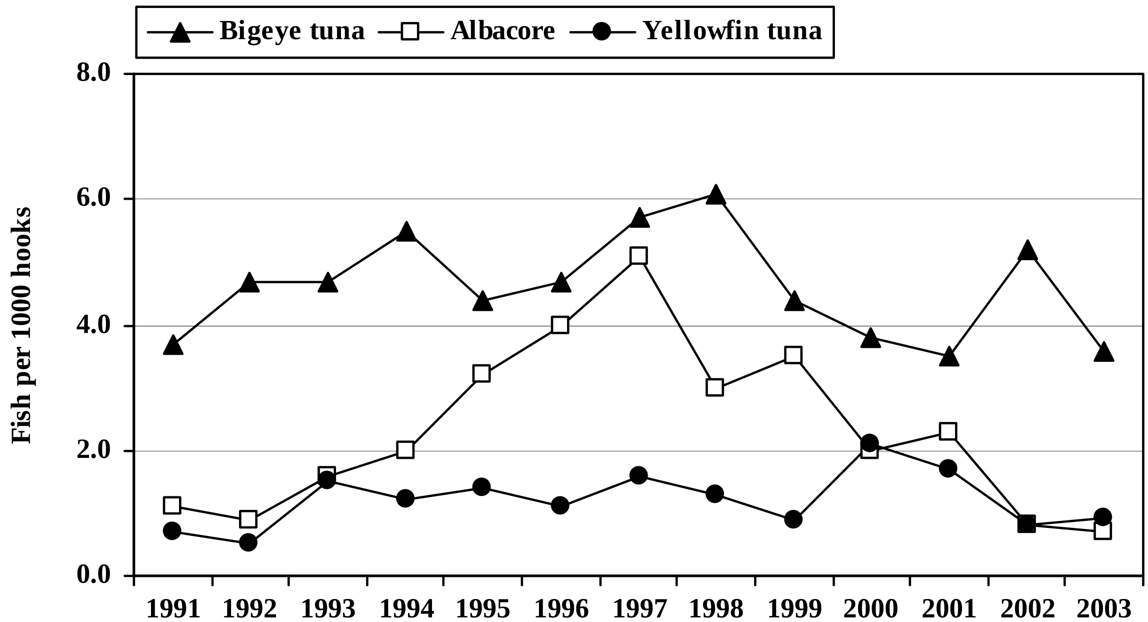
Table 7. Bycatch, retained catch, and total catch for the Hawaii-based longline fishery, 2003.

Interpretation: Bycatch of the Hawaii-based longline fishery was measured in number of fish released. The total bycatch for all species combined was 20% in 2003. Sharks accounted for 75% of the total longline bycatch and 97% percent of all sharks caught were released. Mako and thresher sharks are kept for their flesh but almost all other species of sharks are not marketable and therefore discarded. Tunas, which are the primary target species of the longline fleet, had the lowest release rate (8%). Skipjack tuna made up 60% of the tuna released. Although billfish and other miscellaneous pelagic catch are not targeted, these species are highly marketable and also have low rates of discards (6% and 3%, respectively).

Source and Calculations: Longline bycatch totals and percentages were compiled from Federal daily longline logbooks. Longline bycatch was summarized as number of fish released.

	Number released	Percent released	Kept	Caught
Tuna				
Albacore	340	1.6	20,520	20,860
Bigeye tuna	4,258	4.0	102,872	107,130
Bluefin tuna	0	0.0	2	2
Skipjack tuna	9,135	27.9	23,550	32,685
Yellowfin tuna	1,422	5.1	26,494	27,916
Other tuna	18	31.6	39	57
Billfish				
Blue marlin	81	1.4	5,604	5,685
Spearfish	943	5.3	16,976	17,919
Striped marlin	853	3.3	25,033	25,886
Other marlin	1,222	34.5	2,318	3,540
Swordfish	25	4.5	527	552
Other pelagic fish				
Mahimahi	1,994	3.6	53,337	55,331
Moonfish	136	1.1	11,765	11,901
Oilfish	320	1.9	16,869	17,189
Pomfret	485	1.4	33,363	33,848
Wahoo	195	1.1	18,172	18,367
Miscellanous fish	1,352	58.6	956	2,308
Sharks				
Blue shark	61,054	99.4	393	61,447
Mako shark	931	46.6	1,065	1,996
Thresher shark	2,913	83.7	567	3,480
Other sharks	2,391	95.5	112	2,503
Total	90,068	20.0	360,534	450,602

Figure 30. Hawaii longline CPUE for major tunas on tuna trips, 1991-2003.



Interpretation: Tuna-target trips usually had the highest catch rate for bigeye tuna, as expected because it is the primary target species. Bigeye tuna catch-per-unit-effort (CPUE) was consistently higher than those for albacore or yellowfin tuna. Bigeye tuna CPUE peaked at 6.1 in 1998 and was 3.6 in 2003. Bigeye tuna CPUE was highest in the MHI EEZ.

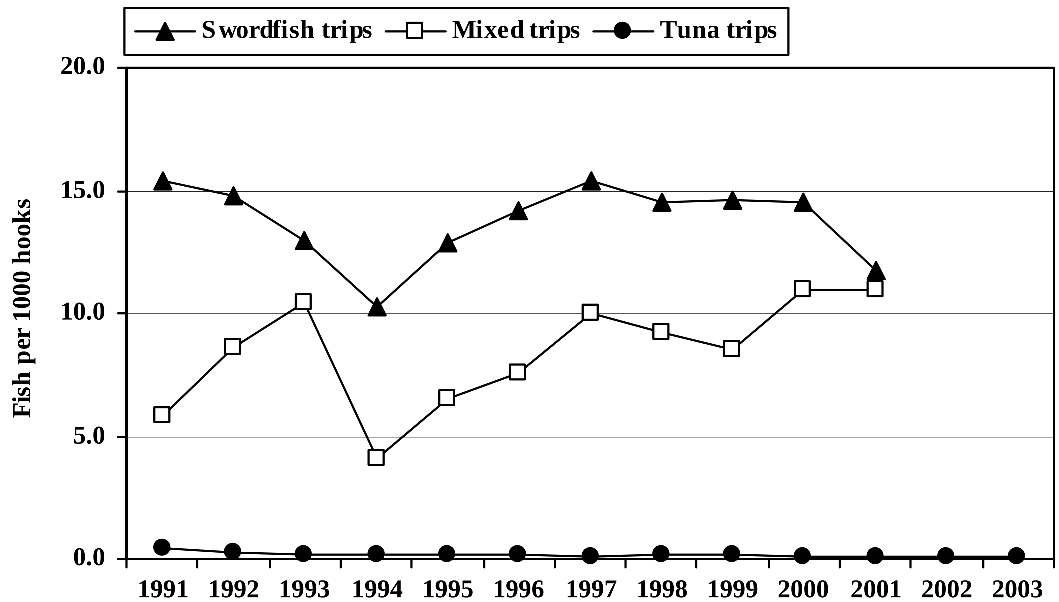
Since the average price for albacore is substantially lower than those for bigeye and yellowfin tuna, it is targeted only infrequently and is more often caught incidentally. Albacore CPUE rose rapidly in the early 1990s, peaked in 1997, then declined to a record low of 0.7 fish per 1000 hooks in 2003. Albacore CPUE is usually higher outside of the U.S. EEZ.

CPUE for yellowfin tuna was usually the lowest of the three major tuna species. Yellowfin tuna CPUE was lowest in 1992, increased slightly the following year, remained relatively stable until 1999, peaked in 2000 and then declined thereafter. The higher than usual yellowfin tuna CPUEs were observed in 2000 and 2001 due to high catches in the EEZ of Kingman Reef and Palmyra Atoll.

Source and Calculation: Longline tuna catch rates were compiled from federal daily longline logbooks. CPUE was based on number of fish caught per 1,000 hooks set.

	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
Average	**4.6**	**2.3**	**1.2**
SD	**0.8**	**1.4**	**0.4**

Figure 31. Hawaii longline swordfish CPUE by trip type, 1991-2003.



Interpretation: Swordfish CPUE varies considerably depending upon the target species, and for this reason average swordfish CPUE for the longline fleet was not an accurate measurement of fishery performance. Effort with "shallow" longline gear, which is the typical method of fishing for swordfish and mixed trips, was drastically reduced in 2001 and prohibited beginning in 2002 due to sea turtle conservation measures. Therefore, swordfish CPUE for these trips types was unavailable for 2002 and 2003.

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 from 1996 through 2000. Swordfish target effort was curtailed substantially in 2001, leading to a 19% decrease in CPUE.

Mixed-target trips had intermediate swordfish catch rates. Mixed-target trips also exhibited a record low swordfish CPUE in 1994, and this decline was greater than that of the swordfish-target trips. The CPUE for this trip type then increased from this record low to peak catch rates in 2000 and 2001. Tuna-target trips had very low swordfish CPUEs throughout the monitoring period.

Source and Calculation: Longline swordfish catch rates were compiled from federal daily longline logbooks. CPUE (catch-per-unit-effort) was based on number of fish caught per 1,000 hooks set. Trips were categorized by longline captains or, if the captain could not be contacted, NMFS staff categorized the trip based on the vessels' fishing history and gear configuration. Trips were categorized as targeting swordfish, tuna, or mixed species (mixed in reference to targeting both tunas and swordfish on each set or switching from one target species to a different species within a trip).

	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	14.2	7.6	0.2
1997	15.4	10.0	0.1
1998	14.5	9.2	0.2
1999	14.6	8.5	0.2
2000	14.5	11.0	0.1
2001	11.7	11.0	0.1
2002	---	---	0.1
2003	---	---	0.1
Average	**13.8**	**8.4**	**0.2**
SD	**1.6**	**2.2**	**0.1**

Figure 32a. Longline blue marlin CPUE by trip type, 1992-2003.

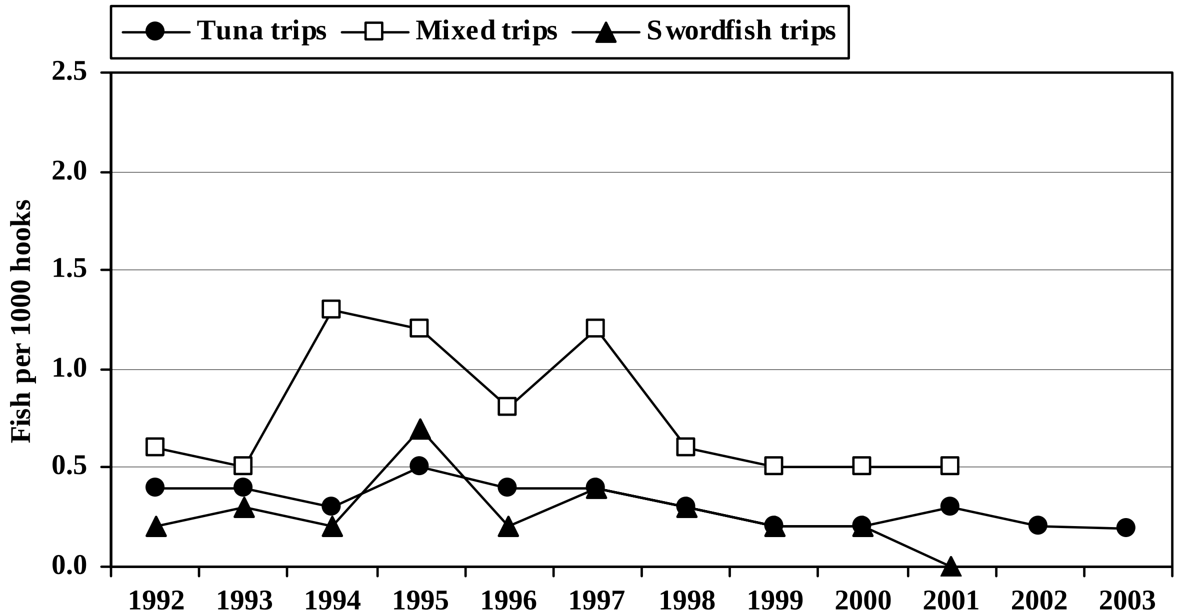
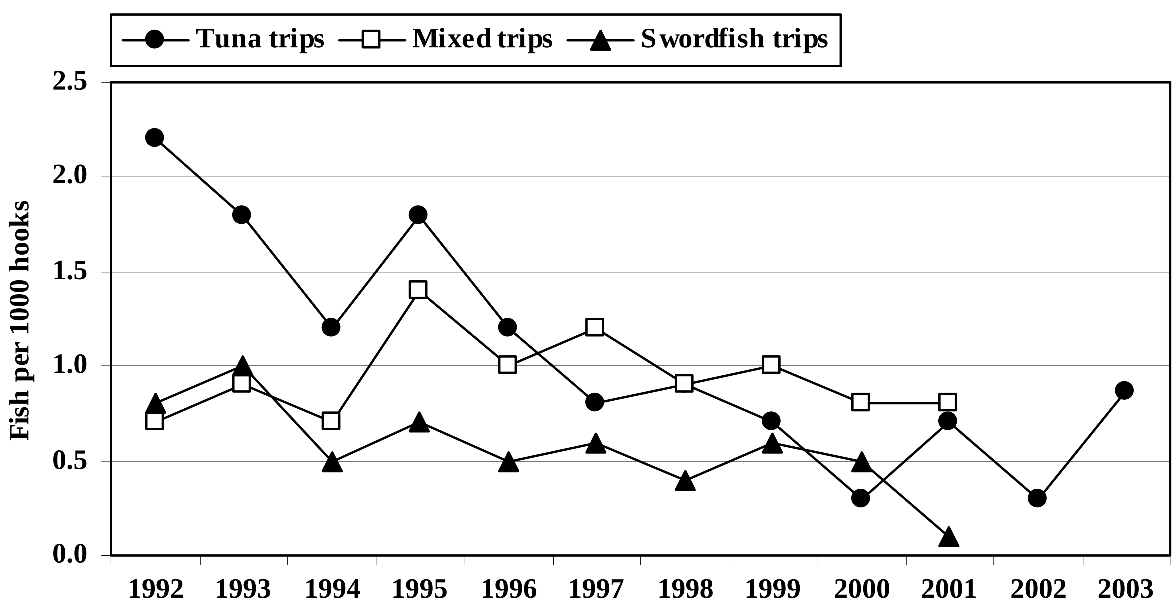


Figure 32b. Longline striped marlin CPUE by trip type, 1992-2003.

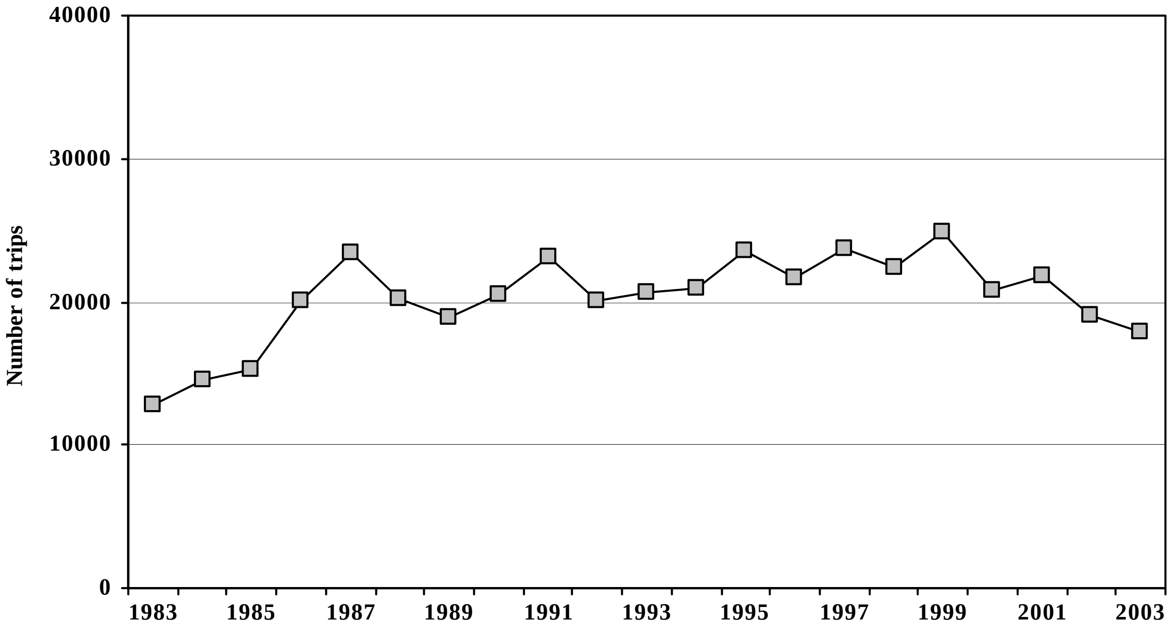


Interpretation: Blue and striped marlin were caught incidentally by the longline fishery. Therefore, catch rates for these two species were significantly lower than CPUE for target species such as swordfish and bigeye tuna. There were differences in marlin CPUE among trip types. Blue marlin CPUE was noticeably 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 lower levels from 1998 thorough 2001. Striped marlin CPUE was usually higher on tuna-target trips and appeared to be on the decline.

Source and Calculation: Longline blue and striped marlin catch rates were compiled from federal daily longline logbooks. CPUE (catch-per-unit-effort) was based on number of fish caught per 1,000 hooks set. Trips were categorized by longline captains or, if the captain could not be contacted, NMFS staff categorized the trip based on the vessel's fishing history and gear configuration. Trips were categorized as targeting swordfish, tuna, or mixed species (mixed in reference to targeting both tunas and swordfish on each set or switching from one target species to a different species within a trip).

	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	2.2	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	0.5
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	0.9	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	0.5	0.0	0.7	0.8	0.1
2002	0.2	---	---	0.3	---	---
2003	0.2	---	---	0.9	---	---
Average	**0.3**	**0.8**	**0.3**	**1.1**	**0.9**	**0.6**
SD	**0.1**	**0.3**	**0.2**	**0.6**	**0.2**	**0.2**

Figure 33. Number of Main Hawaiian Islands troll trips, 1983-2003.

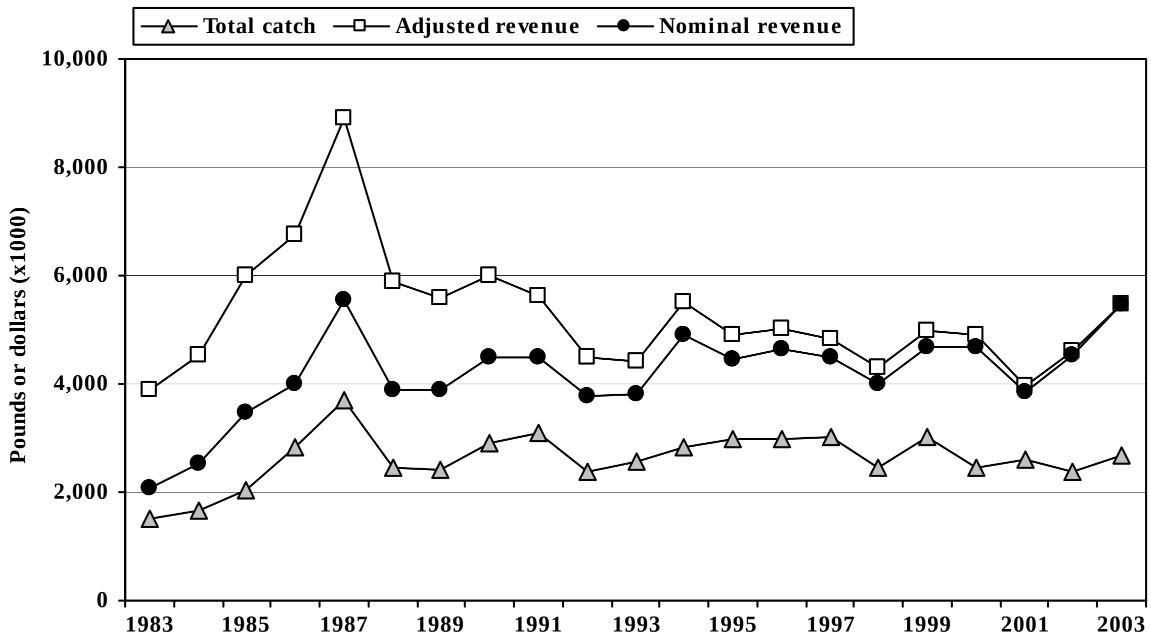


Interpretation: Main Hawaiian Islands (MHI) troll trips almost doubled from 12,842 in 1983 to 24,884 in 1987 but then remained at approximately stable levels until 2001. Reported trip activity decreased in both 2003 and 2003; the total in the latter year (17,904) was the lowest value since 1985.

Source and Calculations: The number of MHI troll trips was compiled from HDAR commercial fish catch reports by counting the unique number of commercial marine license numbers using trolling gear that fished in HDAR statistical areas 100 to 699. Trips with zero catches were not included in this caluculation. The 2002 trip summary was updated with data that became available in 2003 and the 2003 summary was based on preliminary data.

Year	MHI troll trips
1983	12,842
1984	14,556
1985	15,291
1986	20,139
1987	23,391
1988	20,202
1989	18,924
1990	20,468
1991	23,184
1992	20,109
1993	20,647
1994	20,905
1995	23,527
1996	21,611
1997	23,674
1998	22,403
1999	24,884
2000	20,855
2001	21,814
2002	19,029
2003	17,904
Average	20,302.8
SD	3,106.2

Figure 34. Main Hawaiian Islands troll catch and revenue, 1983-2003.



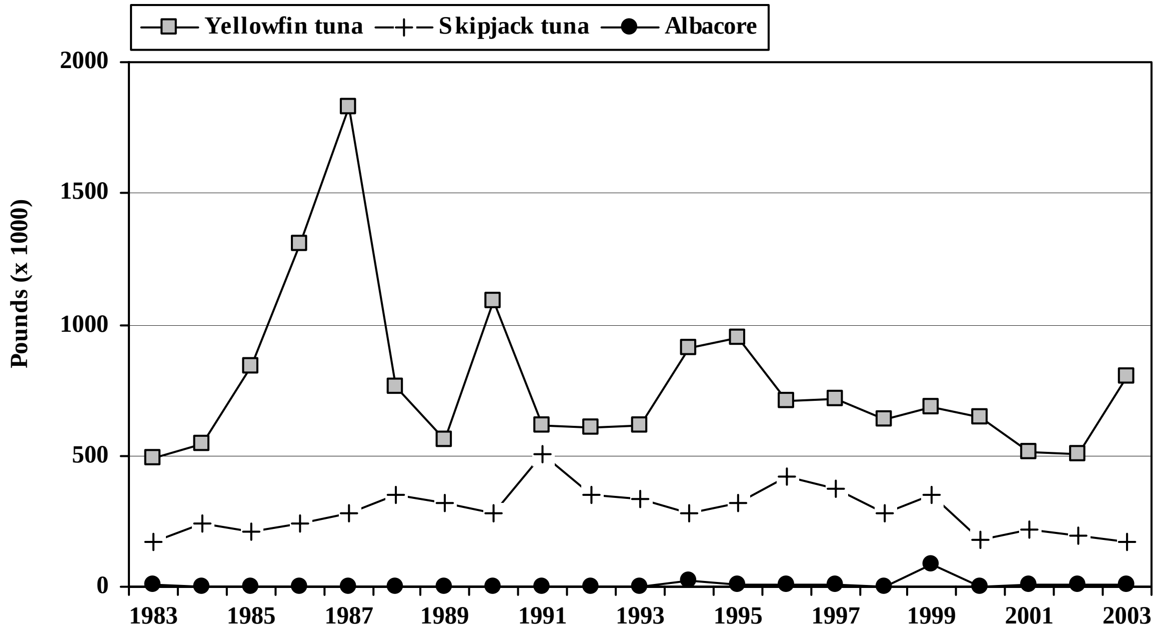
Interpretation: The MHI troll catch grew from 1.5 million pounds in 1983 to a peak of 3.7 million pounds in 1987. Catch decreased to 2.4 million pounds the following year and had remained above 2.3 million pounds. The catch total was 2.7 million pounds in 2003.

The pattern for MHI troll ex-vessel inflation adjusted revenue was similar to catch; it increased in the early 1980s to a peak of $8.9 million in 1987, followed by a drop the following year, and relatively stable levels thereafter. MHI troll revenue was $5.5 million in 2003.

Source and Calculations: MHI troll catch and revenue were summarized from HDAR commercial fish catch reports. Total catch and nominal revenue were summed from the “pounds caught” and “value” fields for trolling gear that fished in HDAR statistical areas 100 to 699. The catch and revenue summary for 2003 was compiled with preliminary data and will be updated with final data in the report for 2004.

Year	Total catch (1000 lbs)	Adjusted revenue ($1000)	Nominal revenue ($1000)	Honolulu CPI
1983	1,493	$ 3,874	$ 2,085	99.3
1984	1,675	$ 4,524	$ 2,538	103.5
1985	2,049	$ 6,010	$ 3,479	106.8
1986	2,842	$ 6,761	$ 4,009	109.4
1987	3,709	$ 8,889	$ 5,536	114.9
1988	2,445	$ 5,875	$ 3,875	121.7
1989	2,401	$ 5,589	$ 3,899	128.7
1990	2,901	$ 6,004	$ 4,494	138.1
1991	3,102	$ 5,606	$ 4,497	148.0
1992	2,395	$ 4,475	$ 3,762	155.1
1993	2,578	$ 4,398	$ 3,816	160.1
1994	2,833	$ 5,492	$ 4,897	164.5
1995	2,966	$ 4,907	$ 4,471	168.1
1996	2,994	$ 5,026	$ 4,650	170.7
1997	3,016	$ 4,816	$ 4,487	171.9
1998	2,470	$ 4,315	$ 4,011	171.5
1999	3,002	$ 4,988	$ 4,685	173.3
2000	2,456	$ 4,890	$ 4,673	176.3
2001	2,614	$ 3,975	$ 3,844	178.4
2002	2,387	$ 4,620	$ 4,515	180.3
2003	2,692	$ 5,475	$ 5,475	184.5
Average	**2,620.0**	**$ 5,262.4**	**$ 4,176.1**	
SD	**494.1**	**$ 1,109.3**	**$ 820.5**	

Figure 35. Main Hawaiian Islands troll tuna catch, 1983-2003.

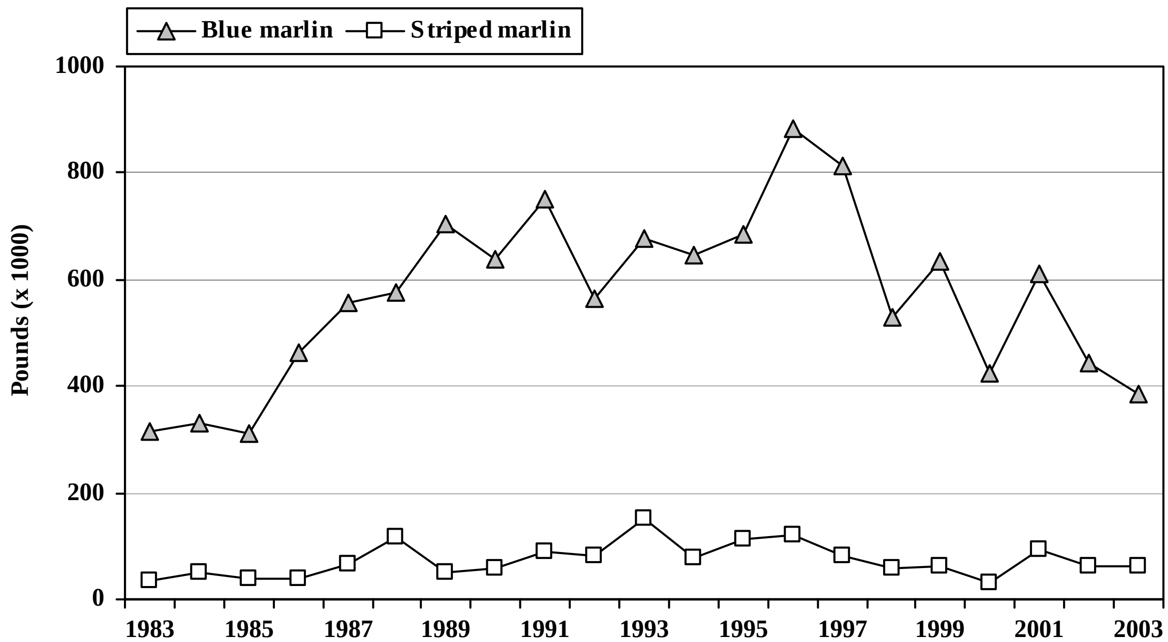


Interpretation: The MHI troll tuna catch was composed predominantly of yellowfin tuna. Yellowfin tuna catch increased more than three-fold between 1983 and 1987, but then declined by 58% in 1988. Yellowfin tuna catch remained below 1 million pounds since 1991, with a minimum of 500,000 pounds in 2002. Skipjack tuna was the second largest component of the MHI troll catch. Skipjack tuna catches were relatively stable though somewhat lower in the past four years with a record low of 170,000 in 2003. Small quantities of bigeye tuna, albacore, and other tunas were also caught by this fishery.

Source and Calculations: MHI troll tuna catches were compiled from HDAR commercial catch reports during 1983-2001 and fish dealer reports in 2002 and 2003. These data reflect catches using trolling gear in HDAR statistical areas from 100 to 699. Catch from the distant-water troll albacore fishery was excluded.

	MHI troll tuna catch (1000 pounds)					
Year	**Yellowfin tuna**	**Skipjack tuna**	**Bigeye tuna**	**Albacore**	**Other tunas**	**Total tunas**
1983	492	174	6	6	5	683
1984	547	241	6	4	11	808
1985	844	207	6	1	4	1,062
1986	1,308	241	10	0	8	1,567
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	1,263
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	1,124
2000	649	181	6	4	6	845
2001	514	216	9	10	5	754
2002	503	195	100	8	4	810
2003	805	169	145	8	5	1,132
Average	**778.3**	**288.4**	**18.9**	**8.9**	**9.7**	**1,104.8**
SD	**316.2**	**86.9**	**35.3**	**18.6**	**4.8**	**322.7**

Figure 36. Main Hawaiian Islands troll billfish catch, 1983-2003.

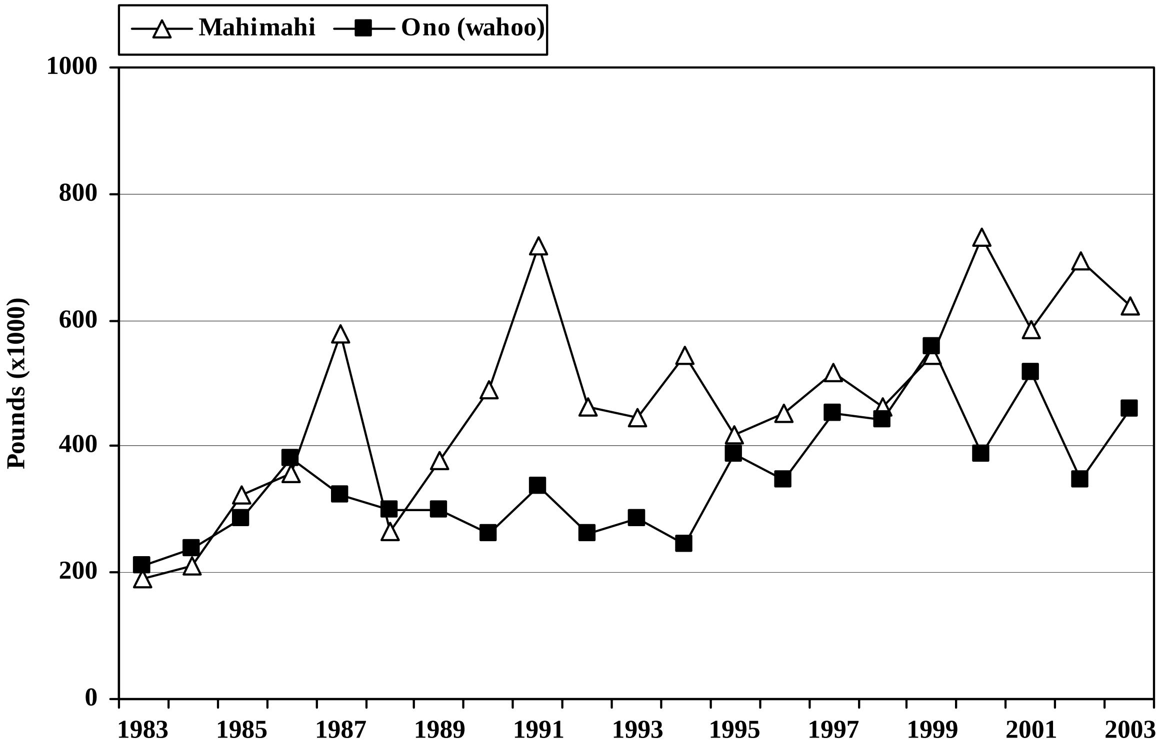


Interpretation: MHI troll catch for billfish was composed primarily of blue marlin. The blue marlin catch increased from 300,000 pounds in the early 1980s to approximately 900,000 pounds in 1996 and declined to 400,000 pounds in 2003. In contrast to the longline fishery, the striped marlin catch in this fishery was quite low with catches typically below 100,000 pounds. The MHI troll fishery also yielded small catches of other billfish, e.g., including short-bill spearfish, sailfish, and swordfish.

Source and Calculations: MHI troll billfish catches were compiled from HDAR commercial catch reports during 1983-2001 and fish dealer reports in 2002 and 2003. These data reflect catches using trolling gear in HDAR statistical areas 100 to 699. Catch from the distant-water troll albacore fishery was excluded.

	MHI troll billfish catch (1000 pounds)				
Year	Blue marlin	Striped marlin	Other billfish	Swordfish	Total billfishes
1983	314	36	53	1	404
1984	332	51	34	1	418
1985	311	39	24	1	375
1986	463	40	29	0	533
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	423	30	34	1	489
2001	610	94	51	1	756
2002	443	64	22	5	533
2003	387	63	27	1	478
Average	568.6	73.6	40.7	1.2	684.1
SD	161.8	31.6	11.8	0.9	188.7

Figure 37. Main Hawaiian Islands troll catch of other pelagic PMUS, 1983-2003.

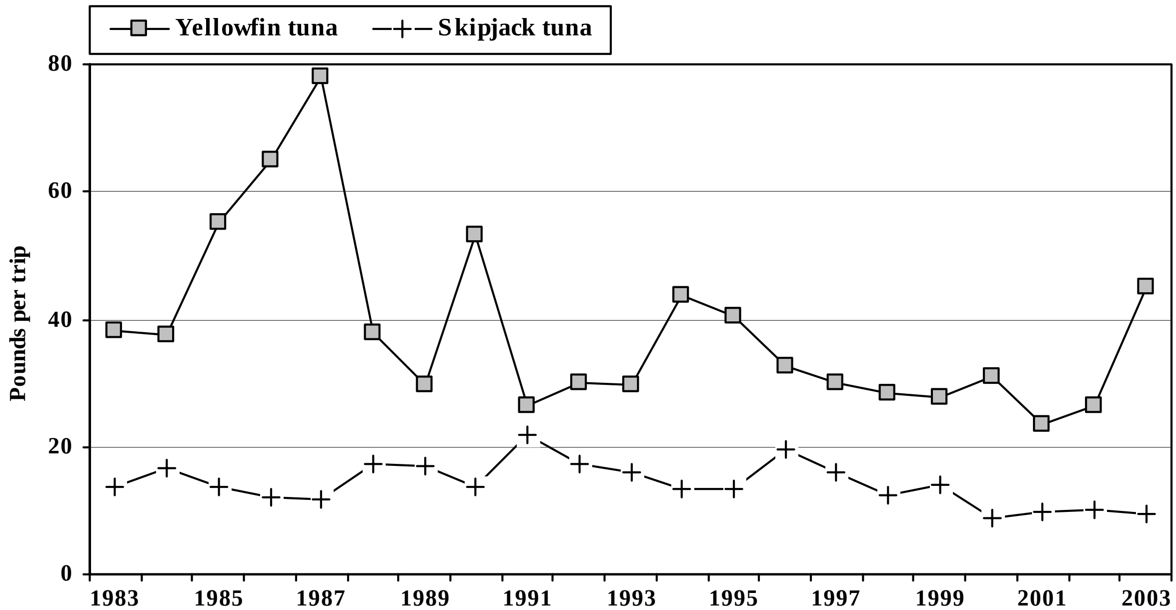


Interpretation: Mahimahi and ono comprised most of the MHI troll catch of other pelagic management unit species (PMUS). Mahimahi catches were usually higher than those for ono. Mahimahi catch peaked in 2000 while ono catch peaked in 1999. Catch for both species seemed to be on a gradually increasing trend over the 21-year period.

Source and Calculations: MHI troll catches of other PMUS were compiled from HDAR commercial catch reports during 1983-2001 and fish dealer reports in 2002 and 2003. These data reflect catches using trolling gear in HDAR statistical areas from 100 to 699. Catch from the distant-water troll albacore fishery was excluded.

	MHI troll other pelagics catch (1000 pounds)			
Year	**Mahimahi**	**Ono (wahoo)**	**Misc pelagics**	**Total other pelagics**
1983	191	210	5	406
1984	210	236	2	449
1985	323	287	2	612
1986	358	381	3	742
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	731	387	5	1,122
2001	584	516	4	1,104
2002	695	346	3	1,043
2003	621	461	0	1,082
Average	**475.8**	**348.7**	**6.5**	**831.1**
SD	**154.0**	**94.6**	**4.3**	**215.3**

Figure 38. Main Hawaiian Islands troll tuna catch per trip, 1983-2003.

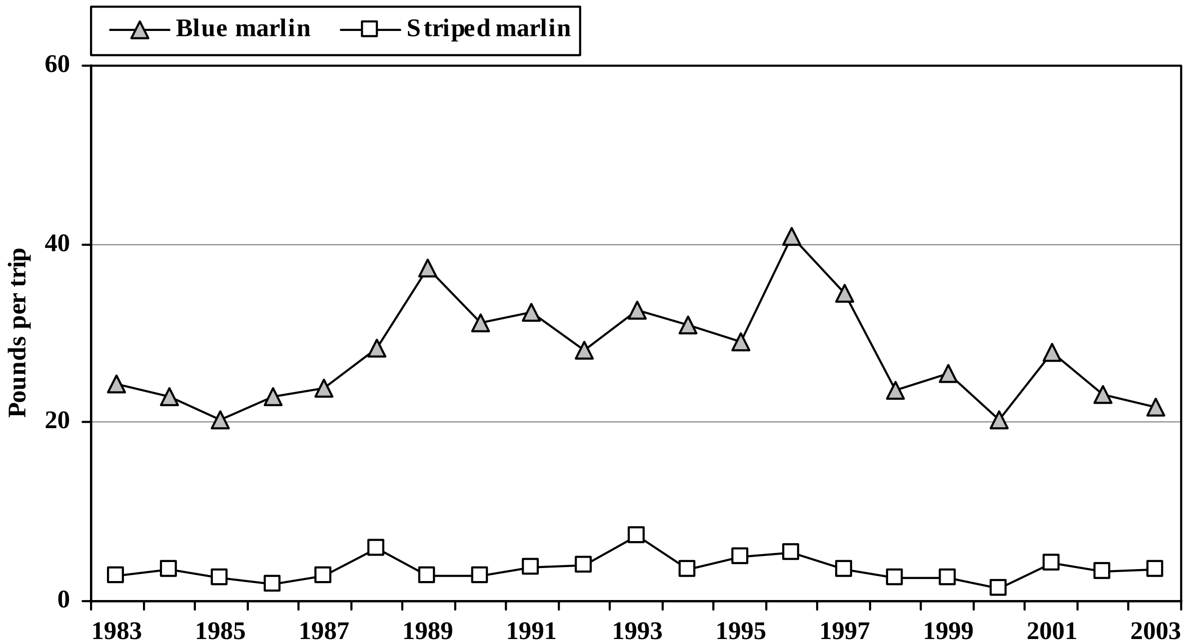


Interpretation: MHI troll yellowfin tuna CPUE showed substantial variability from 1980 until 1990. It then remained fairly constant thereafter. CPUE was 45 pounds per trip in 2003. Skipjack tuna CPUE was relatively stable throughout the 21-year period, with CPUE at 11 pounds per trip in 2003.

Source and Calculations: MHI troll tuna CPUE was measured as pounds of tuna caught per trip. Tuna catches were compiled from HDAR commercial catch reports during 1983-2001 and fish dealer reports in 2002 and 2003. These data reflect only trolling gear codes in area codes within the MHI including seamounts located within HDAR statistical areas codes 100 to 699. These catches were then divided by the number of MHI troll trips. The calculation for CPUE did not include zero catch trips.

	MHI troll tuna CPUE (pounds per	
Year	**Yellowfin tuna**	**Skipjack tuna**
1983	38	14
1984	38	17
1985	55	14
1986	65	12
1987	78	12
1988	38	17
1989	30	17
1990	53	14
1991	27	22
1992	30	17
1993	30	16
1994	44	14
1995	40	14
1996	33	20
1997	30	16
1998	28	12
1999	28	14
2000	31	9
2001	24	10
2002	26	10
2003	45	9
Average	**38.6**	**14.2**
SD	**14.1**	**3.4**

Figure 39. Main Hawaiian Island troll marlin catch per trip, 1983-2003.

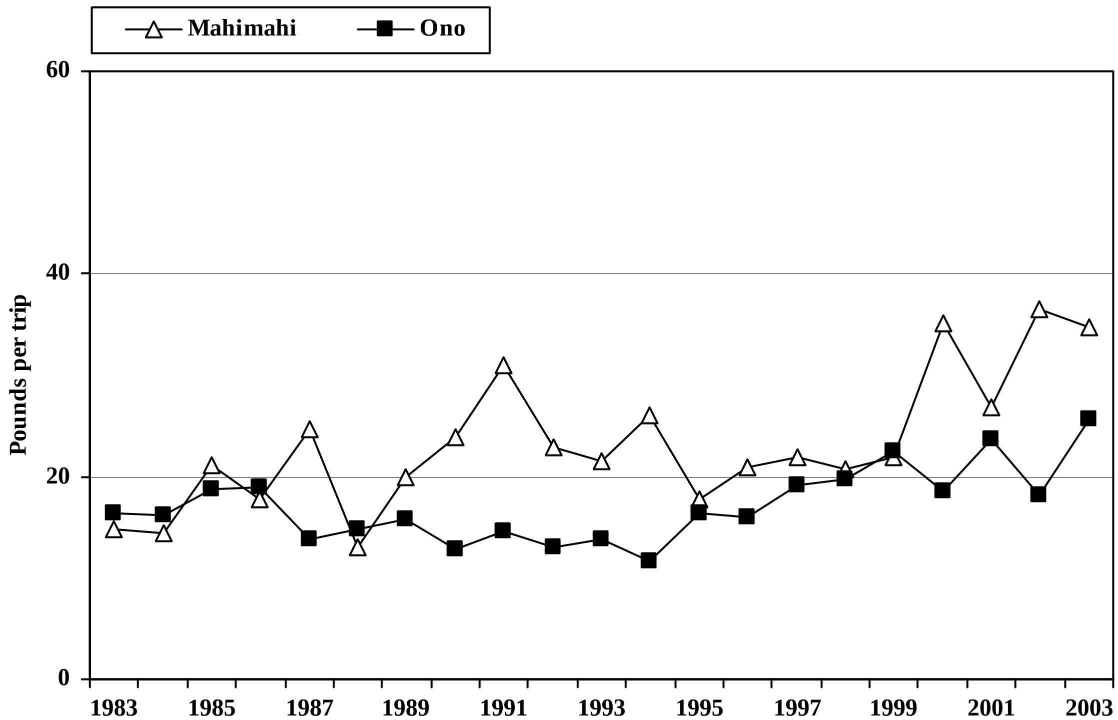


Interpretation: Blue marlin CPUE ranged from 20 to 41 pounds per trip throughout 1983-2003 with peaks in 1989 and 1996. Striped marlin CPUE was substantially lower and peaked at only 7 pounds in 1993. CPUE for striped marlin also seemed to be stable.

Source and Calculations: MHI troll marlin CPUE was measured as pounds of marlin caught per trip. Marlin catches were compiled from HDAR commercial catch reports during 1983-2001 and fish dealer reports in 2002 and 2003. These data reflect only trolling gear codes in area codes within the MHI, including seamounts located within HDAR statistical areas codes of less than 1000. These catches were then divided by the number of MHI troll trips. The calculation for CPUE did not include zero catch trips.

	MHI troll marlin CPUE (pounds per trip)	
Year	**Blue marlin**	**Striped marlin**
1983	24	3
1984	23	3
1985	20	3
1986	23	2
1987	24	3
1988	28	6
1989	37	3
1990	31	3
1991	32	4
1992	28	4
1993	33	7
1994	31	4
1995	29	5
1996	41	6
1997	34	3
1998	24	3
1999	26	3
2000	20	1
2001	28	4
2002	23	3
2003	22	4
Average	**27.7**	**3.6**
SD	**5.7**	**1.4**

Figure 40. Main Hawaiian Island troll mahimahi and ono catch per trip, 1983-2003.

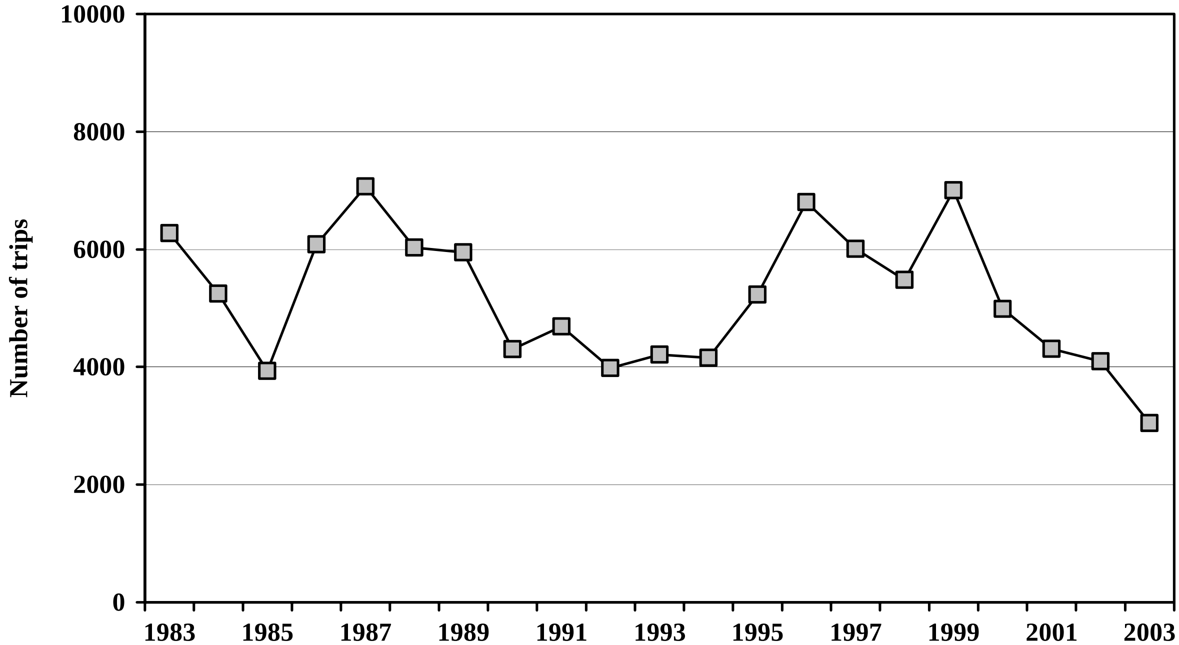


<u>Interpretation</u>: Mahimahi CPUE was greater than or equal to that for ono every year since 1990. Mahimahi CPUE peaked at 37 pounds per trip in 2002 while ono CPUE was highest at 26 pounds per trip in 2003. However, CPUE for both species were on an upward trend from the mid-1990s.

<u>Source and Calculations</u>: MHI troll mahimahi and ono CPUE were measured as pounds caught per trip. Mahimahi and ono catches were compiled from HDAR commercial catch reports during 1983-2001 and fish dealer reports in 2002 and 2003. These data reflect only trolling gear codes in area codes within the MHI and included seamounts located within HDAR statistical areas codes of less than 1000. These catches were then divided by the number of MHI troll trips. The calculation for CPUE did not include zero catch trips.

MHI troll mahimahi and ono catch per trip (pounds)		
Year	**Mahimahi**	**Ono**
1983	15	16
1984	14	16
1985	21	19
1986	18	19
1987	25	14
1988	13	15
1989	20	16
1990	24	13
1991	31	15
1992	23	13
1993	22	14
1994	26	12
1995	18	16
1996	21	16
1997	22	19
1998	21	20
1999	22	22
2000	35	19
2001	27	24
2002	37	18
2003	35	26
Average	**23.2**	**17.2**
SD	**6.6**	**3.7**

Figure 41. Number of Main Hawaiian Islands handline trips, 1983-2003.

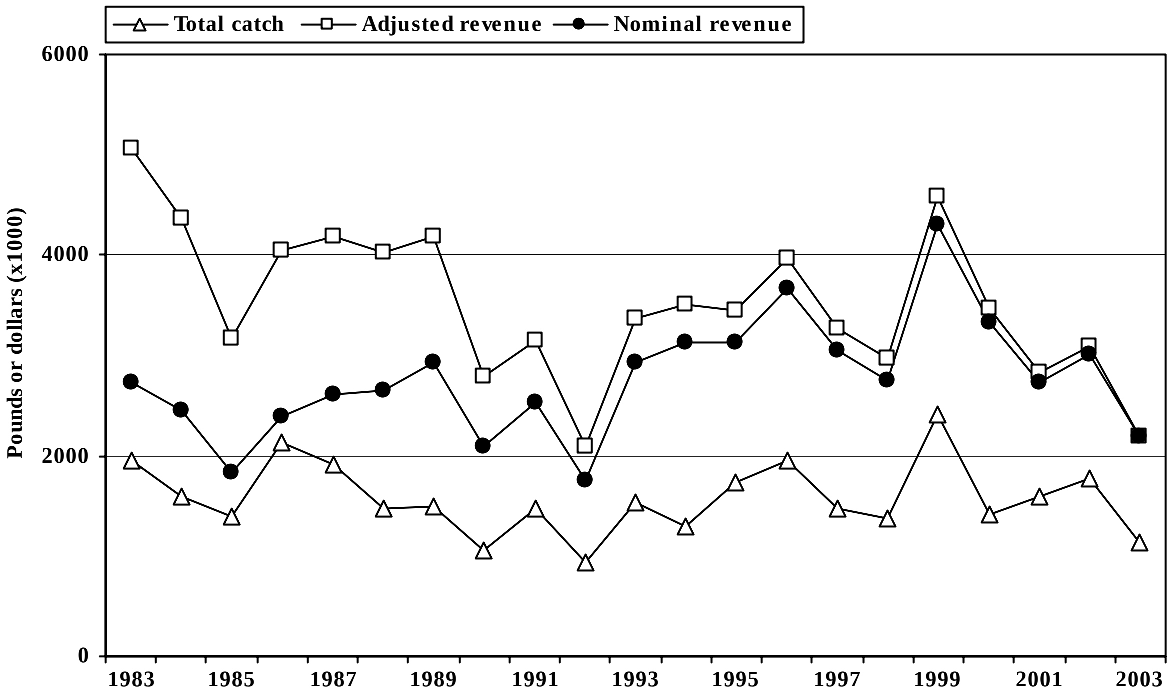


<u>Interpretation</u>: The number of Main Hawaiian Islands (MHI) handline trips ranged between 3,043 in 2003 and 7,069 trips in 1987. Although handline trip activity varied substantially, there was no clear long-term trend. New commercial fish catch forms were implemented in 2002 and reporting and processing were delayed. Thus, it is unclear how much of the apparent decrease in 2003 reflects reporting problems, lower trip activity, or both.

<u>Source and Calculations</u>: The number of MHI handline trips was compiled from HDAR commercial fish catch reports. MHI handline trips were summarized by counting unique commercial marine license number and date combinations when catches were greater than zero. The latter were excluded because there was no way to determine if a zero catch trip report represented unsuccessful fishing operations or no fishing effort, the trip summary does not include zero catch trips. The 2002 trip summary was updated with data that became available in 2003.

Year	MHI handline trips
1983	6,275
1984	5,248
1985	3,929
1986	6,087
1987	7,069
1988	6,032
1989	5,947
1990	4,300
1991	4,688
1992	3,981
1993	4,209
1994	4,157
1995	5,230
1996	6,801
1997	6,010
1998	5,481
1999	7,004
2000	4,985
2001	4,307
2002	4,095
2003	3,043
Average	**5,184.7**
SD	**1,144.5**

Figure 42. Main Hawaiian Island handline catch and revenue, 1983-2003.



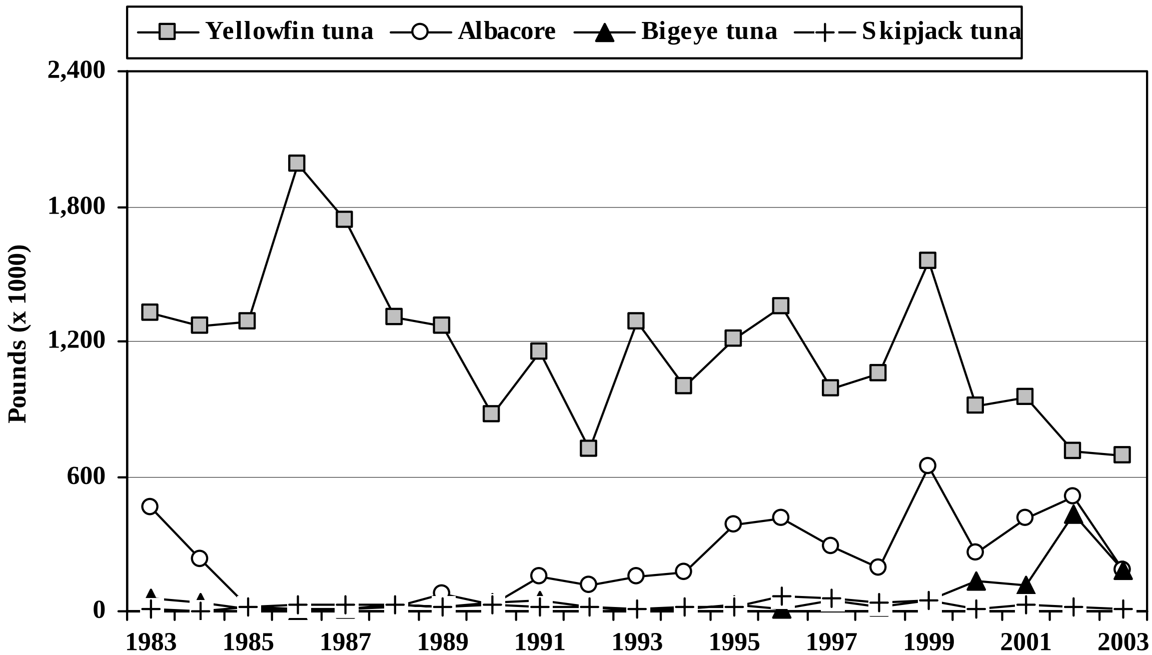
<u>Interpretation</u>: The MHI handline total ranged from 940,000 pounds in 1992 to 2.5 million pounds in 1999. Although handline catches varied substantially year to year, the long-term trend seemed to be stable over the 21-year period. Handline catch was 1.1 million pounds in 2003, down 35% from the previous year and the third lowest total in the time series.

The MHI handline ex-vessel revenue ranged from $2.1 million in 1992 to $5.1 million in 1983. MHI handline revenue varied substantially throughout the time series with no clear trend.

<u>Source and Calculations</u>: MHI handline catch and revenue were summarized from HDAR commercial fish catch reports. Total catch and nominal revenue were summed from the pounds caught and value fields, respectively. The catch and revenue summary for 2003 was compiled with preliminary data and will be updated with final data in next years report.

Year	Total catch (1000 lbs)	Adjusted revenue ($1000)	Nominal revenue ($1000)	Honolulu CPI
1983	1,949	$ 5,059	$ 2,723	99.3
1984	1,591	$ 4,366	$ 2,449	103.5
1985	1,391	$ 3,172	$ 1,836	106.8
1986	2,136	$ 4,046	$ 2,399	109.4
1987	1,914	$ 4,185	$ 2,606	114.9
1988	1,471	$ 4,024	$ 2,654	121.7
1989	1,487	$ 4,189	$ 2,922	128.7
1990	1,060	$ 2,784	$ 2,084	138.1
1991	1,477	$ 3,156	$ 2,532	148.0
1992	946	$ 2,086	$ 1,754	155.1
1993	1,532	$ 3,370	$ 2,924	160.1
1994	1,287	$ 3,516	$ 3,135	164.5
1995	1,733	$ 3,445	$ 3,139	168.1
1996	1,962	$ 3,966	$ 3,669	170.7
1997	1,479	$ 3,267	$ 3,044	171.9
1998	1,368	$ 2,968	$ 2,759	171.5
1999	2,414	$ 4,579	$ 4,301	173.3
2000	1,412	$ 3,474	$ 3,320	176.3
2001	1,604	$ 2,825	$ 2,732	178.4
2002	1,767	$ 3,081	$ 3,011	180.3
2003	1,146	$ 2,195	$ 2,195	184.5
Average	**1,577.5**	**$ 3,512.1**	**$ 2,770.9**	
SD	**357.6**	**$ 758.3**	**$ 589.5**	

Figure 43. Main Hawaiian Island handline tuna catch, 1983-2003.

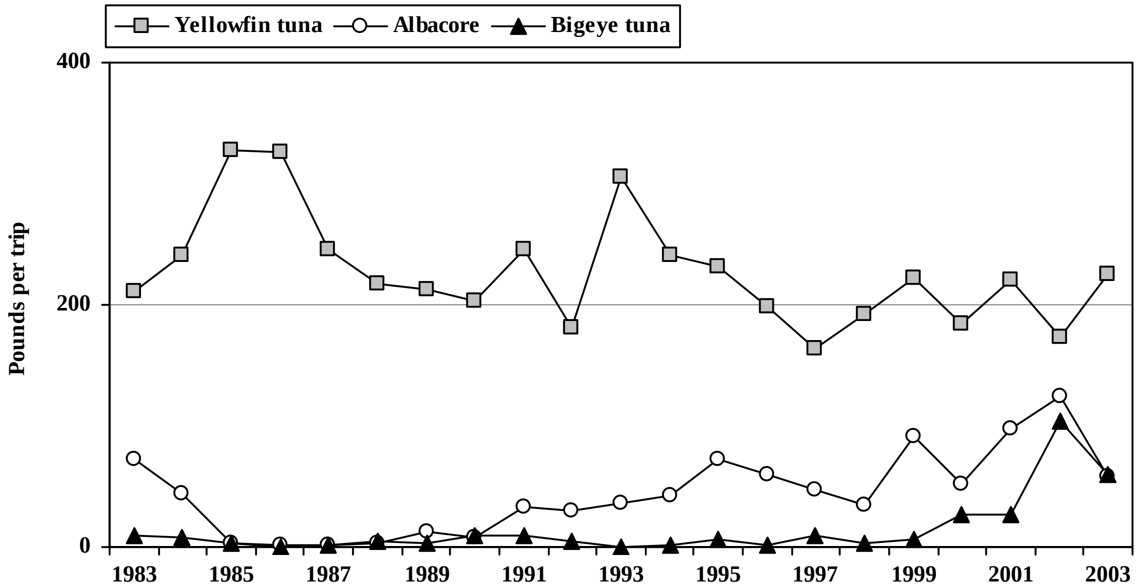


Interpretation: Yellowfin tuna was the dominant component of the MHI handline tuna catch. Yellowfin tuna catch peaked at almost 2 million pounds in 1986, dropped the following two years and remained low thereafter. Yellowfin tuna catches were below the long-term average during the past four years. Albacore catch increased from 11,000 pounds in 1985 and peaked at 642,000 pounds in 1999. Albacore catch has been above 110,000 pounds from 1991. Bigeye tuna catch was usually small but increased to a record 427,000 pounds in 2002. Small catches of skipjack tuna and other tunas by the handline fishery represented about 2% of the total catch.

Source and Calculations: MHI handline tuna catches were compiled from HDAR commercial catch reports during 1983-2001 and fish dealer reports in 2002 and 2003. These data reflect catches using handline gear in HDAR statistical areas from 100 to 699. Catch from the distant-water troll albacore fishery was excluded.

	MHI handline tuna catch (1000 lbs)					
Year	**Yellowfin tuna**	**Albacore**	**Bigeye tuna**	**Skipjack tuna**	**Other tunas**	**Total**
1983	1,323	457	59	14	26	1,879
1984	1,264	230	42	2	2	1,540
1985	1,287	15	11	16	1	1,330
1986	1,984	11	2	24	1	2,023
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	916	260	133	13	2	1,324
2001	952	417	117	28	3	1,518
2002	711	507	427	18	2	1,665
2003	687	179	180	12	0	1,058
Average	**1,172.8**	**225.1**	**61.8**	**25.4**	**5.1**	**1,490.2**
SD	**329.6**	**183.3**	**95.7**	**16.2**	**5.5**	**345.3**

Figure 44. Main Hawaiian Island handline tuna catch per trip, 1983-2003.

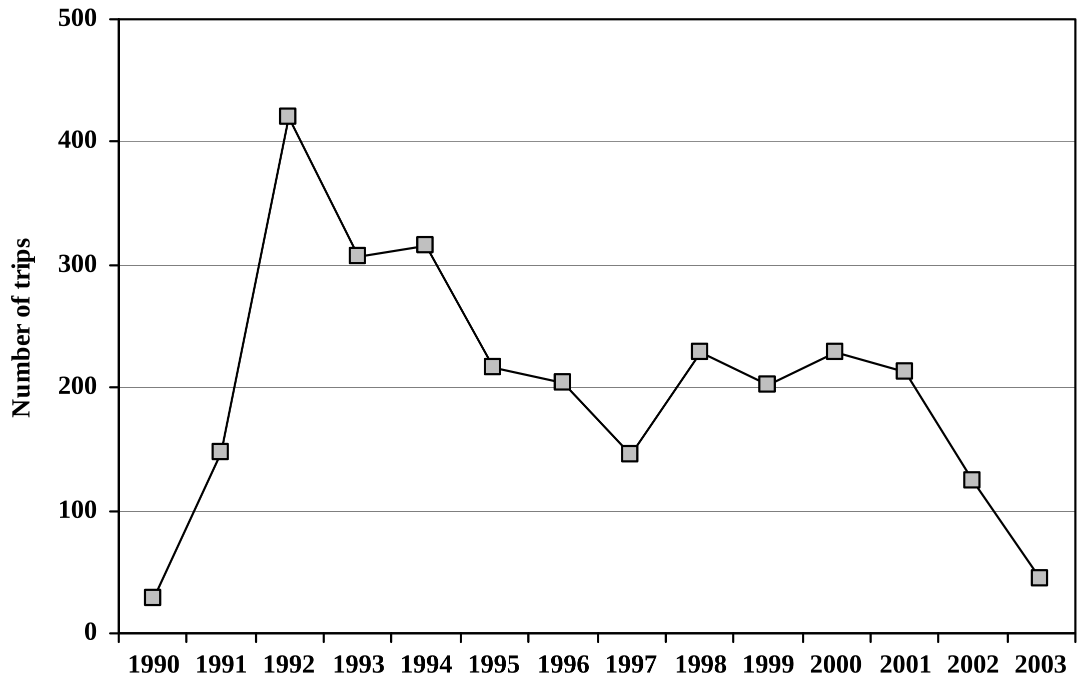


Interpretation: MHI handline yellowfin tuna CPUE was usually close to 200 pounds per trip with spikes above 300 pounds on three occasions (1985, 1986, and 1993) over the 21-year period. There was no obvious trend. Albacore CPUE was a record 124 pounds per trip in 2002 on what appears to be a upward trend. Bigeye tuna CPUE was also reached a record high in 2002. Catch rates for bigeye tuna have increased from 1999.

Source and Calculations: MHI handline tuna CPUE was measured as pounds of tuna caught per trip. Tuna catches were compiled from HDAR commercial catch reports during 1983-2001 and fish dealer reports in 2002 and 2003. These data reflect only handline gear codes in area codes within the MHI and included seamounts located within HDAR statistical areas codes 100 to 699. These catches were then divided by the number of MHI handline trips. Since there was no way to determine if a zero catch trip report represented unsuccessful fishing operations or no fishing effort, the CPUE does not include zero catch trips.

	MHI handline catch per trip (pounds)			
Year	**Yellowfin tuna**	**Albacore**	**Bigeye tuna**	**Total**
1983	211	73	9	311
1984	241	44	8	303
1985	328	4	3	354
1986	326	2	0	351
1987	245	2	1	271
1988	217	3	5	244
1989	213	13	3	250
1990	204	7	9	246
1991	246	33	10	315
1992	181	29	5	238
1993	305	37	1	364
1994	241	42	2	310
1995	231	73	6	331
1996	199	60	2	289
1997	164	48	9	246
1998	192	35	3	250
1999	223	92	7	345
2000	184	52	27	283
2001	221	97	27	372
2002	174	124	104	432
2003	226	59	59	377
Average	**227.2**	**44.2**	**14.2**	**308.6**
SD	**45.3**	**34.1**	**24.6**	**54.3**

Figure 45. Number of offshore tuna handline trips, 1990-2003.

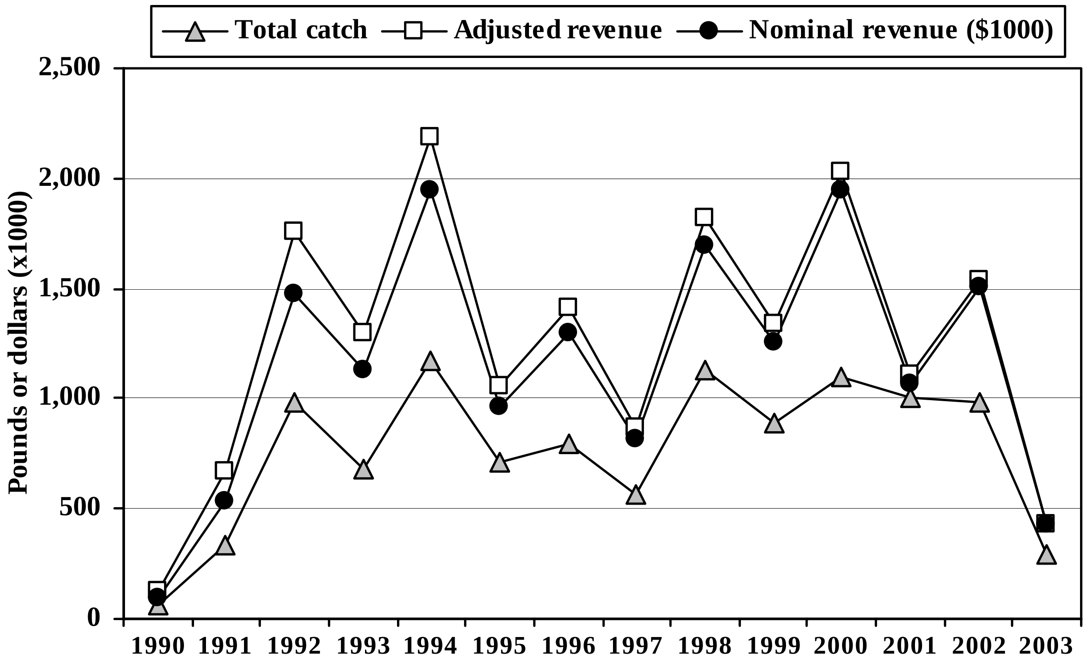


Interpretation: The number of offshore tuna handline trips dropped to 44 in 2003, a 35% decrease from the previous year. Trips by offshore tuna handline vessels peaked in 1992 and remained at about 200 trips from 1995 though trip activity declined for the past three years. Reporting and processing the offshore handline data was delayed due to the implementation of new commercial fish report forms in 2002.

Source and Calculation: The number of offshore handline trips was compiled from HDAR commercial fish catch reports. Offshore handline trips were summarized by counting unique commercial marine license number and date combinations, when catches were greater than zero (i.e., this excludes zero catch trips). Since there was no way to determine if a zero catch trip report represented unsuccessful fishing operations or no fishing effort, the trip summary does not include zero catch trips. In addition to the above set of conditions, the HDAR fishery statistical areas 16223 (NOAA weather buoy (W)1), 15717 (W 2), 16019 (W 3), 15217 (W 4), and 15818 (Cross Seamount) and other offshore areas were selected out for this fishery. There were no catch reports from this fishery prior to 1990. The number of trips for 2002 was updated with data which became available in 2003.

Year	Offshore handline trips
1990	29
1991	148
1992	420
1993	307
1994	316
1995	216
1996	204
1997	145
1998	228
1999	202
2000	228
2001	212
2002	125
2003	44
Average	201.7
SD	103.8

Figure 46. Offshore tuna handline catch and revenue, 1990-2003.

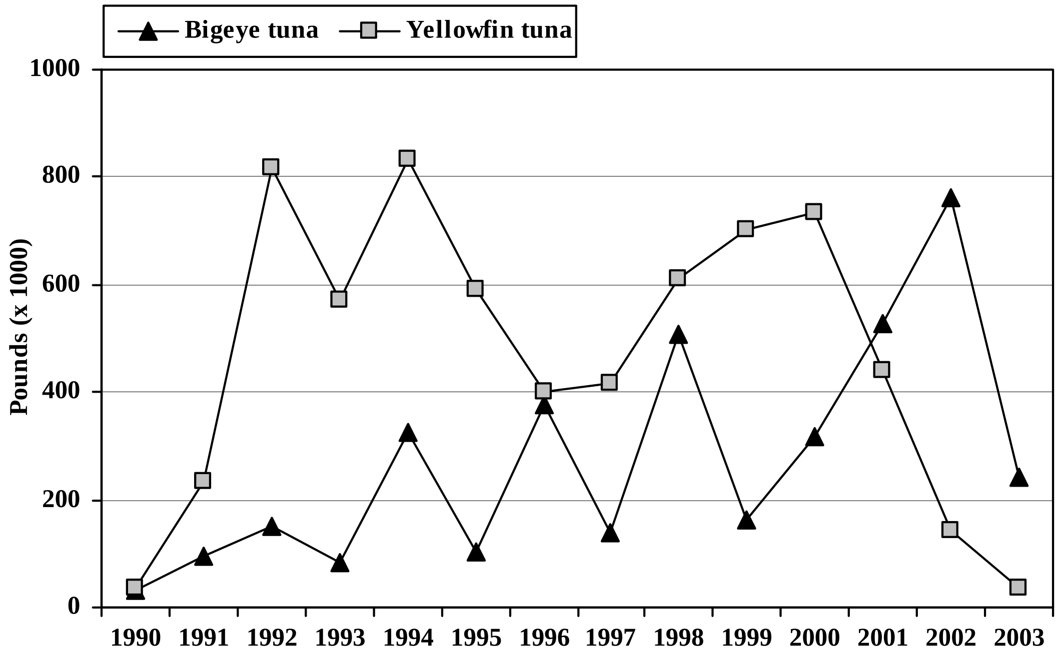


Interpretation: The preliminary offshore handline fishery catch and revenue was 296,000 pounds worth $427,000 in 2003. These values represented decreases of 70% and 72%, respectively, from 2002. Catch and revenue grew rapidly in the early 1990s. Though there was substantial year to year variation, catch and revenue exhibited no apparent trend during the past decade. Reporting and processing the offshore handline data was delayed due to the implementation of new HDAR commercial catch report forms in 2002.

Source and Calculation: Offshore handline catch and revenue were summarized from HDAR commercial fish catch reports. Total catch and nominal revenue were summed from the pounds caught and value fields, respectively. The offshore handline data are a subset of the combined tuna handline data for HDAR fishery statistical areas 16223 (NOAA weather buoy (W)1), 15717 (W 2), 16019 (W 3), 15217 (W 4), and 15818 (Cross Seamount) and other offshore areas. The Honolulu CPI was applied to nominal revenue to derive inflation-adjusted revenue. The catch and revenue summaries for 2002 were updated with data which became available in 2003.

Year	Total catch (1000 lbs)	Adjusted revenue ($1000)	Nominal revenue ($1000)	Honolulu CPI
1990	66	$ 130	$ 97	138.1
1991	331	$ 664	$ 533	148.0
1992	987	$ 1,757	$ 1,477	155.1
1993	679	$ 1,296	$ 1,125	160.1
1994	1,175	$ 2,184	$ 1,947	164.5
1995	714	$ 1,058	$ 964	168.1
1996	793	$ 1,407	$ 1,302	170.7
1997	563	$ 870	$ 811	171.9
1998	1,134	$ 1,825	$ 1,696	171.5
1999	888	$ 1,337	$ 1,256	173.3
2000	1,096	$ 2,034	$ 1,944	176.3
2001	1,007	$ 1,106	$ 1,069	178.4
2002	987	$ 1,539	$ 1,504	180.3
2003	296	$ 427	$ 427	184.5
Average	**765.4**	**1,259.6**	**1,153.7**	
SD	**343.6**	**599.2**	**554.6**	

Figure 47. Offshore handline catch, 1990-2003.



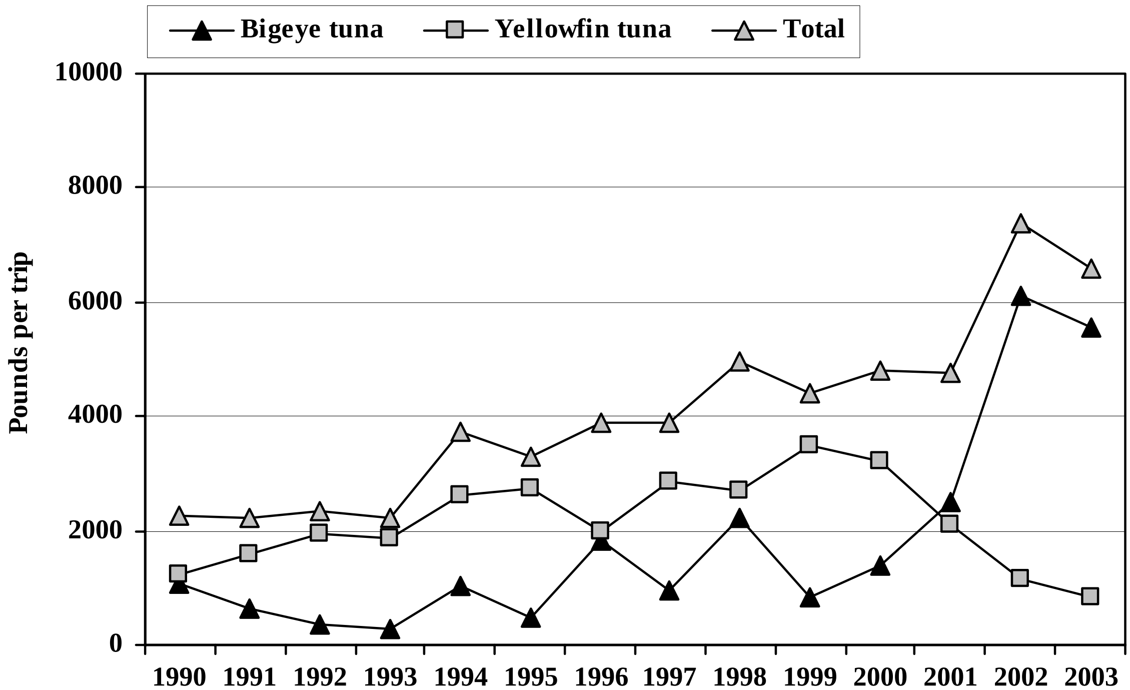
Interpretation: Yellowfin tuna was the largest component of the offshore handline fishery from 1990 through 2000; bigeye tuna then became the dominant species. Bigeye tuna composed 83% of the catch and was followed by yellowfin tuna (12%), and small catches of mahimahi. In general, bigeye tuna catch has been on a increasing trend. This may reflect better species identification by fishermen (small bigeye tuna and yellowfin tuna can be very difficult to distinguish).

Most of the tunas caught by the offshore handline fishery are smaller than those taken by the inshore handline fishery. It should be noted that many of the reported yellowfin tuna catch may actually be bigeye tuna; knowledgeable observers have reported that the small tunas caught by this fishery (up to 70%) are predominantly bigeye tuna (David Itano, pers. comm.). As standard practice, tuna catch reported by fishermen as "ahi" are coded by the HDAR Fisheries Statistics Unit as yellowfin tuna. Though these tunas may indeed be bigeye tuna, the Statistics Unit must record the species as reported by fishermen unless they have evidence or confirmation to make changes to the data. Therefore, the total tuna catch by the offshore handline fishery are almost certainly more accurate than the catch for individual species. HDAR is making an effort to help educate fishermen and fish dealers correctly ID small tunas.

	Offshore handline catch (1000 pounds)			
Year	**Bigeye tuna**	**Yellowfin tuna**	**Mahimahi**	**Total**
1990	31	35	0	66
1991	94	232	5	331
1992	151	816	21	987
1993	85	571	23	679
1994	324	834	18	1,175
1995	102	591	20	714
1996	375	401	17	793
1997	138	415	9	563
1998	508	613	13	1,134
1999	164	703	20	888
2000	317	734	46	1,096
2001	530	442	36	1,007
2002	762	142	21	956
2003	244	36	10	293
Average	**273.1**	**468.9**	**18.5**	**762.9**
SD	**210.5**	**273.3**	**11.8**	**342.5**

Source and Calculation: Offshore handline tuna catches were compiled from HDAR commercial catch reports during 1990-2001 and fish dealer reports in 2002. The offshore handline data are a subset of the combined tuna handline data for HDAR fishery statistical areas 16223 (NOAA weather buoy (W)1), 15717 (W 2), 16019 (W 3), 15217 (W 4), and 15818 (Cross Seamount) and other HDAR offshore statistical areas. The catch summary for 2002 was updated with data which became available in 2003.

Figure 48. Offshore tuna handline catch per trip, 1990-2003.



<u>Interpretation</u>: Catch per trip was the unit of measurement for offshore handline CPUE. This was based on multi-day trips. CPUE for the offshore handline fishery was down 11% in 2003. Generally, catch rates for both bigeye and yellowfin tunas increased though the 1990s. Bigeye tuna CPUE, however, exhibited a large increase from 1999 to 2002 (almost 7-fold) whereas yellowfin tuna CPUE decreased 77% at the same time.

<u>Source and Calculations</u>: Offshore handline tuna CPUE was measured as pounds of tuna caught per trip. Tuna catches were compiled from HDAR commercial catch reports during 1990-2001 and fish dealer reports in 2002 and 2003. The offshore handline data are a subset of the combined tuna handline data for HDAR fishery statistical areas 16223 (NOAA weather buoy (W)1), 15717 (W 2), 16019 (W 3), 15217 (W 4), and 15818 (Cross Seamount) and other HDAR offshore statistical areas. These catches were then divided by the number of offshore handline trips. Since there was no way to determine if a zero catch trip report represented unsuccessful fishing operations or no fishing effort, the CPUE does not include zero catch trips.

	Offshore handline catch per trip (pounds)			
Year	**Bigeye tuna**	**Yellowfin tuna**	**Mahimahi**	**Total**
1990	1,052	1,217	2	2,271
1991	634	1,569	31	2,234
1992	359	1,942	49	2,350
1993	276	1,858	76	2,210
1994	1,024	2,638	56	3,718
1995	473	2,738	94	3,305
1996	1,840	1,966	82	3,888
1997	954	2,862	65	3,881
1998	2,227	2,688	57	4,972
1999	814	3,482	101	4,397
2000	1,388	3,218	201	4,808
2001	2,498	2,084	169	4,751
2002	6,096	1,136	168	7,400
2003	5,545	818	227	6,591
Average	**1,798.6**	**2,158.3**	**98.5**	**4,055.5**
SD	**1,833.3**	**807.2**	**67.2**	**1,597.3**

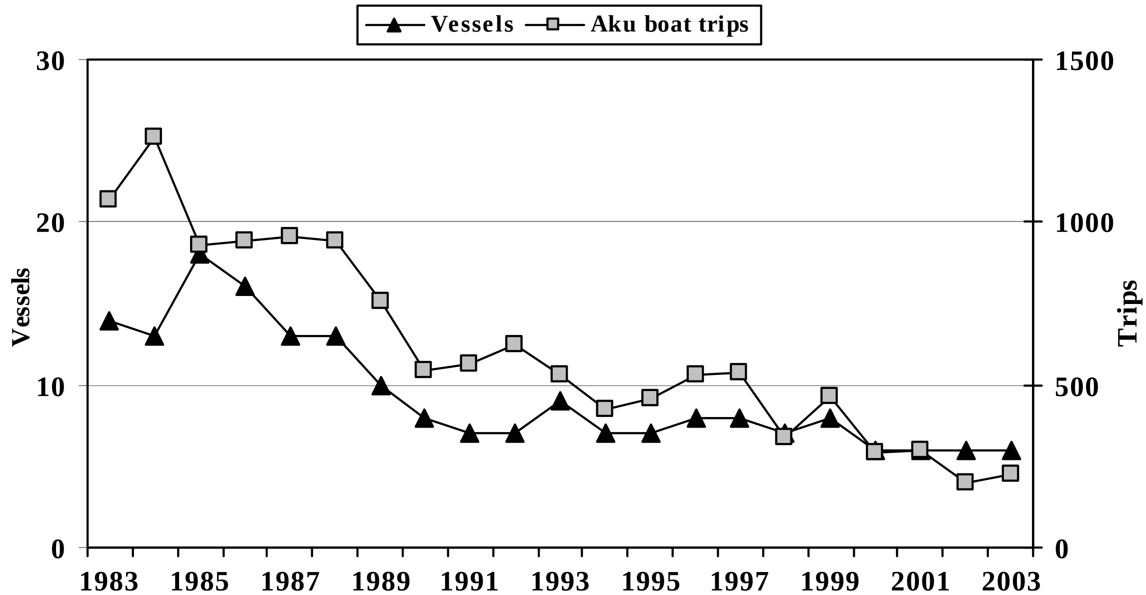
Table 8. Average weight by species for troll and handline catch, 1987-2003.

SPECIES	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Average	S.D.
TUNAS																			
Albacore	33	64	55	58	53	53	55	53	22	42	40	21	48	47	47	45	39	**45.6**	**11.9**
Bigeye tuna	14	34	24	25	29	28	22	30	18	24	19	21	24	25	21	30	20	**24.0**	**5.1**
Skipjack tuna	7	7	11	7	9	6	7	9	7	12	11	5	7	7	8	7	6	**7.8**	**1.9**
Yellowfin tuna	32	32	44	41	34	27	44	37	30	42	34	28	31	43	34	39	28	**35.3**	**5.9**
BILLFISH																			
Blue marlin	215	181	188	248	197	215	182	233	204	195	175	201	211	244	188	232	196	**206.2**	**22.3**
Striped marlin	66	64	68	76	63	70	67	67	61	65	68	58	55	53	51	60	49	**62.4**	**7.3**
Swordfish	126	124	107	97	122	75	139	95	110	86	96	85	88	91	100	108	103	**103.0**	**17.0**
OTHER PMUS																			
Mahimahi	21	18	21	20	15	14	14	14	16	16	16	18	18	15	16	16	16	**16.7**	**2.3**
Ono (wahoo)	24	25	25	25	23	26	24	27	24	23	21	25	27	26	24	26	22	**24.5**	**1.7**

Interpretation: Average weight for most species caught by troll and handline gear in 2003 was lower compared to both the previous year and the long-term average. Mean weight for albacore was 6 pounds less than in 2002. Bigeye and yellowfin tuna mean weight were about 10 pounds less in 2003. Blue marlin had the highest mean weight of all species for troll and handline caught fish. Striped marlin mean weight was at a record low while swordfish changed little. Mahimahi and ono were close to the long-term average.

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

Figure 49. Hawaii aku boat (pole and line) vessel and trip activity, 1983-2003.

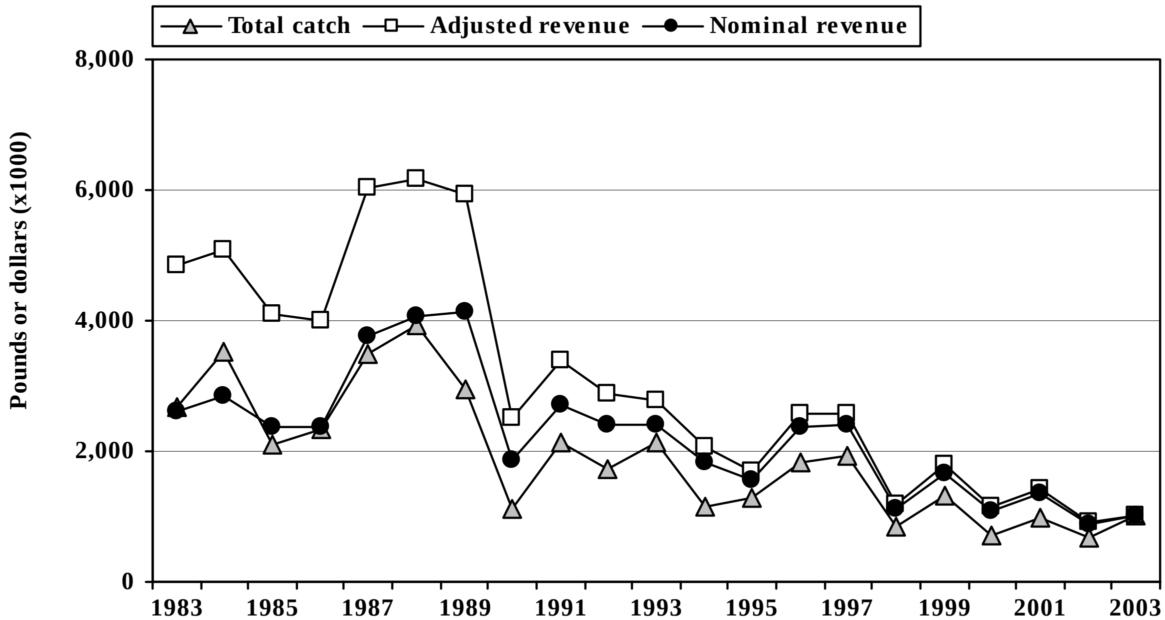


Interpretation: There were six aku boat vessels fishing in 2003. The participation in this fleet has declined slowly from the 1990s and was much lower than in the 1980s. The number of aku boat trips during 1983-2003 follows the same pattern as vessel participation with a steep decline from 1984 to 1990 followed by a gradual decrease since 2000. The steep decline of the 1980s can be attributed partly to the closure of the tuna cannery. Attrition of vessels, many which were built in the 1940s, and poor skipjack tuna catches are other reasons for the long-term decline in this fishery. Preliminary data show that six vessels made 223 trips in 2003. Reporting and processing 2002 data have been slow because fishermen and HDAR staff have begun using a new, more detailed, and unfamiliar aku boat catch form. Thus, it is unclear how much of the apparent decrease in aku boat trips reflects reporting problems, lower trip activity, or both.

Source and Calculations: The aku boat trip summary was compiled from Hawaii Division of Aquatic Resources (HDAR) commercial fish catch reports for records that designated pole and line as the type of gear used. A unique combination of license number, month, day, and year was used to define an aku boat trip. Zero catch trips from the aku boat fish report data were included in this summary.

Year	Vessels	Akuboat trips
1983	14	1,070
1984	13	1,264
1985	18	927
1986	16	943
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	197
2003	6	223
Average	**9.4**	**613.7**
SD	**3.6**	**299.9**

Figure 50. Hawaii aku boat (pole and line) catch and revenue, 1983-2003.

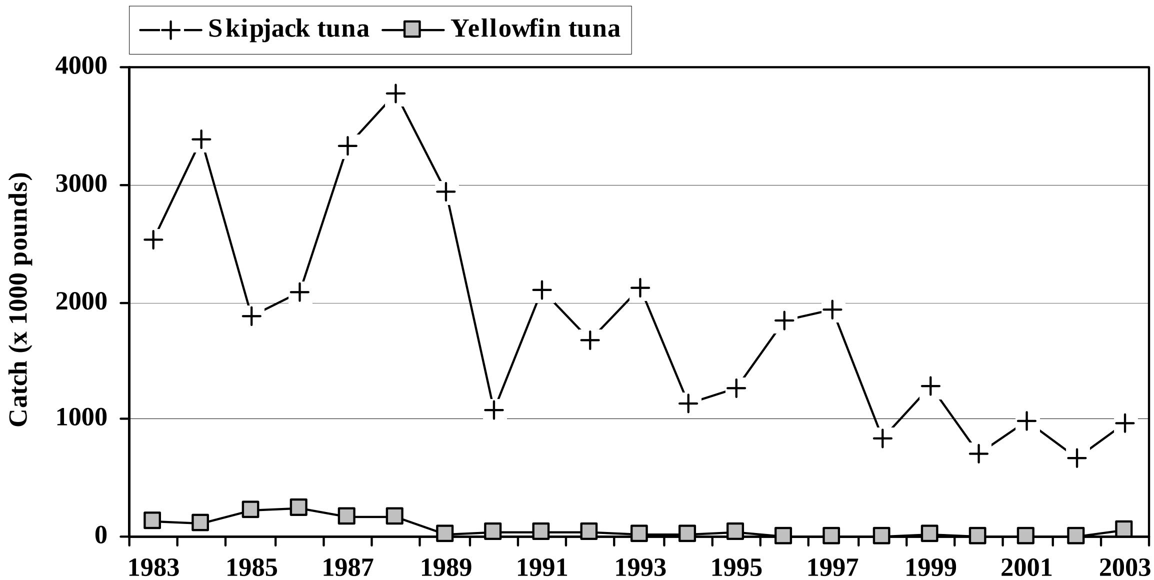


Interpretation: Catch and revenue by the aku boat fishery in 2003 increased to 1,018,000 pounds worth an estimated ex-vessel value of $1.0 million in 2003. Aku boat catch and revenue peaked in 1988, declined sharply in 1990, and continued to decline slowly thereafter. The closure of the tuna cannery in 1985 was followed by a decrease in vessels participating in this fishery. The decreases in catch and revenue were a result of these events.

Source and Calculation: The aku boat catch and nominal revenue were compiled from Hawaii Division of Aquatic Resources (HDAR) commercial fish catch reports for records that designated pole and line as the type of gear used. The Honolulu Consumer Price Index (CPI) was applied to the nominal revenue to derive inflation-adjusted revenue.

Year	Total catch (1000 lbs)	Adjusted revenue ($1000)	Nominal revenue ($1000)	Honolulu CPI
1983	2,681	$ 4,835	$ 2,602	99.3
1984	3,527	$ 5,082	$ 2,851	103.5
1985	2,114	$ 4,089	$ 2,367	106.8
1986	2,351	$ 3,990	$ 2,366	109.4
1987	3,503	$ 6,023	$ 3,751	114.9
1988	3,940	$ 6,160	$ 4,063	121.7
1989	2,962	$ 5,944	$ 4,146	128.7
1990	1,116	$ 2,502	$ 1,873	138.1
1991	2,146	$ 3,373	$ 2,706	148.0
1992	1,735	$ 2,873	$ 2,415	155.1
1993	2,137	$ 2,783	$ 2,415	160.1
1994	1,159	$ 2,058	$ 1,835	164.5
1995	1,291	$ 1,701	$ 1,550	168.1
1996	1,844	$ 2,582	$ 2,389	170.7
1997	1,947	$ 2,568	$ 2,393	171.9
1998	845	$ 1,190	$ 1,106	171.5
1999	1,312	$ 1,782	$ 1,674	173.3
2000	707	$ 1,145	$ 1,094	176.3
2001	990	$ 1,412	$ 1,365	178.4
2002	677	$ 900	$ 880	180.3
2003	1,018	$ 1,005	$ 1,005	184.5
Average	**1,900.0**	**$ 3,050.0**	**$ 2,230.0**	
SD	**980.0**	**$ 1,730.0**	**$ 950.0**	

Figure 51. Hawaii aku boat (pole and line) fishery catch, 1983-2003.

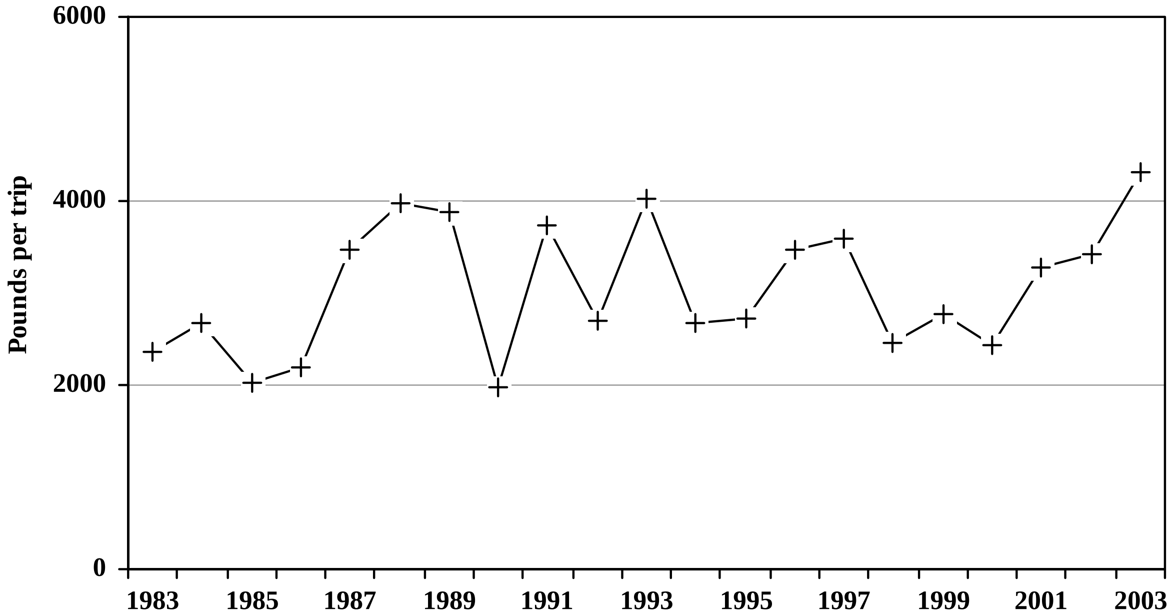


<u>Interpretation</u>: The aku boat fishery catches primarily skipjack tuna (aku); this single species typically represented over 95% of the total catch. There were also small catches of yellowfin tuna. Skipjack tuna catch varied annually with a overall downward trend throughout 1982-2003. Part of the reason for the decline in catch 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.

<u>Source and Calculations</u>: The aku boat catch summary was compiled from Hawaii Division of Aquatic Resources (HDAR) commercial fish catch reports for records that designated pole and line as the type of gear used.

	Akuboat catch (x 1000 pounds)				
Year	Skipjack tuna	Yellowfin tuna	Other tunas	Mahimahi	Total
1983	2,539	121	12	9	2,681
1984	3,387	119	16	5	3,527
1985	1,881	227	6	0	2,114
1986	2,075	251	17	7	2,351
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	0	707
2001	986	4	0	0	990
2002	672	4	1	0	677
2003	960	50	0	1	1,018
Average	**1,834.4**	**64.2**	**3.4**	**2.5**	**1,904.8**
SD	**925.9**	**78.9**	**5.2**	**3.7**	**975.5**

Figure 52. Hawaii aku boat (pole and line) fishery catch per trip, 1983-2003.



Interpretation: CPUE for the aku boat fishery was measured as catch (in pounds) per trip. The aku boat skipjack tuna catch per trip increased to a record 4,305 pounds per trip in 2003 for the 21-year time series. There was no clear long-term trend for aku boat catch per trip though CPUE has consistently for the most recent four years.

Source and Calculations: The aku boat catch summary was compiled from Hawaii Division of Aquatic Resources (HDAR) commercial fish catch reports for records that designated pole and line as the type of gear used. Catch per trip was then calculated by dividing the catch by the total number of trips.

	Aku boat CPUE (pounds per trip)	
Year	**Skipjack tuna**	**Total catch**
1983	2,373	2,505
1984	2,680	2,790
1985	2,029	2,280
1986	2,201	2,493
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	2,438
2001	3,274	3,289
2002	3,411	3,437
2003	4,305	4,565
Average	**3,057.5**	**3,151.3**
SD	**709.6**	**706.2**

Appendix 4

Commonwealth of the Northern Mariana 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 80% 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. Some fishermen sell their catch going “door to door” which results in around 20% of the unreported commercial landings.

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 have a limited 20-mile travel radius from Saipan. In 2003 about 55 vessels were identified as involved in full-time commercial fishing and 41 vessels were classified as part-time. No fishing and/or recreational usage included 312 vessels.

Twenty-six vessels were registered with the Boating Safety Office as charter vessels for 2003. Charter vessels generally retain their catches, selling half or more to local markets. While the general magnitude of charter boat sales is unknown, it is questionable whether the local market can absorb these catches without impacting commercial fishermen. No logbook system is currently in effect.

The primary target and most marketable species for the pelagic fleet are skipjack tuna. Yellowfin tuna and mahimahi are also easily marketable species but are seasonal. During their seasonal runs, these fish are usually found close to shore and provide easy targets for the local fishermen. In addition to the economic advantages of being near shore and their relative ease of capture, these species are widely accepted by all ethnic groups. This has kept market demand fairly high due to the continuing immigrant population growth on Saipan (over half of the population on Saipan is nonnative).

2002 Recommendations

1) To work closely with WPacFIN in developing a data collection system for the new longline fishery that is beginning to develop in the CNMI.

2002 Status

CNMI received IFA funds to monitor this fishery. However permit holder has not conducted any lonlining.

Table

page

Figures

page

Table 1.—CNMI Consumer Price Indices (CPIs)

Year	CPI	CPI Adjusted Factor
1983	140.90	1.92
1984	153.20	1.77
1985	159.30	1.70
1986	163.50	1.66
1987	170.70	1.59
1988	179.60	1.51
1989	190.20	1.43
1990	199.33	1.36
1991	214.93	1.26
1992	232.90	1.16
1993	243.18	1.11
1994	250.00	1.08
1995	254.48	1.07
1996	261.98	1.03
1997	264.95	1.02
1998	264.18	1.03
1999	267.80	1.01
2000	273.23	0.99
2001	270.98	1.00
2002	271.53	1.00
2003	**271.05**	**1.00**

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

Table 2. NMI 2003 Commercial Pelagic Landings, Revenues and Price

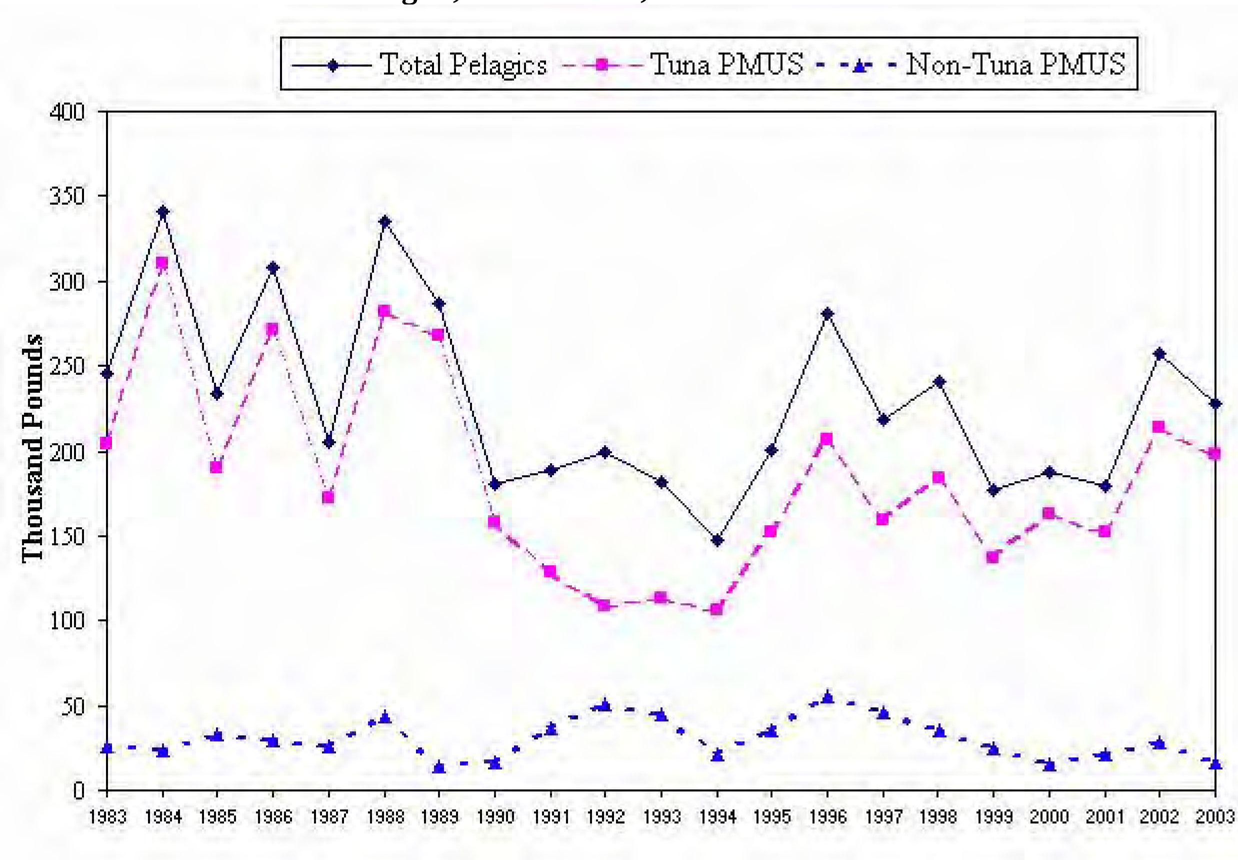
Species	Landing (Lbs)	Value ($)	Avg Price ($/Lb)
Skipjack Tuna	171,312	332,181	1.94
Yellowfin Tuna	25,500	53,714	2.11
Saba (kawakawa)	1,228	2,183	1.78
Tuna PMUS	**198,040**	**388,078**	**1.94**
Mahimahi	7,173	16,186	2.26
Wahoo	7,803	15,848	2.03
Blue Marlin	1,130	1,929	1.71
Sailfish	137	214	1.56
Sickle Pomfret (w/woman)	722	1,666	2.31
Non-tuna PMUS	**16,966**	**35,842**	**1.97**
Dogtooth Tuna	7,842	12,369	1.58
Rainbow Runner	4,353	8,336	1.91
Non-PMUS Pelagics	**12,196**	**20,705**	**1.75**
Total Pelagics	**227,203**	**444,625**	**1.92**

Interpretation: Skipjack landings decreased 4% or more than 7,000 pounds in 2003. Skipjack tuna continues to dominate the pelagic landings, comprising around 87 % of the (commercially receipted) industry's pelagic catch. Yellowfin tuna and wahoo ranked second and third in total landings during 2003. Wahoo landings surpassed mahimahi landings for 2003, however it decreased by 4% in comparison to the 2002 landings. Yellowfin landings also decreased 15%. Increase in yellowfin landings in 2002 is partly due to landings from the Northern Islands and by a longline experiment conducted by a fishing company. Skipjack tunas are easily caught in near shore waters throughout the year. Mahimahi is seasonal with peak catch usually from February through April. Yellowfin season usually runs from April to September. The overall pelagic catch decreased by 11% in 2003.

The highest average price of identified pelagic species was $2.31/lb for Sickle Pomfret. The lowest priced species is Dogtooth. In 2002, Dogtooth tuna increased in landings by 73% partly due to the bottom fishing in Northern Islands. However in 2003, limited activity from the Northern Islands Bottomfishing Boats caused the decrease of Dogtooth landings by 40%. The average price per pound for Skipjack tuna, the species with the greatest landings, remained around $1.93/lb.

The recorded Blue Marlin landing for 2003 is 1,130 pounds. The low ex-vessel price may be partially related to the manner in which the fish is kept prior to sale. Blue Marlin is rarely a target by commercial fishermen except during fishing tournaments and by Charter boats.

**Figure 1. NMI Annual Commercial Landings:
All Pelagics, Tuna PMUS, and Non-Tuna PMUS**



Source and Calculation: Annual summaries for each species are from the Commercial Purchase Data Base invoices.

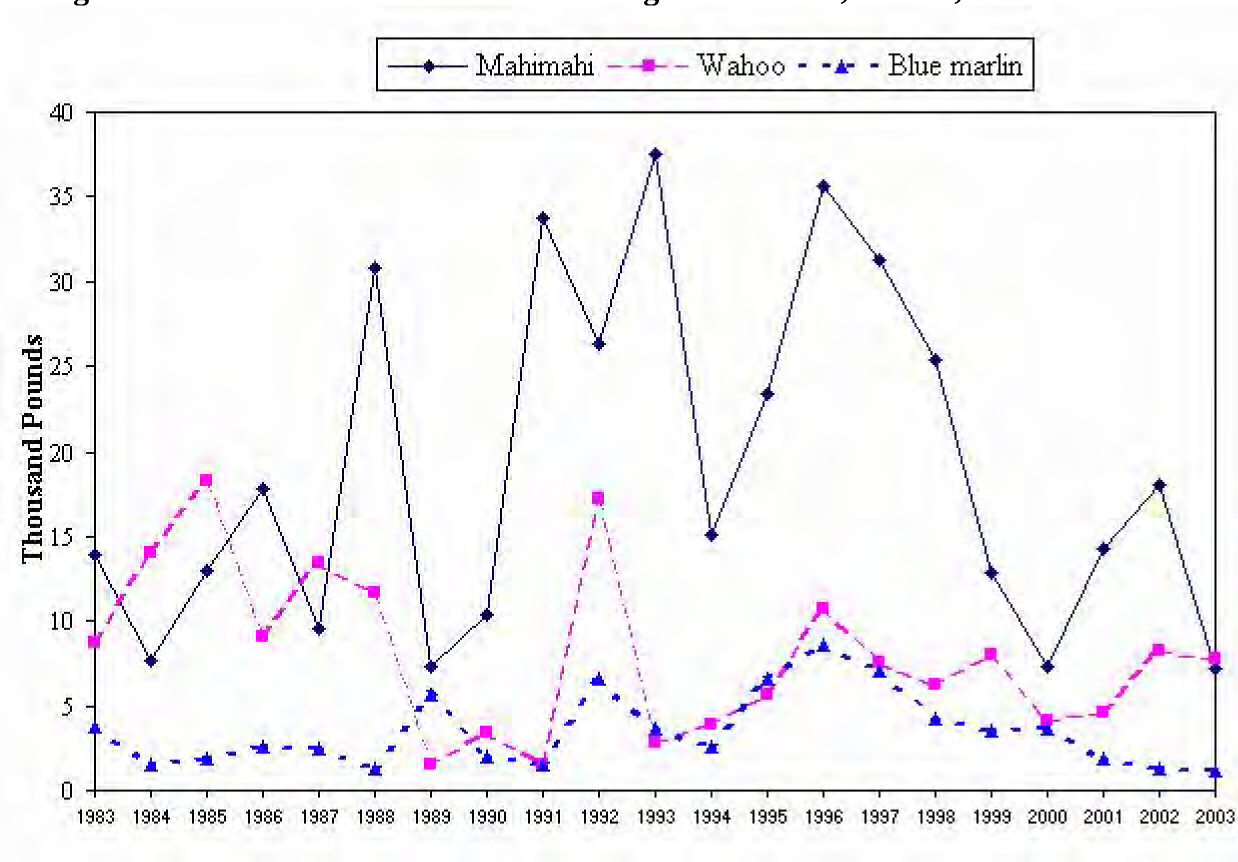
Interpretation: Total weight of pelagics landed in 2003 decreased 11% from 2002 level. Tuna landings also decreased by 6%. Landings recorded in the "Non-Tuna PMUS" category decreased significantly by 24,000 pounds or 58% from 2002 figures.

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	**227,203**	**198,040**	**16,966**
Average	229,539	184,717	30,739
Standard Deviation	54,502	58,374	12,070

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



Interpretation: Mahimahi landings decreased by 61% from 17,937 pounds in 2002 to just 7,075 pounds in 2003. 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 44% over the previous year but drop slightly in 2003.

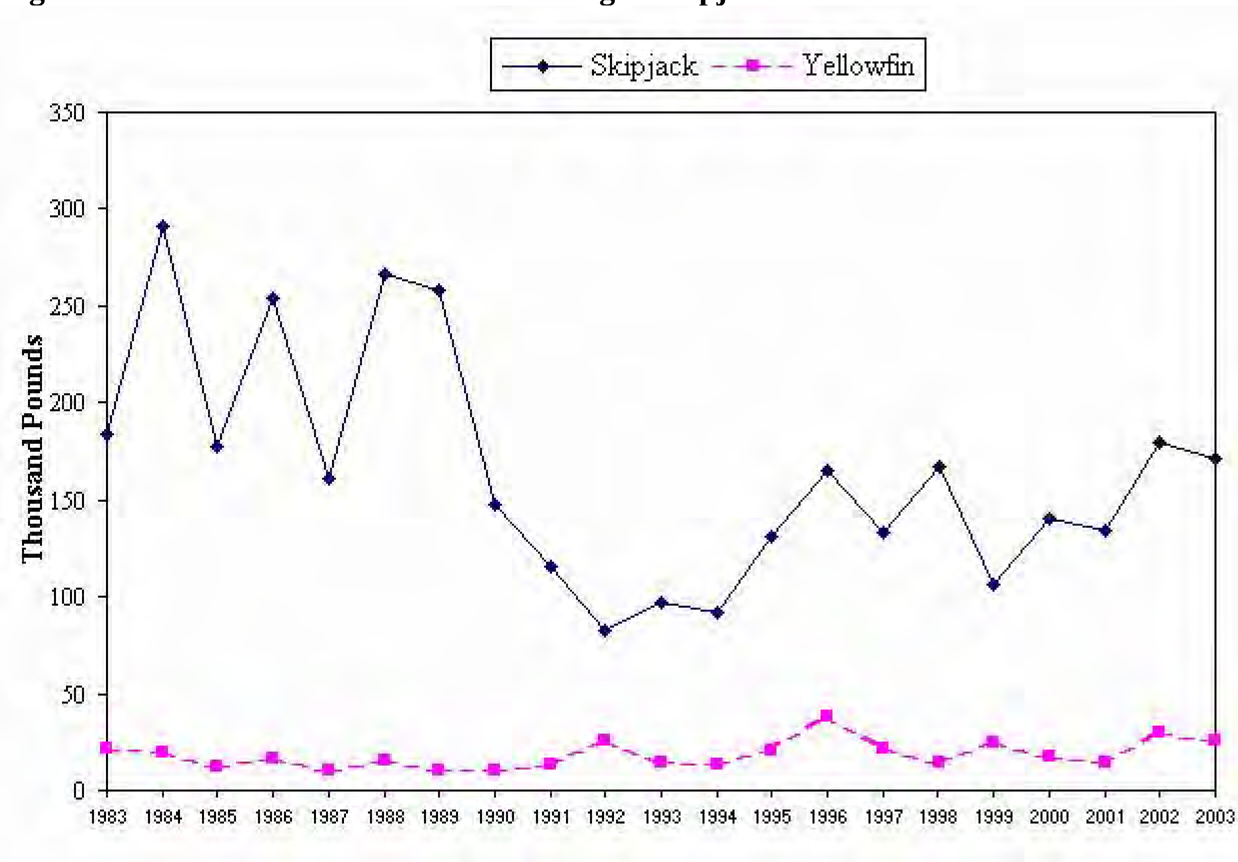
The Blue Marlin landing decreased 10% from the 2002 figures. Blue marlin is rarely a target by the commercial fishermen except for charter boats and during fishing tournaments. If blue marlins are landed, they are often kept by the fishermen and therefore rarely ever recorded in the Commercial Purchase Data Base.

Source and Calculation: The annual commercial landings of the three major PMUS species (mahimahi, wahoo and blue marlin) were summed directly from the Commercial Purchase Data Base.

Total Commercial Landings (Lb)

Year	Mahimahi	Wahoo	Blue Marlin
1983	13,939	8,760	3,787
1984	7,614	14,087	1,544
1985	12,955	18,251	1,860
1986	17,796	9,062	2,654
1987	9,502	13,404	2,460
1988	30,799	11,697	1,309
1989	7,320	1,571	5,704
1990	10,439	3,462	2,034
1991	33,756	1,521	1,568
1992	26,257	17,172	6,603
1993	37,545	2,779	3,687
1994	15,063	3,863	2,635
1995	23,321	5,722	6,619
1996	35,655	10,783	8,593
1997	31,277	7,580	7,068
1998	25,375	6,299	4,201
1999	12,882	8,063	3,541
2000	7,324	4,097	3,608
2001	14,229	4,550	1,924
2002	18,042	8,212	1,261
2003	**7,173**	**7,803**	**1,130**
Average	18,965	8,035	3,514
Standard Deviation	10,215	4,808	2,195

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. For 2003 Skipjack landings dipped slightly by 4% possibly due to a series of bad weather.

Schools of skipjack tuna have historically been common in near shore waters, providing an opportunity to catch numerous fish with a minimum of travel time and fuel costs. Skipjack is readily consumed by the local populace, primarily as sashimi.

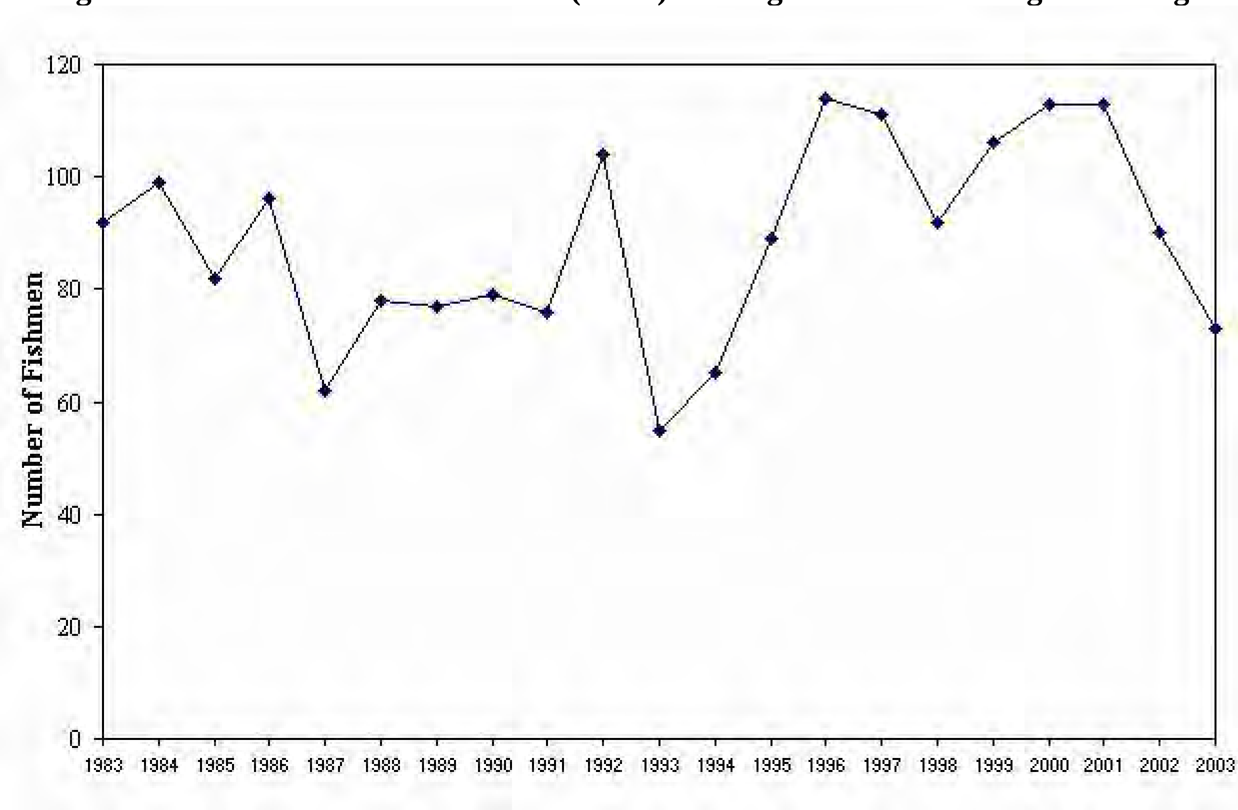
Although more highly prized than skipjack, yellowfin tuna are not as common, and therefore not landed as often. The average fish size tends to be smaller when compared with yellowfin tuna from other geographic areas. The total landings for yellowfin tuna increased in 2002 by 51% from the 2001 figures. This increase is partly due to landings from the Northern Islands bottom fishing fleet and a long lining experiment by one fishing company whom recently applied and received a federal long lining permit. However due to the high cost associated with lonlining, permit holder did not continue longlining in 2003, therefore causing a decrease in landings by 15% for 2003.

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	**171,312**	**25,500**
Average	164,566	18,607
Standard Deviation	59,194	7,146

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.

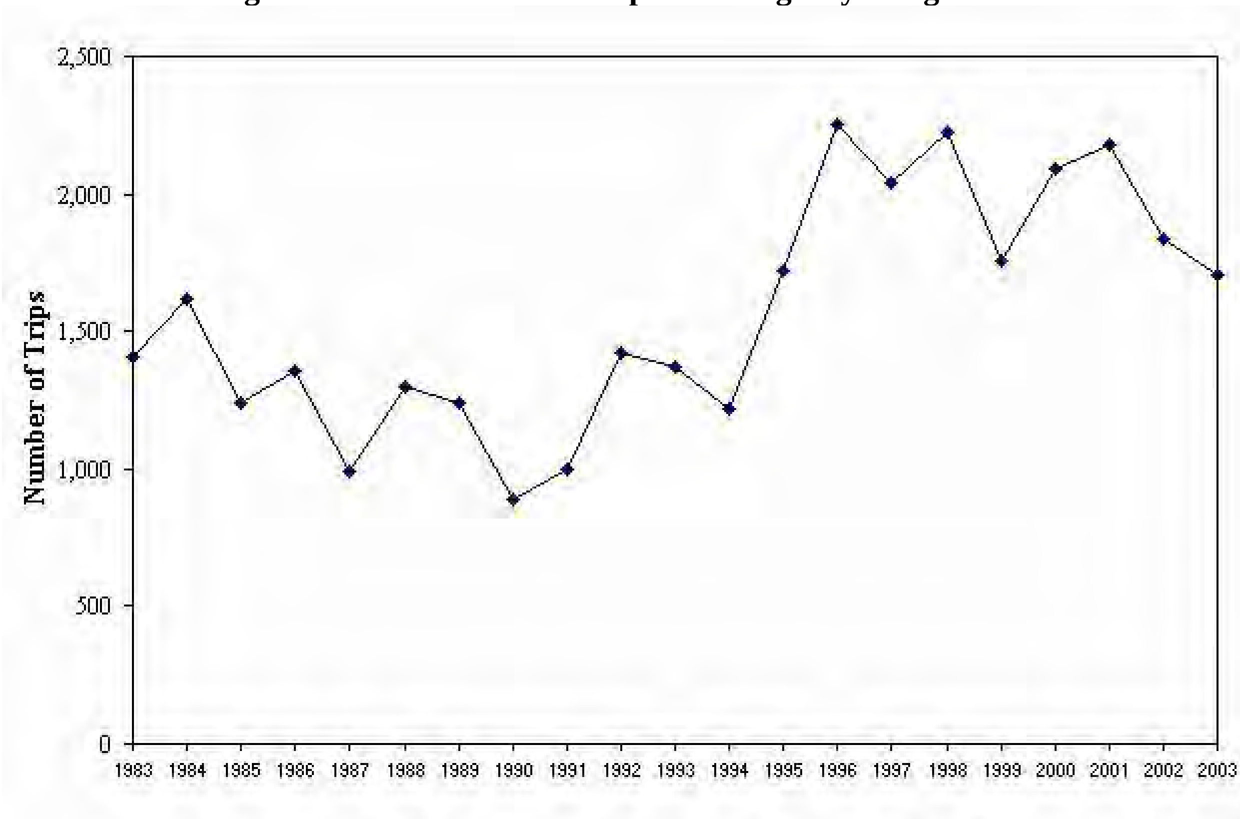
The number of fishermen making pelagic landings decreased 20% from 113 in 2001 to 90 in 2002. Data indicates a continued decline of 19% in 2003. The decrease is partly due to vendors whom own multiple fishing boats entering all their landings on a single receipt and at times combining monthly total landings 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 the continued increase in fuel price.

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**
Average	89
Standard Deviation	18

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



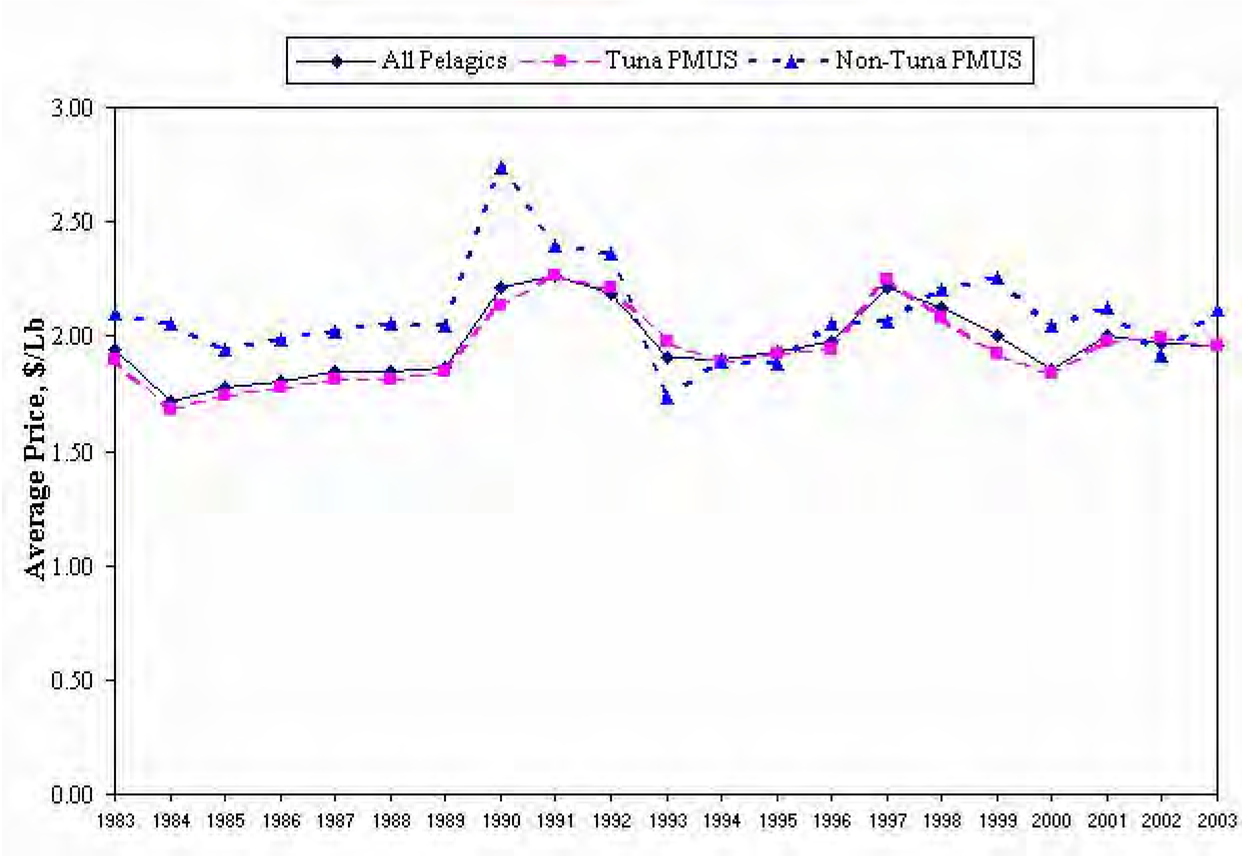
Interpretation: The number of pelagic trips decreased in 2002 by 16% from 2,179 to 1835 and continued to decline in 2003 by 9%. Several typhoons hit the Marianas region, which attributed to decline in fishing trips. The number of pelagic trips rose in 1998, the decrease in 1999 figures may be caused by the refusal of vendors to participate in the Ticket System.

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	**1,704**
Average	1,565
Standard Deviation	423

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 increase 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 2% for 2002. However inflation adjusted average price for tuna decreased by 4% in 2003.

The average price of “Non-Tuna PMUS” increased 19% in 2003 on the inflation-adjusted price.

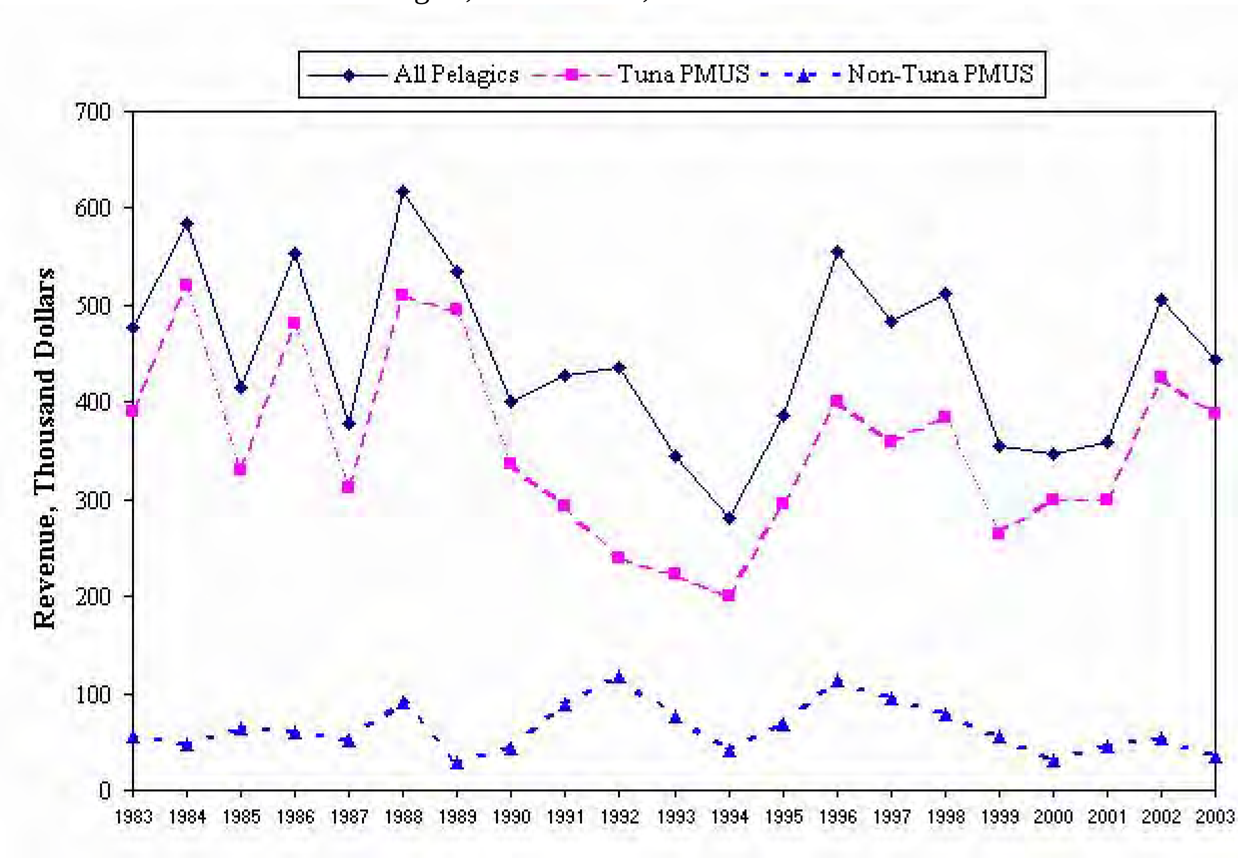
Although in 2001 there was a loss of the large Korean tourist market in the CNMI, there appears to be no substantial loss to revenue. This may be attributed to a redirection of the market toward the local community.

Source and Calculation: The unadjusted average price is calculated by dividing the total revenues generated by the total weight sold. The inflation adjustment is made using the 1998 NMI Consumer Price Index (CPI) as the basis by which calculations of previous years' prices are made.

Inflation-Adjusted Average Price ($/Lb)

Year	All Pelagics		Tuna PMUS		Non-Tuna PMUS	
	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
1983	1.01	1.94	0.99	1.90	1.09	2.10
1984	0.97	1.71	0.95	1.68	1.16	2.06
1985	1.04	1.77	1.02	1.74	1.14	1.94
1986	1.09	1.80	1.07	1.77	1.20	1.99
1987	1.16	1.84	1.14	1.81	1.27	2.02
1988	1.22	1.85	1.20	1.81	1.36	2.06
1989	1.30	1.86	1.29	1.85	1.43	2.05
1990	1.63	2.22	1.57	2.13	2.01	2.74
1991	1.80	2.26	1.80	2.27	1.90	2.39
1992	1.88	2.18	1.91	2.22	2.04	2.36
1993	1.72	1.91	1.78	1.97	1.56	1.74
1994	1.76	1.90	1.75	1.89	1.75	1.89
1995	1.81	1.93	1.80	1.93	1.76	1.88
1996	1.92	1.98	1.88	1.94	1.99	2.05
1997	2.17	2.21	2.20	2.25	2.03	2.07
1998	2.07	2.13	2.02	2.08	2.14	2.20
1999	1.98	2.00	1.91	1.93	2.24	2.26
2000	1.87	1.85	1.86	1.84	2.07	2.05
2001	2.00	2.00	1.97	1.97	2.12	2.12
2002	1.97	1.97	1.99	1.99	1.92	1.92
2003	**1.96**	**1.96**	**1.96**	**1.96**	**2.11**	**2.11**
Average	1.63	1.97	1.62	1.95	1.73	2.10
Standard Deviation	0.40	0.15	0.41	0.16	0.39	0.21

Figure 7. NMI Annual Commercial Inflation-Adjusted Revenues for All Pelagics, Tuna PMUS, and Non-Tuna PMUS



Interpretation: The erratic fluctuations of the inflation-adjusted revenues for Tunas and for All Pelagics prior to 1990 is most likely due to the annual variations in skipjack tuna landings (see Fig. 3) which completely dominated the tuna category and the “All Pelagic” category.

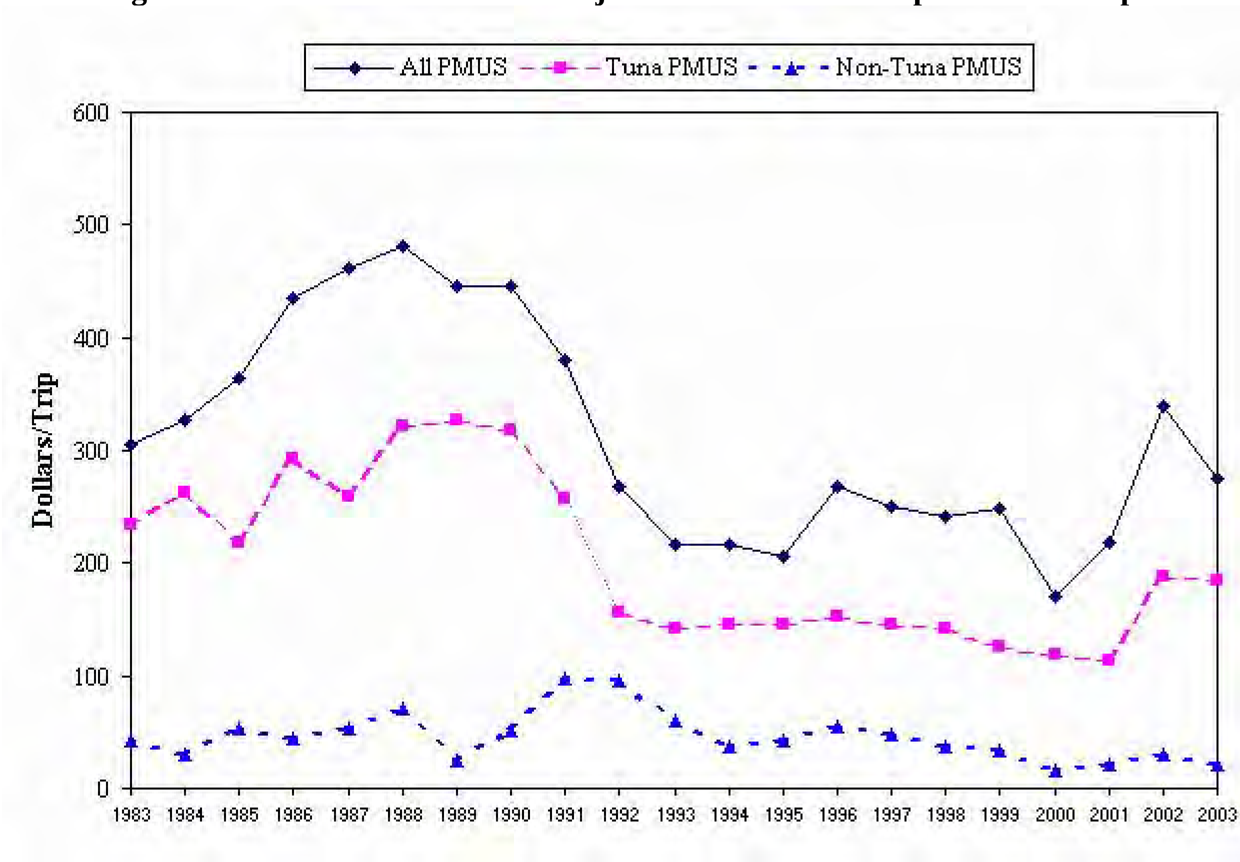
The tunas' inflation-adjusted revenues decreased 10% from the 2002 figures. This is possibly due to the decrease in price per pound and landings of Skipjack tuna, which comprises 87% of the total pelagic landings. Data also indicates a drop of 34% for the "Non-Tuna PMUS" inflation-adjusted revenues for the year 2003.

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	159	305	202,800	389,376	29,059	55,793
1984	185	327	294,077	520,516	27,044	47,868
1985	214	364	193,920	329,664	37,882	64,399
1986	262	435	289,681	480,870	35,488	58,910
1987	290	461	195,793	311,311	32,344	51,427
1988	318	480	338,348	510,905	59,701	90,149
1989	312	446	345,839	494,550	20,917	29,911
1990	327	445	248,144	337,476	32,102	43,659
1991	302	381	232,077	292,417	70,235	88,496
1992	231	268	206,950	240,062	102,133	118,474
1993	195	216	201,350	223,499	69,592	77,247
1994	200	216	185,381	200,211	37,818	40,843
1995	193	207	275,080	294,336	62,920	67,324
1996	261	269	388,691	400,352	110,939	114,267
1997	245	250	351,492	358,522	93,306	95,172
1998	234	241	372,142	383,306	77,011	79,321
1999	246	248	261,394	264,008	55,404	55,958
2000	172	170	302,473	299,448	32,186	31,864
2001	219	219	300,154	300,154	44,987	44,987
2002	339	339	425,961	425,961	53,468	53,468
2003	**275**	**275**	**388,078**	**388,078**	**35,842**	**35,842**
Average	247	313	285,706	354,525	53,351	64,066
Standard Deviation	54	96	74,591	93,938	25,873	25,649

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



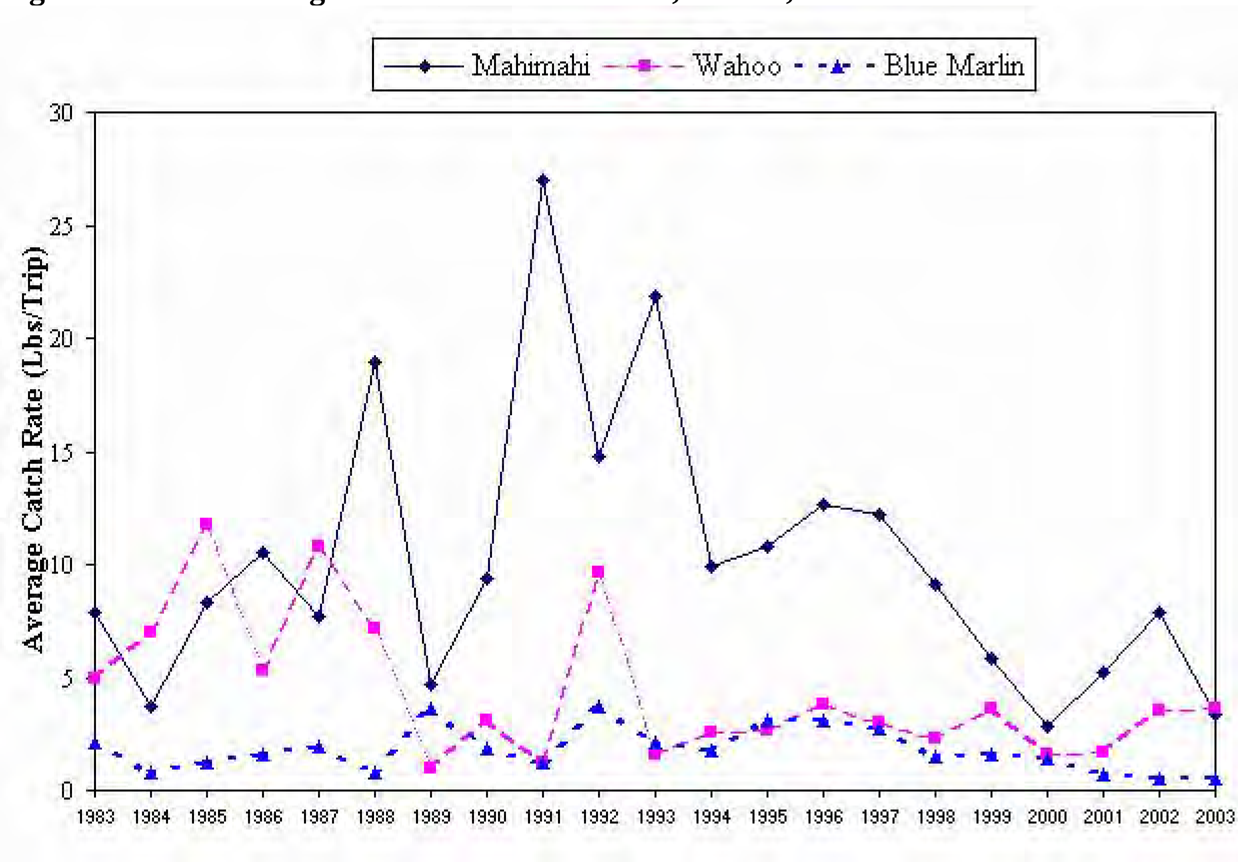
Interpretation: The inflation-adjusted revenue per trip for "All Species" indicates a slight decrease of 4% while "Non-Tuna PMUS" decreased 27% and "Tunas" remained relatively stable in comparison to 2002 at 188 $/Trip. The current year values for all categories were below their respective 20-year means.

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	141.00	270.72	122.00	234.24	22.00	42.24
1984	163.00	288.51	148.00	261.96	17.00	30.09
1985	158.00	268.60	128.00	217.60	31.00	52.70
1986	197.00	327.02	176.00	292.16	27.00	44.82
1987	192.00	305.28	163.00	259.17	34.00	54.06
1988	252.00	380.52	213.00	321.63	47.00	70.97
1989	241.00	344.63	228.00	326.04	17.00	24.31
1990	265.00	360.40	233.00	316.88	38.00	51.68
1991	271.00	341.46	204.00	257.04	77.00	97.02
1992	211.00	244.76	135.00	156.60	83.00	96.28
1993	182.00	202.02	128.00	142.08	55.00	61.05
1994	170.00	183.60	135.00	145.80	35.00	37.80
1995	168.00	179.76	136.00	145.52	39.00	41.73
1996	192.00	197.76	148.00	152.44	53.00	54.59
1997	186.00	189.72	143.00	145.86	47.00	47.94
1998	179.00	184.37	138.00	142.14	36.00	37.08
1999	160.00	161.60	125.00	126.25	33.00	33.33
2000	134.00	132.66	121.00	119.79	16.00	15.84
2001	132.00	132.00	113.00	113.00	21.00	21.00
2002	221.00	221.00	189.00	189.00	30.00	30.00
2003	**209.00**	**209.00**	**185.00**	**185.00**	**21.00**	**21.00**
Average	191.62	244.07	157.67	202.39	37.10	45.98
Standard Deviation	40.64	76.62	37.18	72.20	18.29	22.00

Figure 9. NMI Trolling Catch Rate of Mahimahi, Wahoo, and Blue Marlin



Interpretation: The 2003 mahimahi catch rate drop significantly by 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 eighteen years.

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 by 54% from 2001, and again increased 4% for 2003.

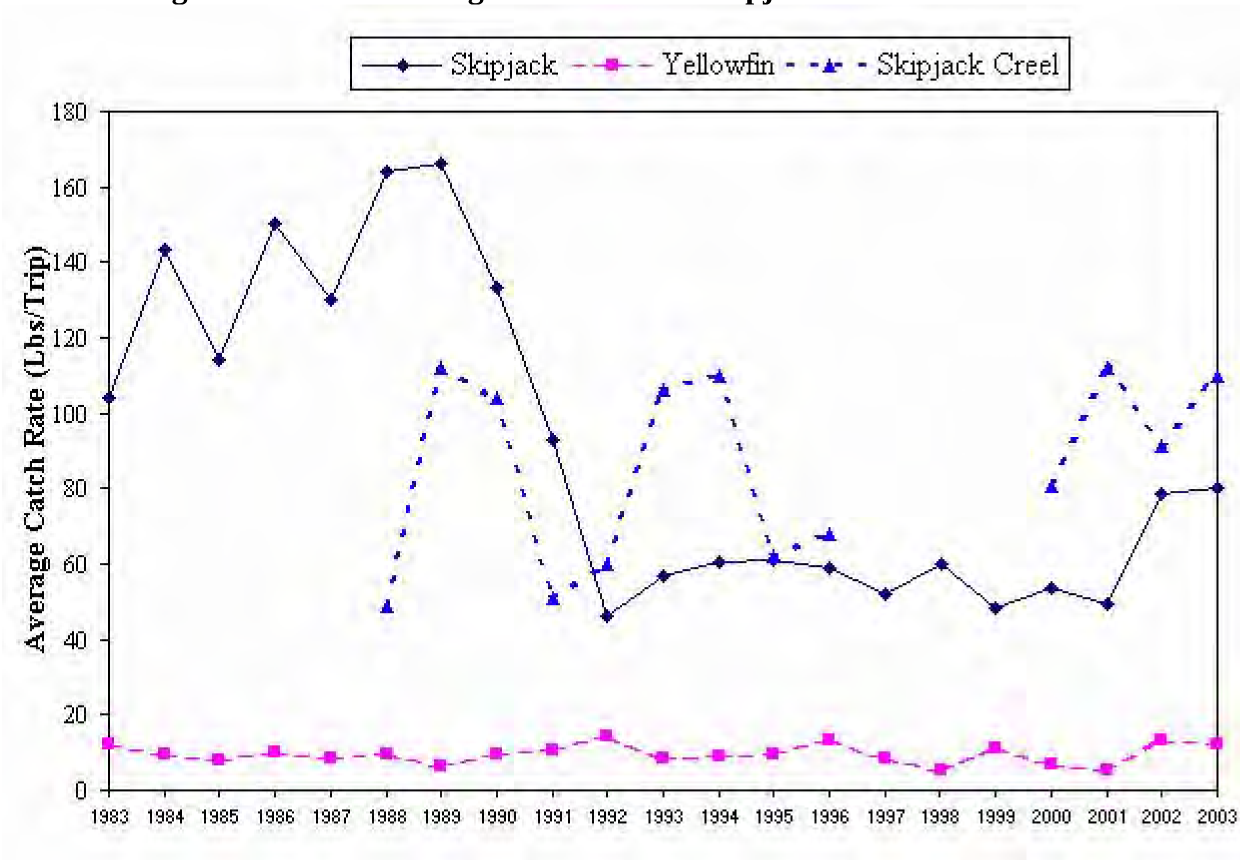
Blue Marlin catch rates decreased by less than 1% from 2002 level. Marlins are not a marketable species and is rarely a target by fishermen except during fishing tournaments. When landed, it is rarely sold to vendors participating in the Commercial Purchase Data Collection Program; therefore it would 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	**3.37**	**3.66**	**0.53**
Average	10.23	4.39	1.81
Standard Deviation	6.20	3.17	0.98

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 82 lbs/trip is a continued increase of 5% in comparison with the 2002 catch rate of 78. Skipjack tuna is the preferred species in the troll fishery of the NMI because of their relative ease of capture and local popularity. 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 conducted by a fishing company whom recently applied and received a federal longline permit. In 2003 Yellowfin catch rates remain relatively stable at 12 lbs/trip despite bad weather that plagued through the Marianas for nearly the entire 2003.

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.

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	81
2001	49	5	112
2002	78	13	91
2003	**80**	**12**	**110**
Average	91	10	86
Standard Deviation	42	3	25

Offshore Daytime Creel Survey Bycatch Summary
Based on the Interview Catch Data in Year 2000-2003
Method: Trolling

		Number Caught					Trip		
	Species	Released	Dead/Injd	Both	All	BC%	With BC	All	BC%
Non Charter							2	626	0.32
	Mahimahi	3		3	570	0.53			
	Yellowfin Tuna		1	1	400	0.25			
	Total			4	970	0.41			
	Compared With All Species			4	15,589	0.03			
Charter							0	90	0.00
	Compared With All Species			0	442	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 2003 by both non-charter and charter boats indicates less than 1% or 4 out of 15,589 of the total pelagic species landed is released. The only two species reported as bycatch was Mahimahi and Yellowfin Tuna. 3 out of 570 Mahimahi or .53% landed was released. And 1 out of 400 Yellowfin Tuna or .25% landed was released. Charter boats had no bycatch reported.

Bycatch in the CNMI has been believed in the past not to exist, which is further supported by the results of the Offshore Creel Survey. The CNMI will continue sampling in order to monitor this issue however it is a common practice by fishermen to keep all species caught regardless of size or condition.

Source: Offshore Daytime Creel Survey Expansion Program.

Appendix 5

International Module

The areas administered 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 various nations and 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 2002 for the purse seine fishery, longline and pole-and-line fisheries.

Fishery trends in the Pacific Ocean for the purse seine, longline and pole-and-line fisheries.

The 2003 purse-seine fishery in the western and central Pacific Ocean (WCPO)

Vessels

The majority of the WCPO purse seine catch is taken by the four main DWFN fleets – Japan, Korea, Taiwan and USA, which currently number around 140 vessels, but with an increasing contribution from the Pacific Islands domestic fleets in recent years (and in particular, the PNG–flagged purse seine fleet). The balance of the regional purse-seine fleet include vessels in the Philippines fisheries and a variety of other fleets, including a small seasonally active Spanish fleet.

Catch

The purse-seine fishery has accounted for around 55-60% of the WCPO total catch since the early 1990s, with annual catches in the range 790,000–1,200,000 mt. The provisional 2003 purse-seine catch of 1,172,780 mt was the second highest on record and maintained the catch in excess of 1,000,000 mt since the record year attained in 1998. The purse seine skipjack catch for 2003 (937,929 mt – 80%) was 34,000 mt less that the record for this fishery (in 2002 – 971,849 mt). The purse seine yellowfin catch for 2003 (214,535 mt – 18%) rebounded from relatively poor catches experienced in 2002 (only 174,366 mt). The estimated purse seine bigeye catch for 2003 (20,316 mt – 2%) continues the declining trend in catches since the record 1999 catch (34,634 mt), primarily due to the gradual reduction in fishing effort on drifting FADs over recent years.

Taiwan has been the highest producer in the tropical purse seine fishery since 1996; the 2003 provisional catch estimate (201,317 mt.) for this fleet is 50,000 mt lower than in 2002, although the final 2003 estimate is expected to be higher. The PNG purse seine fleet constitutes the largest Pacific-island domestic fleet and is now made up of 17 domestically-based vessels fishing in joint-venture arrangements in PNG waters and another 15 vessels that fish over a wider area under the FSM Arrangement. The steady increase in the annual catch by the PNG fleet in recent years is noteworthy; this fleet now catches more than the US fleet and is on par with recent annual (tropical waters) catch by the Japanese fleet.

Fleet distribution

Catch distribution in tropical areas of the WCPO is strongly influenced by El Nino–Southern Oscillation Index (ENSO) events. Fishing effort is typically distributed further to the east during El Nino years and contracts westwards during La Nina periods. The WCPO experienced an ENSO-transitional (or neutral) period during 2001, an El Nino period during 2002 and into the first quarter of 2003, then a return to an ENSO-transitional (netural) period for the remainder of 2003. There was a significant westwards shift in purse seine effort during 2003 (compared to previous years) despite it not being a La Nina year.

Table 1. Total reported purse seine catch (metric tonnes) of skipjack, yellowfin and bigeye tuna in the Pacific Ocean. Source: SCTB17 report.

Year	Skipjack	Yellowfin	Bigeye	Total
1967	108,916	76,583	976	186,475
1968	61,848	100,829	2,679	165,356
1969	45,279	123,179	624	169,082
1970	52,652	155,240	2,058	209,950
1971	102,191	125,664	3,371	231,226
1972	46,286	182,755	3,054	232,095
1973	56,657	217,564	2,926	277,147
1974	86,350	220,330	2,323	309,003
1975	129,265	210,877	5,247	345,389
1976	143,057	249,002	11,506	403,565
1977	117,210	214,897	8,636	340,743
1978	205,149	189,000	12,678	406,827
1979	189,797	215,598	9,564	414,959
1980	206,230	192,495	17,480	416,205
1981	207,803	242,238	14,405	464,446
1982	269,180	196,928	9,492	475,600
1983	378,195	195,177	12,544	585,916
1984	387,880	253,290	14,766	655,936
1985	353,492	318,934	11,369	683,795
1986	431,096	370,232	9,448	810,776
1987	432,896	423,147	12,166	868,209
1988	570,089	383,526	8,355	961,970
1989	566,069	449,085	14,121	1,029,275
1990	674,352	444,210	16,843	1,135,405
1991	832,830	446,456	17,145	1,296,431
1992	787,745	473,975	24,923	1,286,643
1993	661,804	466,651	22,331	1,150,786
1994	791,499	438,106	39,928	1,269,533
1995	853,786	407,607	50,192	1,311,585
1996	845,596	368,054	67,979	1,281,629
1997	821,821	512,073	82,126	1,416,020
1998	1,088,344	530,482	53,341	1,672,167
1999	1,054,684	514,562	75,266	1,644,512
2000	1,078,699	474,352	100,866	1,653,917
2001	978,249	606,344	66,882	1,651,475
2002	1,131,627	594,859	56,015	1,782,501
2003	1,197,091	613,323	61,036	1,871,450
Average	465,240	321,786	23,990	811,015
STD Deviation	363,580	151,041	26,674	528,980

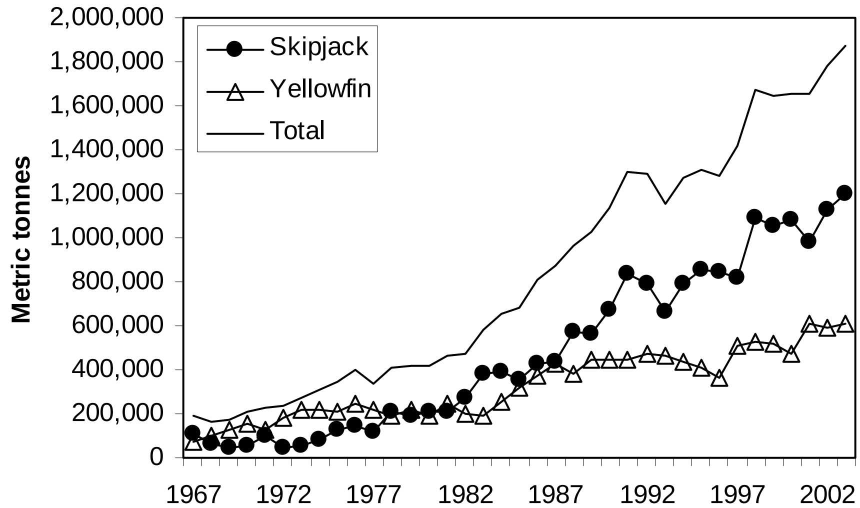


Figure 1. Total purse seine catch of skipjack and yellowfin tuna in the Pacific Ocean, 1967–2002. Source: SCTB17 report.

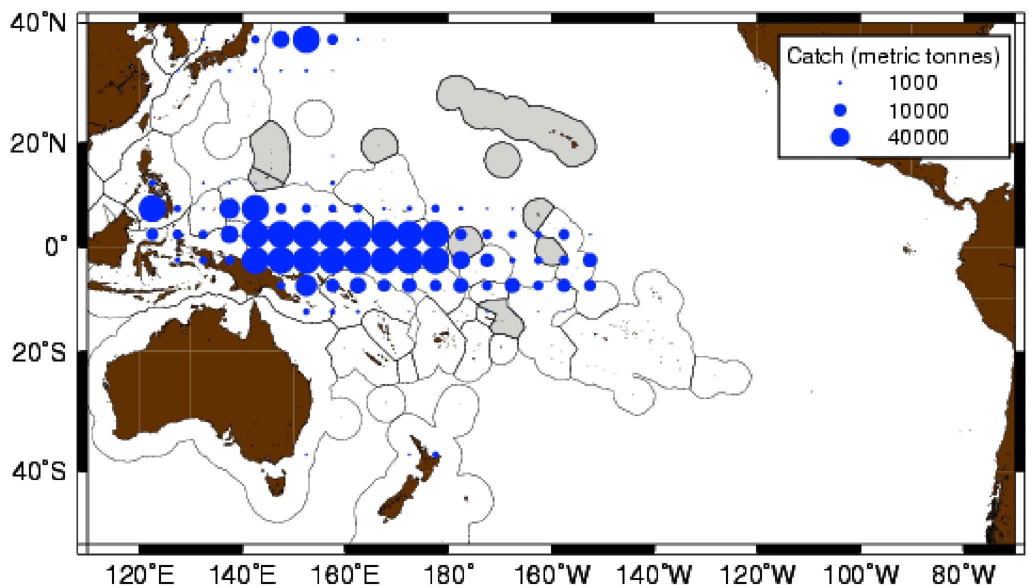


Figure 2. Distribution of total purse seine WCPO skipjack catch in 2002. Source: SPC public domain data.

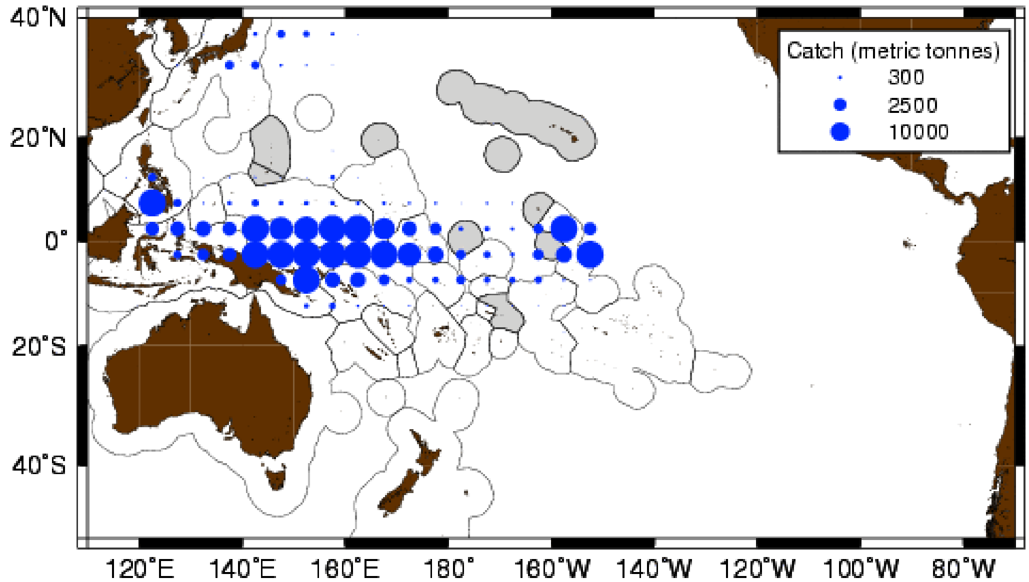


Figure 3. Distribution of total purse seine WCPO yellowfin catch in 2002. Source: SPC public domain data.

The 2003 longline fishery in the WCPO

Vessels

The diverse longline fleet in the WCPO was composed of roughly 5,000 vessels in 2003. These vessels can be divided into four components largely based on the area of fishing operations:

- Over 500 vessels are **domestically-based in the Pacific Islands** with the Samoa alia fleet representing half of these vessels,
- approximately 3,000 vessels are **domestically-based in non-Pacific Island** countries such as Japan and Taiwan,
- about 1,000 large **distant-water** freezer vessels from Japan, Korea and Taiwan that operate over large areas in the region, and
- about 500 **offshore vessels based in Pacific Island countries**. The offshore fleet is composed of equal numbers of vessels from mainland China, Japan and Taiwan.

Catch

The provisional WCPO longline catch (213,259 mt) for 2003 was around 18,000 mt lower that the highest on record, which was attained in 2002 (231,968 mt). The south Pacific albacore catch of 49,899 mt was the second highest on record after the 2002 catch. The bigeye catch (56,578 mt) for 2003 was the lowest for seven years, and the yellowfin catch (67,490 mt) was the lowest since 1999. The yellowfin catch (59,056 mt) in 1999 was the lowest for nearly 30 years, and is understood to be related to the age class showing poor recruitment into the purse seine fishery in 1996.

The most significant change in the WCPO longline fishery over the past 5 years has been the growth of Pacific-Islands domestic albacore fisheries, which went from taking 30% of the total south Pacific albacore longline catch in 1999, to accounting for around 50% of the catch for the past three years. The Taiwanese distant-water longline fleet has been the dominant fleet in the south Pacific albacore fishery for more than two decades, but there have been recent changes in the species and areas targeted by this fleet (more vessels are now targeting bigeye in the eastern equatorial waters of the WCPO), which has resulted in a reduced contribution to the overall albacore catch in recent years. Domestic fleet sizes continue to increase at the expense of foreign-offshore and distant-water fleets, although the Taiwanese distant-water longline fleet has increased by 70% (to 142 vessels in 2003) over the past two years. The evolution in fleet dynamics no doubt has some effect on the species composition of the catch. For example, the increase in Pacific Islands domestic fleets has primarily been in albacore fisheries; while the decrease in vessel numbers from distant-water fleets (e.g. Japan) has principally been in yellowfin and bigeye fisheries.

Fleet distribution

Effort by the large-vessel, distant-water fleets of Japan, Korea and Taiwan account for most of the effort but this has declined to some extent over the past decade. Effort is widespread as sectors of these fleets target bigeye and yellowfin for the frozen sashimi market, and albacore in the more temperate waters for canning. Activity by the foreign-offshore fleets from Japan, mainland China and Taiwan are restricted to the tropical waters, targeting bigeye and yellowfin for the fresh sashimi market; these fleets have limited overlap with the distant-water fleets. The substantial "offshore" effort in the west of the region is primarily by Indonesian and Taiwanese domestic fleets targeting yellowfin and bigeye. The growth in domestic fleets in the South Pacific over recent years has been noted; the most significant examples are the increases in the American Samoan, Fijian and French Polynesian fleets and the recent establishment of the Cook Islands fleet. As noted above, some vessels in the distant-water Taiwanese longline fleet are now targeting bigeye in the eastern equatorial areas of the WCPO.

Table 2. Total reported longline catch (metric tonnes) of PMUS in the Pacific Ocean. Source: SCTB17 report and SPC public domain data.

Year	Albacore	Yellowfin	Bigeye	Striped Marlin	Black Marlin	Blue Marlin	Swordfish	Total
1962	50,990	68,260	79,256	22,507	2,229	18,797	11,216	253,255
1963	44,566	74,646	107,344	26,602	2,342	19,032	11,414	285,946
1964	38,418	64,960	75,595	39,524	1,876	13,989	8,615	242,977
1965	39,803	64,915	57,483	32,794	2,375	11,084	9,665	218,119
1966	64,442	75,337	65,562	27,351	2,172	10,497	11,615	256,976
1967	69,834	44,620	66,231	31,827	1,825	9,702	12,041	236,079
1968	53,721	57,907	58,761	39,418	1,883	9,469	11,477	232,636
1969	43,014	61,990	80,911	25,564	2,073	10,348	14,358	238,257
1970	50,398	65,712	67,230	35,416	1,605	12,686	10,329	243,376
1971	48,001	57,687	64,463	30,975	2,127	8,058	9,410	220,721
1972	49,985	67,949	81,457	20,922	1,884	9,334	9,102	240,634
1973	54,586	68,525	86,254	18,603	1,935	9,964	9,604	249,470
1974	44,973	61,292	75,990	18,559	1,620	8,946	8,693	220,074
1975	40,439	71,212	94,567	15,181	1,845	7,962	9,124	240,330
1976	42,063	86,336	118,746	16,197	1,056	8,694	11,350	284,442
1977	52,247	100,330	137,021	9,325	936	8,523	10,927	319,309
1978	48,447	120,219	120,052	9,973	1,624	10,090	10,930	321,335
1979	43,400	116,425	112,184	15,694	1,950	10,439	11,189	311,282
1980	46,631	130,895	118,292	17,594	1,652	10,988	17,714	343,767
1981	51,377	100,549	94,815	20,840	2,067	13,409	22,791	305,848
1982	46,158	94,882	98,051	20,980	2,277	13,401	19,248	294,996
1983	40,380	94,498	101,107	14,480	1,916	10,997	20,730	284,108
1984	36,009	80,135	92,509	11,726	1,524	13,298	16,366	251,566
1985	41,889	86,754	117,327	12,494	1,234	11,589	18,849	290,136
1986	45,810	84,848	148,798	17,322	1,250	14,278	20,905	333,212
1987	42,278	92,918	160,846	20,241	1,896	18,196	25,506	361,881
1988	47,017	95,748	122,998	18,264	2,752	15,858	24,332	326,968
1989	36,285	81,238	123,081	12,520	1,515	13,125	16,542	284,306
1990	38,882	107,066	165,797	9,072	1,880	12,157	15,226	350,080
1991	42,422	91,172	155,521	10,518	2,180	14,539	18,265	334,617
1992	49,947	89,000	147,842	8,753	2,103	14,400	19,091	331,136
1993	60,919	88,598	129,563	10,359	1,707	15,603	19,065	325,814
1994	64,007	102,855	138,442	10,372	1,834	17,389	15,754	350,652
1995	58,568	100,110	112,996	11,233	1,370	17,685	14,053	316,015
1996	63,448	92,843	95,630	8,196	864	13,329	15,477	289,788
1997	80,367	90,677	109,196	9,314	1,554	14,583	15,788	321,479
1998	88,027	78,996	118,540	6,093	1,827	13,868	14,987	322,339
1999	82,111	72,586	97,152	5,455	1,682	12,741	14,412	286,139
2000	83,397	98,828	109,379	4,519	2,220	5,809	17,686	321,838
2001	87,324	98,913	128,498	4,146	1,320	7,649	17,505	345,356
2002	89,197	94,305	148,686	3,989	1,342	4,184	17,475	359,178
Average	53,702	84,798	106,931	17,193	1,788	12,114	14,849	291,376
STD deviation	15,394	18,498	29,527	9,670	407	3,477	4,520	43,682

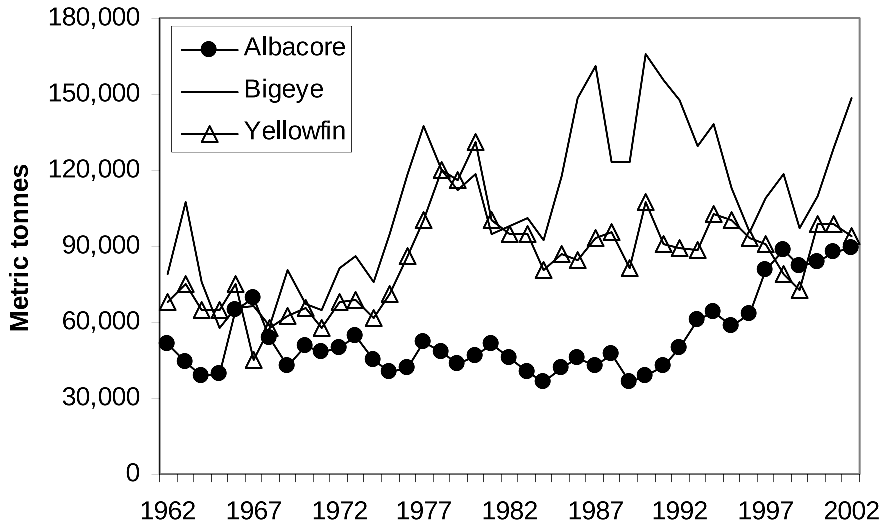


Figure 4. Reported longline tuna catches in the Pacific Ocean. Source: SPC public domain data.

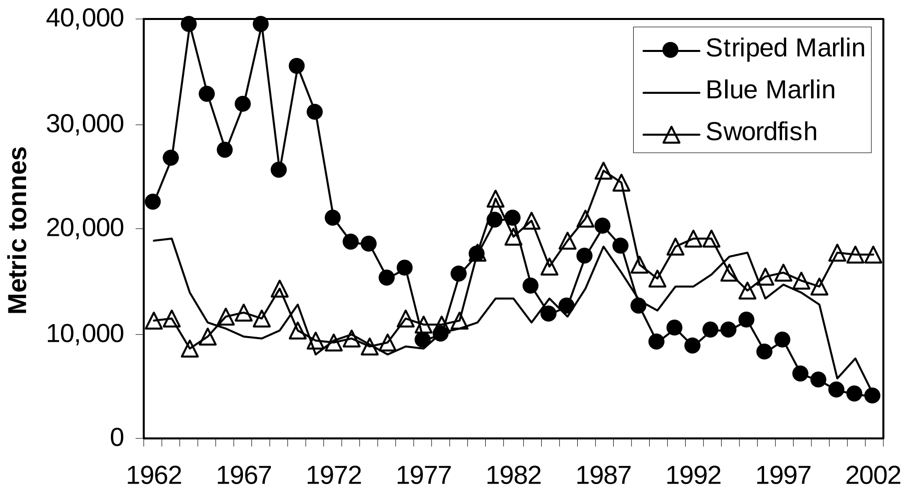


Figure 5. Reported longline billfish catches in the Pacific Ocean. Source: SPC public domain data.

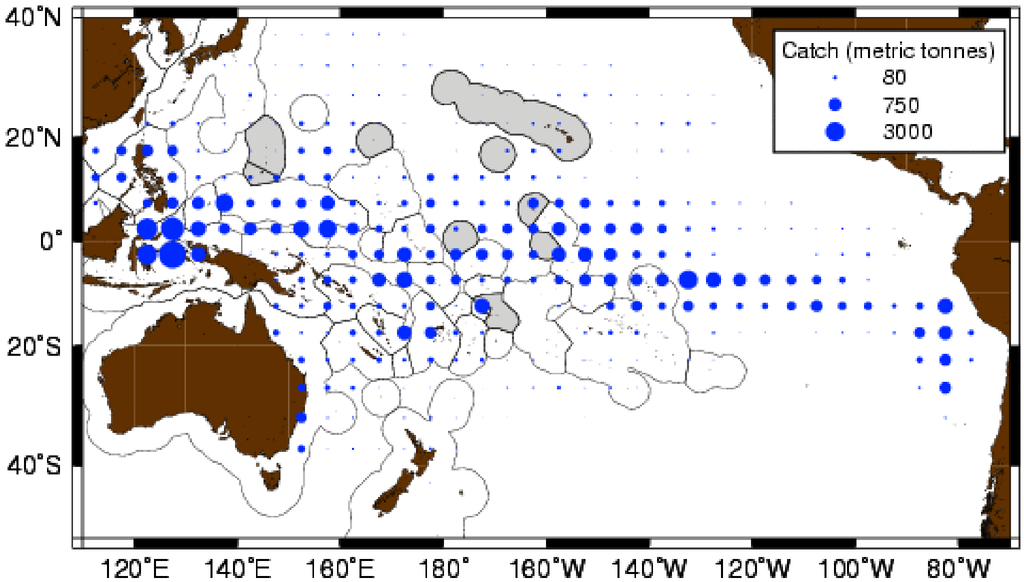


Figure 6. Distribution of longline catches of yellowfin tuna reported in 2002. Source: SPC public domain data.

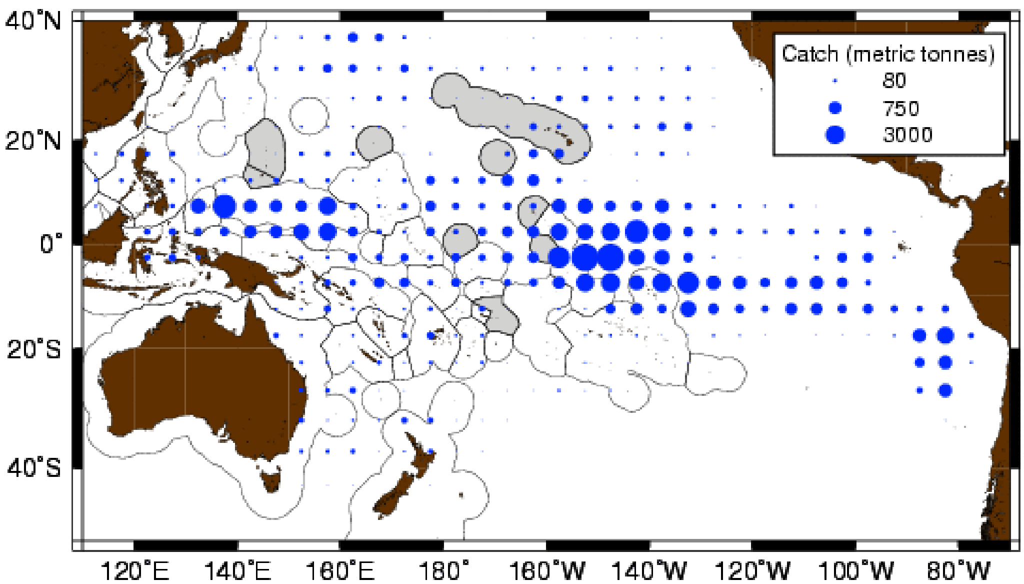


Figure 7. Distribution of longline catches of bigeye tuna reported in 2002. Source: SPC public domain data.

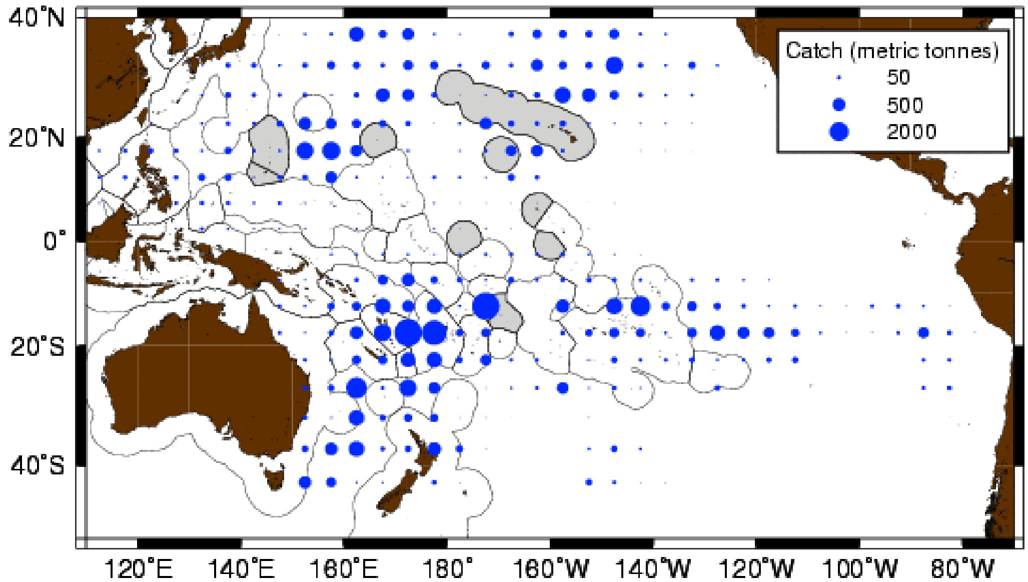


Figure 8. Distribution of longline catches of albacore tuna reported in 2002. Source: SPC public domain data.

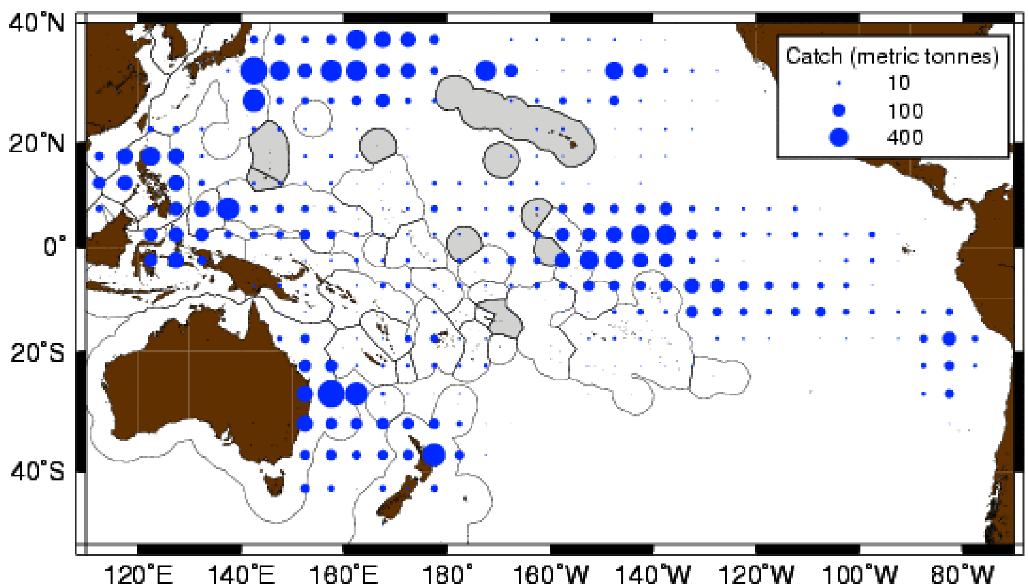


Figure 9. Distribution of longline catches of swordfish reported in 2002. Source: SPC public domain data.

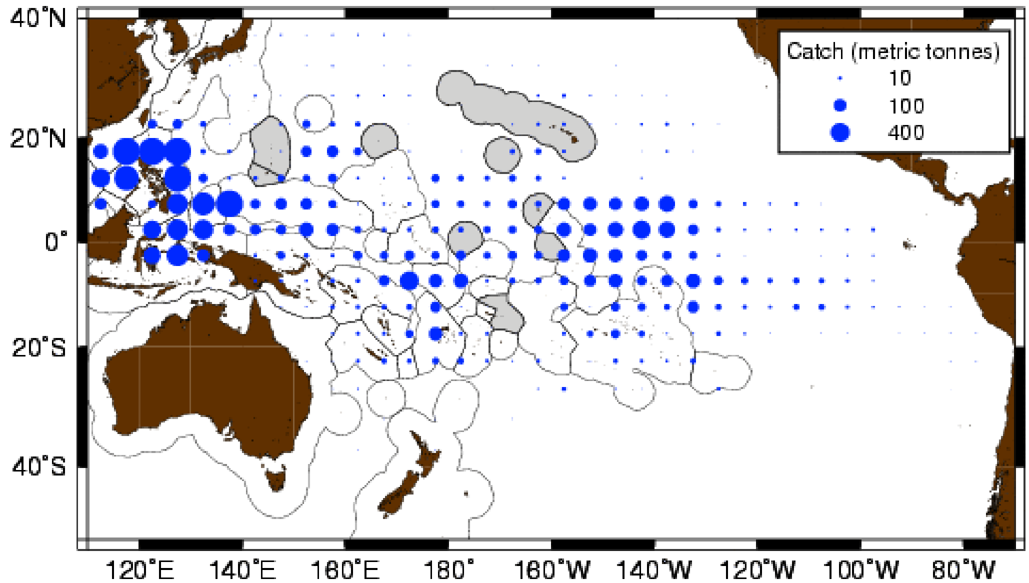


Figure 10. Distribution of longline catches of blue marlin reported in 2002. Source: SPC public domain data.

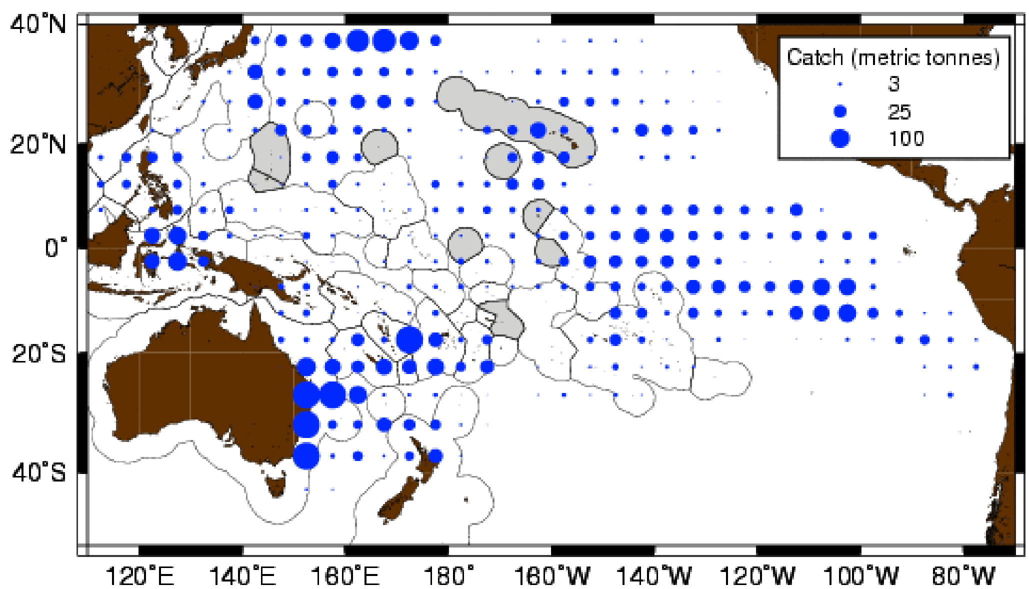


Figure 11. Distribution of longline catches of striped marlin reported in 2002. Source: SPC public domain data.

The 2003 pole-and-line fishery in the WCPO

Vessels The pole-and-line fleet was composed of approximately 1,400 vessels in the 2003 WCPO fishery. Most of the vessels operated in the domestic fisheries in Indonesia and Japan. Over 100 vessels operate in Pacific Island countries and there are 160 vessels in the Japanese distant-water fleet.

Catch The preliminary pole-and-line catch estimate for 2003 (294,752 mt–15% of total WCPO catch) is lower than the 2002 catch (303,933 mt), although the Japanese fleet catch estimate for 2003 has yet to be provided. As in previous years, skipjack accounts for the vast majority of the catch (82%); albacore taken by the Japanese coastal and offshore fleets in the temperate waters of the north Pacific (12%), yellowfin (5%) and a small component of bigeye (1%) make up the remainder of the catch. The Japanese distant-water and offshore (144,638 mt in 2002) and the Indonesian fleets (145,597 mt in 2003) typically account for most of the WCPO pole-and-line catch. The Solomon Islands fleet (9,652 mt in 2002) continues to recover from low catch levels experienced in recent years (only 2,692 mt in 2000), but was still far from the level (of over 20,000 mt annually) experienced in most years during the 1990s.

Fleet distribution The WCPO 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 a subset of the Japan home-water fishery).

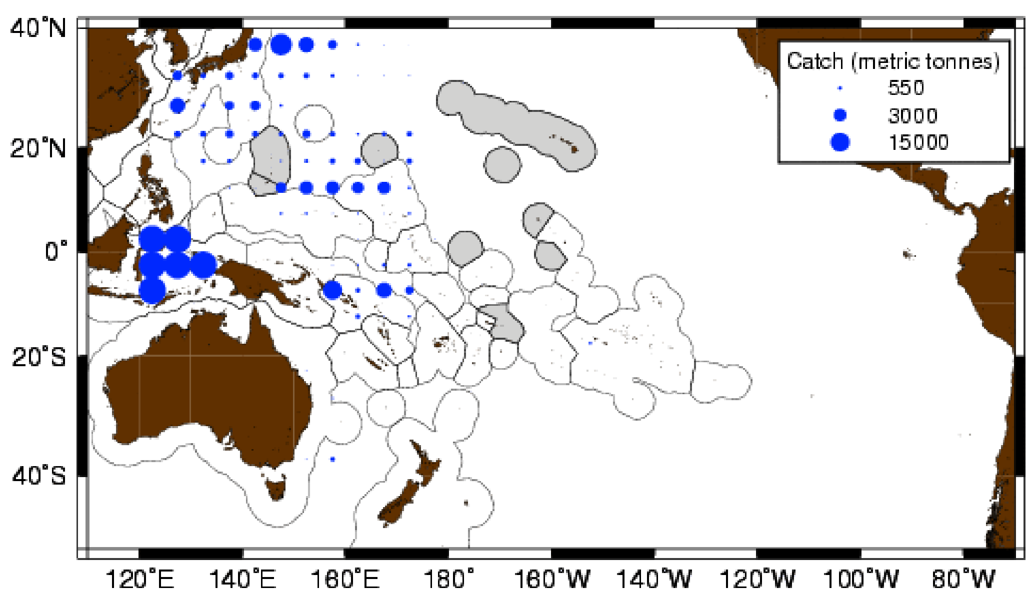


Figure 12. Distribution of pole-and-line catch of skipjack reported in 2002. Source: SPC public domain data.

Table 3. Total reported pole-and-line catch (metric tonnes) of skipjack in the Pacific Ocean. Source: SCTB16 report.

Year	Skipjack
1970	197,873
1971	180,945
1972	172,871
1973	253,065
1974	289,202
1975	218,271
1976	276,581
1977	294,641
1978	331,401
1979	283,494
1980	332,465
1981	294,187
1982	262,233
1983	299,762
1984	379,474
1985	250,010
1986	336,694
1987	262,467
1988	301,031
1989	289,706
1990	224,591
1991	282,397
1992	226,589
1993	270,670
1994	231,385
1995	267,421
1996	229,891
1997	249,421
1998	285,718
1999	291,696
2000	295,336
2001	233,290
2002	238,537
2003	242,255
Average	266,929
STD deviation	44,705

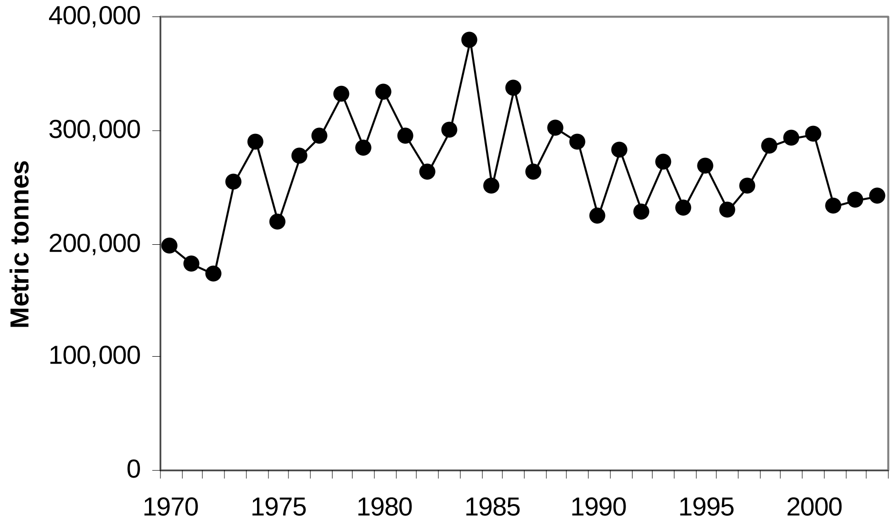


Figure 13. Reported pole-and-line catch (metric tonnes) of skipjack in the Pacific Ocean. Source: SCTB17 report.

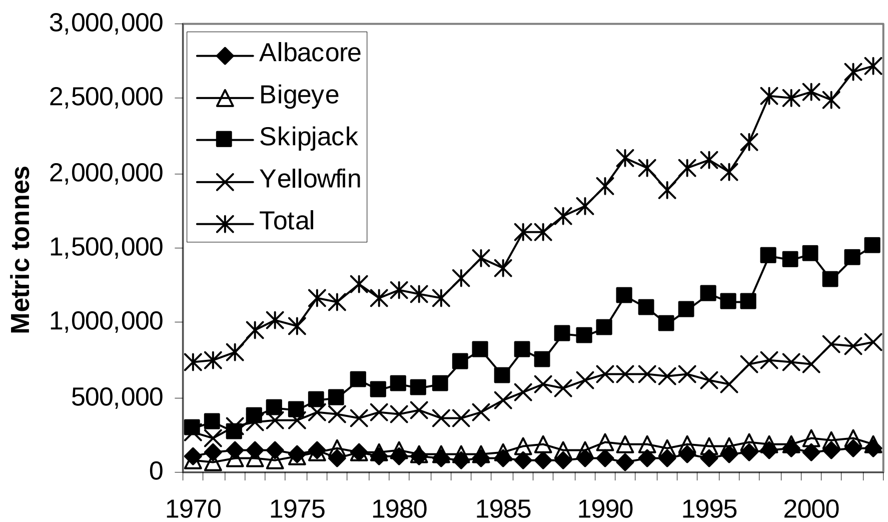


Figure 14. Estimated total annual catch of tuna species in the Pacific Ocean. Source: SCTB16 report.

Table 4. Estimated annual catch (metric tonnes) of tuna species in the Pacific Ocean. Source: SCTB17.

Year	Albacore	Bigeye	Skipjack	Yellowfin	Total
1970	102,244	73,708	298,233	262,158	736,343
1971	127,786	71,866	331,355	225,645	756,652
1972	143,853	89,837	269,574	301,579	804,843
1973	145,238	94,787	371,083	340,320	951,428
1974	147,889	84,071	434,614	345,114	1,011,688
1975	116,827	106,119	413,421	345,077	981,444
1976	149,611	137,862	484,385	397,250	1,169,108
1977	98,670	154,621	490,542	387,966	1,131,799
1978	135,744	140,310	620,393	365,263	1,261,710
1979	100,763	128,830	543,362	395,299	1,168,254
1980	107,791	142,260	589,115	382,979	1,222,145
1981	105,960	116,736	557,727	415,122	1,195,545
1982	99,261	116,412	589,685	355,681	1,161,039
1983	80,125	122,809	742,045	359,262	1,304,241
1984	95,433	115,933	816,122	404,099	1,431,587
1985	90,607	139,177	649,289	486,319	1,365,392
1986	81,934	167,591	820,457	535,628	1,605,610
1987	78,936	181,714	747,947	592,785	1,601,382
1988	86,702	141,919	927,116	563,127	1,718,864
1989	97,219	148,637	910,673	620,113	1,776,642
1990	91,347	195,420	963,865	659,032	1,909,664
1991	71,608	185,483	1,184,353	661,273	2,102,717
1992	91,997	182,715	1,095,336	661,829	2,031,877
1993	88,983	161,302	994,954	646,271	1,891,510
1994	114,301	191,356	1,078,905	652,322	2,036,884
1995	100,038	177,394	1,188,626	618,844	2,084,902
1996	114,163	178,716	1,138,974	583,745	2,015,598
1997	138,869	206,124	1,134,980	729,299	2,209,272
1998	140,674	186,661	1,446,265	747,464	2,521,064
1999	161,127	188,052	1,419,723	739,175	2,508,077
2000	131,302	227,385	1,455,558	728,322	2,542,567
2001	142,421	210,641	1,279,404	852,237	2,484,703
2002	166,487	222,252	1,438,058	845,659	2,672,456
2003	157,363	181,293	1,512,633	873,794	2,725,083
Average	113,512	151,173	831,095	521,402	1,617,182
STD deviation	26,320	43,250	367,027	175,974	579,179

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 Standing Committee on Tuna and Billfish (SCTB) and biennially at the Interim Scientific Committee for Tuna and Tuna-like Species in the North Pacific (ISC). In August 2004, the SCTB17 reviewed assessments for yellowfin and bigeye tuna in the WCPO. In addition, recent assessments from previous SCTB fora are available for Pacific blue marlin, north Pacific blue shark, south Pacific albacore and WCPO skipjack (Table 5 and 6). Stock status for the four tuna species are summarized from the SCTB species summary statements (http://www.spc.int/OceanFish/Html/SCTB/ SCTB16/Execsum.pdf and http://www.spc.int/OceanFish/Html/SCTB/SCTB17/ Execsum.pdf), which also contains additional information on recent developments in the fishery, sizes of fish and trends in CPUE, recruitment, biomass and fishing mortality. In February 2004, the fourth meeting of the ISC reviewed assessments for Pacific bluefin tuna and north Pacific swordfish. Summary statements were produced for these species and north Pacific albacore (http://isc.ac.affrc.go.jp/).

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 14). 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 and anticipated stock assessments for WPRFMC PMUS

Albacore Tuna (S. Pacific)	2003	Swordfish (N. Pacific)	2004
Albacore Tuna (N. Pacific)	2004	Wahoo	
Other tuna relatives (*Auxis* sp.)		Yellowfin Tuna (WCPO)	2004
(*allothunnus* sp., *Scomber* sp.)		Kawakawa	
Bigeye Tuna (WCPO)	2004	Bluefin Tuna (Pacific)	2004
Black Marlin		Common Thresher Shark	
Blue Marlin	2002	Pelagic Thresher Shark	
Mahimahi		Bigeye Thresher Shark	
Oilfishes		Shortfin Mako Shark	
Opah		Longfin Mako Shark	
Pomfrets		Blue Shark (N. Pacific)	2001
Sailfish		Silky Shark	
Shortbill Spearfish		Oceanic Whitetip Shark	
Skipjack Tuna (WCPO)	2003	Salmon Shark	
Striped Marlin	2005		

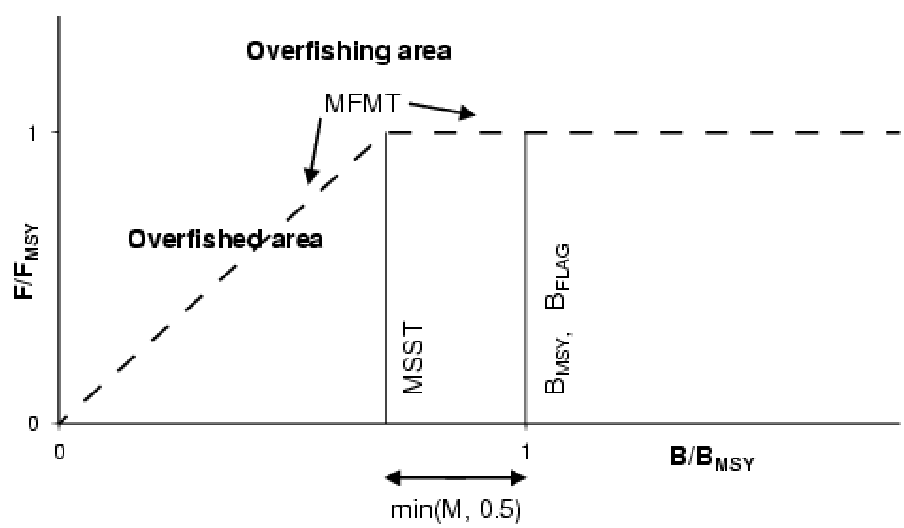


Figure 15. Specification of reference points MFMT and MSST in the WPRFMC Pelagic FMP.

Stock status – WCPO skipjack tuna

No formal stock assessment of skipjack was conducted in 2004 and there was no additional information relating to fisheries indicators that could be used to update last year's stock assessment (Langley et al. 2003). Estimated biological reference points, particularly B/B_{MSY} and F/F_{MSY}, indicate that the skipjack tuna stock of the WCPO is not overfished owing to recent high levels of recruitment and a modest level of exploitation relative to the stock's biological potential (Figure 16, Table 6). Continued catches at the 1.2 million mt level are sustainable with continued high levels of recruitment, which are believed to be determined by principally environmental factors and not owing to a strong spawner-recruit relationship.

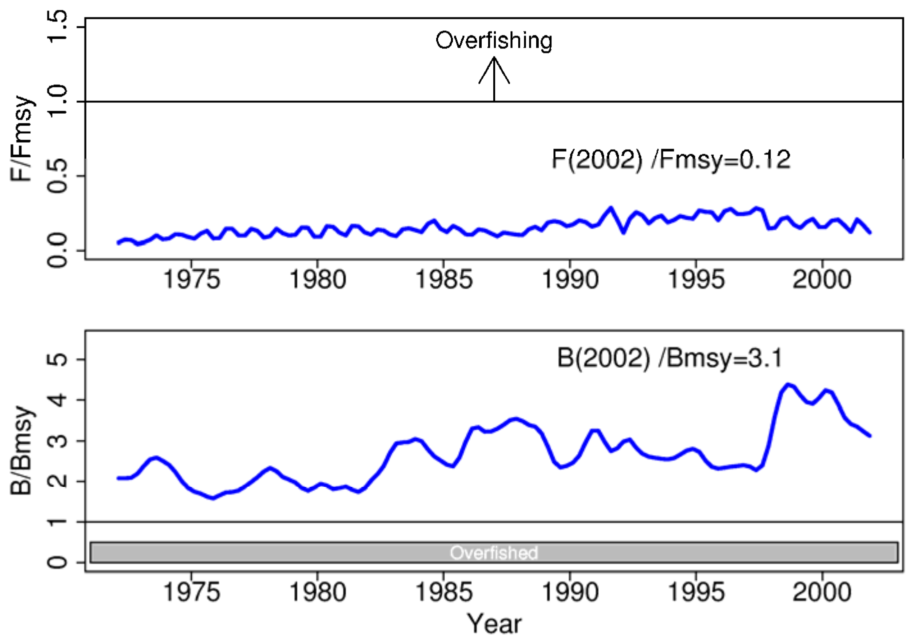


Figure 16. Ratios of F/F_{MSY} (top) and B/B_{MSY} (bottom) for skipjack tuna in the WCPO. The horizontal line at 1.0 in the F/F_{MSY} figure indicates an overfishing reference point. The shaded area in the B/B_{MSY} figure indicates an overfished reference point .

Stock status – WCPO yellowfin tuna

The assessment (Hampton et al. 2004a) reviewed by SCTB17 reaffirms the result of the previous assessment that the yellowfin stock in the WCPO is probably not being overfished ($F/F_{MSY} < 1$) and that it is not in an overfished state ($B/B_{MSY} > 0.5$, Figure 17, Table 6). However, the stock is likely to be nearing full exploitation and any future increases in fishing mortality would not result in any long-term increase in yield and may move the yellowfin stock to an overfished state. While biomass based reference points indicate that the long-term average biomass should remain above that capable of producing *MSY* if present catches are maintained, yield estimates indicate that there may be limited potential to expand long-term catches from the fishery at the current pattern of age-specific selectivity. The assessment also indicates that the equatorial regions are likely to be fully exploited, while the temperate regions are likely to be lightly exploited. Furthermore, the attribution of depletion to various fisheries or groups of fisheries indicates that the Indonesian fishery has the greatest impact, particularly in its home region, but is also impacting other regions, as the assessment model indicates that Region 2 is a source of recruits for other regions. The purse seine fishery also has moderate impact, particularly in the equatorial regions.

It is important to note that the key reference points are sensitive to initial assumptions regarding the nature of the stock-recruitment relationship (Figure 18). The assumed prior distribution for the steepness parameter is highly influential and a relaxation of this assumption results in a more pessimistic assessment despite the lack of any evidence of a strong relationship between spawning stock biomass and recruitment (steepness is a parameter that describes the slope of the ascending limb of the relationship between spawning biomass and recruitment). For future assessments, a comprehensive review of appropriate values of SRR steepness for yellowfin is required to determine appropriate values for inclusion in a range of sensitivity analyses. The other main source of uncertainty is the historical and current levels of catch from the Indonesian fishery.

While recognizing continuing uncertainties associated with the present stock assessment, the SCTB reiterates the previous recommendation that there be no further increases in fishing mortality (particularly on juvenile yellowfin) in the WCPO. If future evidence supports a shift to a lower productivity regime, a decrease in total catch would be anticipated in order to maintain the stock at sustainable levels.

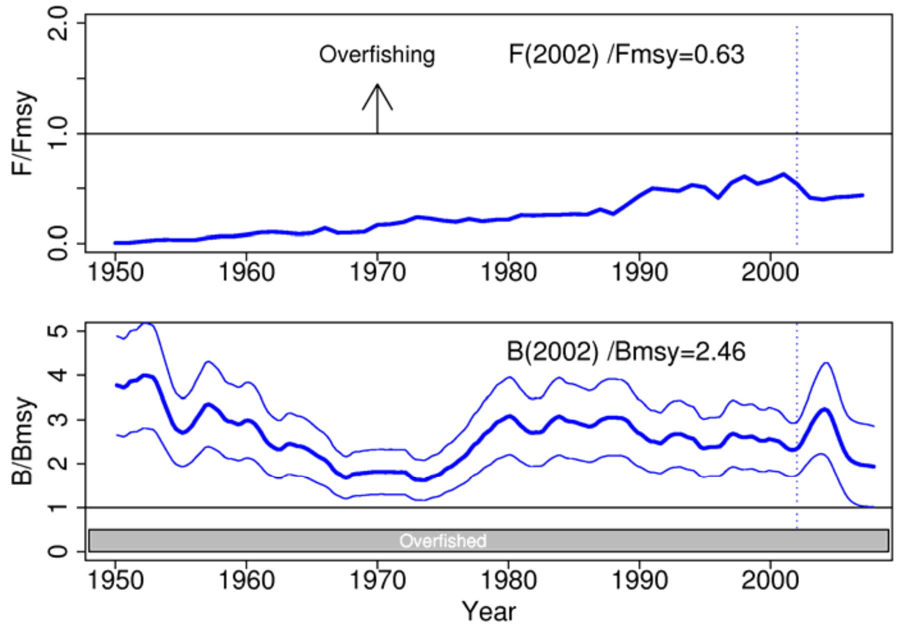


Figure 17. Ratios of F/F_{MSY} (top) and B/B_{MSY} (bottom) for yellowfin tuna in the WCPO. The horizontal line at 1.0 in the F/F_{MSY} figure indicates an overfishing reference point. The shaded area in the B/B_{MSY} figure indicates an overfished reference point (MSST) and thin lines indicate approximate 95% confidence intervals. The dotted vertical line delineates data-supported model estimates from projections.

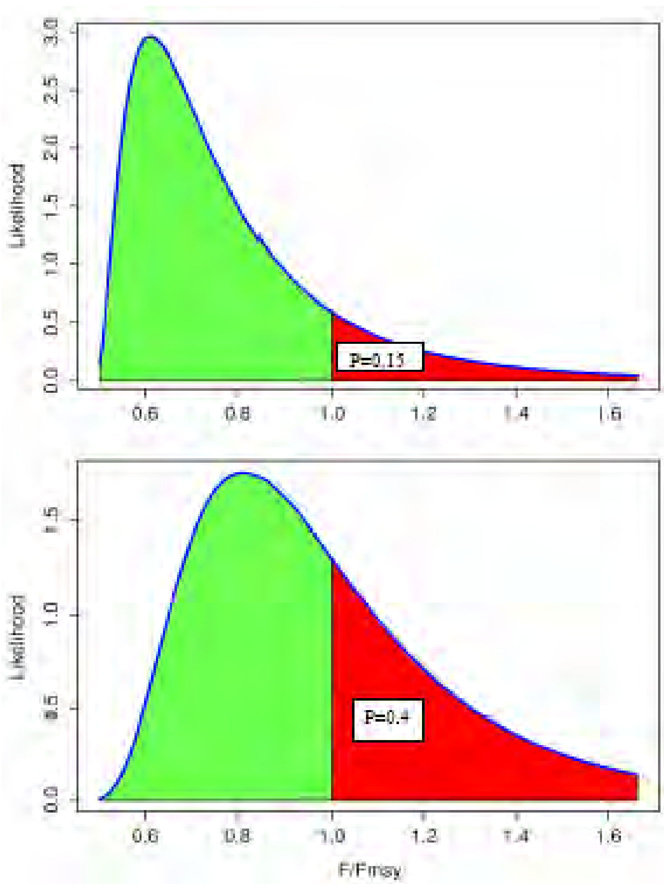


Figure 18. Probability distribution of F/ FMSY for yellowfin tuna in the WCPO based on the likelihood profile method with steepness priors of mode = 0.9 and sd = 0.1 (upper panel) and mode = 0.75 and sd = 0.1 (lower panel).

Stock status – WCPO bigeye tuna

The 2004 assessment results (Hampton et al. 2004b) were reviewed and confirmed as consistent with the 2003 assessment, although the point estimates of some reference points were slightly more optimistic in this assessment (Figure 19, Table 6). The current fishing mortality (i.e. the average for 1999-2001) is estimated to be close to MSY level (F/F_{MSY}) and the current biomass to be above the MSY level ($B>B_{MSY}$) and above the MSST (not in an overfished state). This result is common for all runs. Probability distributions for F/F_{MSY} and B/B_{MSY} were developed by the likelihood profile method. These distributions (Figure 20) indicate that the current levels of fishing mortality carry high risks of overfishing but the probability that the stock is in an overfished state is close to zero.

The future stock status of WCPO bigeye will depend both on future fishing mortality and future recruitment. Recent recruitment has been estimated to be well above average, and if it falls to the long term average or lower, current catch levels would result in stock reductions to near and possibly below MSY-based reference points. Lower future recruitment is a possibility if the recruitment trends for bigeye in the EPO are mirrored in the WCPO, and if the hypothesis concerning the impact of large-scale ocean climate on tropical tuna recruitment, which was suggested in the paper presented to SCTB17 (ECO-5), proves to be correct.

According to the information provided by the IATTC, the spawning stock biomass of bigeye tuna in the eastern Pacific Ocean (EPO) has now declined below the MSY level. The stock will likely remain in an overfished condition for some time because of high fishing mortality and low recent recruitment. The annual meeting of the IATTC adopted several management measures aimed at preventing further decline and promoting recovery of the stock. It was noted that the longline fishery operates continuously across the tropical Pacific (Figure 7) and that collaborative research with the IATTC on Pacific-wide bigeye assessment should continue.

Taking all above information into consideration, it is recommended that, as a minimum measure, there be no further increase in the fishing mortality rate for bigeye tuna from $F_{current}$. If future evidence supports a shift to a lower productivity regime, a decrease in total catch would be anticipated in order to maintain the stock at sustainable levels. The SCTB participants recognize there are still large uncertainties associated with the stock assessment of this species and recommend that the stock assessment be conducted again next year.

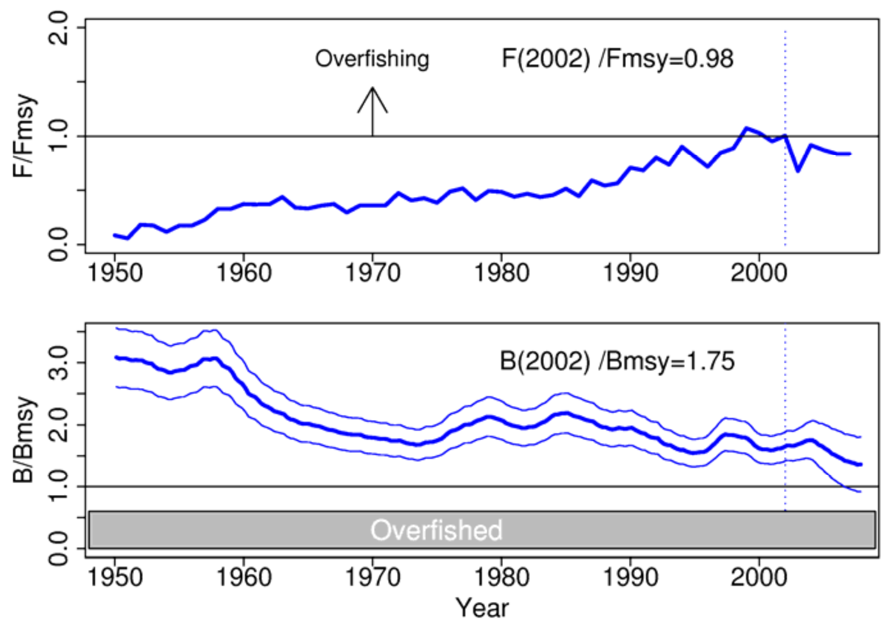


Figure 19. Ratios of F/F_{MSY} (top) and B/B_{MSY} (bottom) for bigeye tuna in the WCPO. The horizontal line at 1.0 in the F/F_{MSY} figure indicates an overfishing reference point. The shaded area in the B/B_{MSY} figure indicates an overfished reference point and thin lines indicate approximate 95% confidence intervals. The dotted vertical line delineates data-supported model estimates from projections.

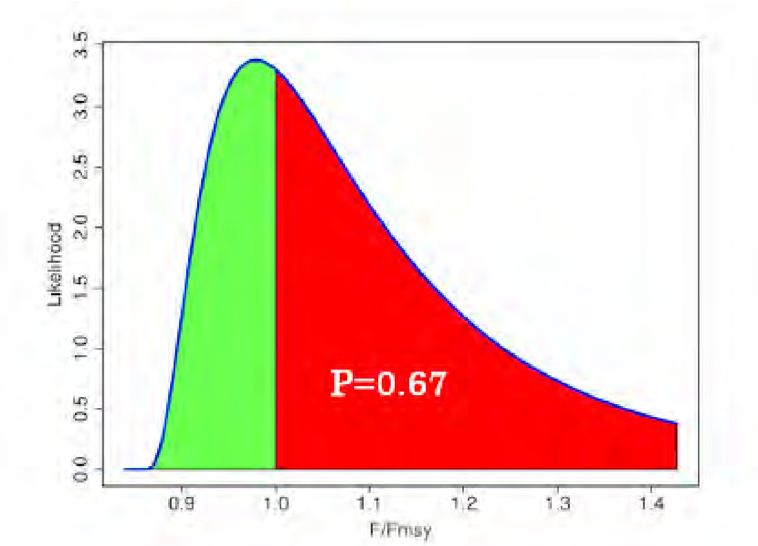


Figure 20. Probability distribution of F/ FMSY for bigeye tuna in the WCPO based on the likelihood profile method (base case with steepness of mode = 0.9 and sd = 0.1)

Stock status – south Pacific albacore tuna

No formal stock assessment of South Pacific albacore was conducted in 2004 and there was no additional information relating to fisheries indicators that could be used to update last year's stock assessment (Labelle and Hampton 2003). The meeting therefore had no basis for altering the main features of last year's assessment, namely that it is unlikely that the South Pacific albacore stock is being overfished or that it is in an overfished state (Figure 21). The meeting did, however, consider further analyses of the declines in CPUE in some Pacific Island states in 2003. Results indicated that much of this decline is a consequence of changed oceanographic conditions, though high levels of localized effort may also be impacting on CPUE in these fisheries. Catch rates for most fleets have recovered over the last 12 months.

The current (2003) stock assessment was conducted with MULTIFAN–CL. The fishery for albacore is unique in that it has exhibited no significant trend in catches over the period of 1960 – 1995. Due to the problems faced by all assessments conducted with limited data on stocks, which have been apparently exploited at only low exploitation rates over the period of the fishery, the results obtained provide little information on the biomass of the stock. Improved results from this model would be expected if there were better return rates of tags placed on albacore.

The 2003 assessment gave similar results to the 2002 assessment, with a low impact of fishing on biomass, and indicated that the current biomass is at about 60% of unfished levels. It is therefore unlikely that the stock is being overfished or is in an overfished state.

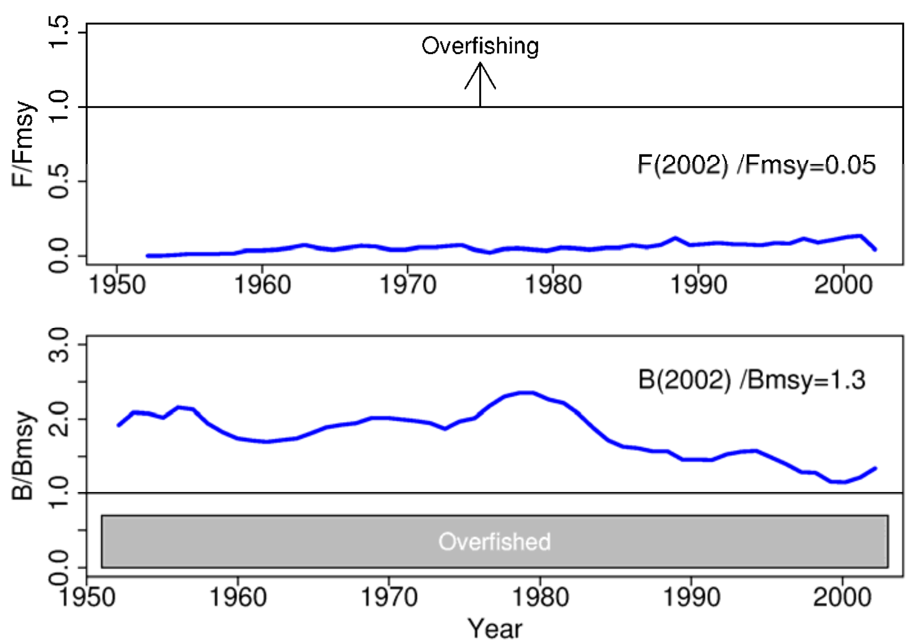


Figure 21. Ratios of F/F_{MSY} (top) and B/B_{MSY} (bottom) for south Pacific albacore tuna. The horizontal line at 1.0 in the F/F_{MSY} figure indicates an overfishing reference point. The shaded area in the B/B_{MSY} figure indicates an overfished reference point.

Stock status – north Pacific albacore

The status of north Pacific albacore was reviewed at the fourth meeting of the ISC. The North Pacific Albacore Workshop reviewed the methods and results generated from length-based, age-structured stock assessments, including virtual population analysis (VPA) based on ADAPT models and preliminary, fully-integrated statistical models based on MULTIFAN-CL software. Results from the ADAPT models indicated that annual estimates of biomass over the last decade were relatively 'high' (i.e., compared with estimated biomass in the mid 1970s through the late 1980s); however, very recent population estimates suggest a 'leveling off' of the stock at large. Estimated recruitment is quite variable and suggests two oceanographic regimes: a low 'productivity' period from 1975 to 1989; and a higher 'productivity' period since that time. Based on recent and forecasted catch and recruitment levels, fishing mortality is relatively high (roughly, F 20%), either in excess of that required to produce MSY assuming a low productivity scenario or roughly at the MSY level assuming a high productivity scenario and proxy biological reference points for this species.

Stock status – Pacific bluefin tuna

A complicating factor in a 2004 Pacific bluefin stock assessment was that some of the fishery statistics are substandard. MULTIFAN-CL and ADAPT VPA assessments show similar biomass trends, though some combinations of various size weightings of the MULTIFAN-CL analysis result in different long-term trends. Biomass was high in the mid 1950s, 1979, and mid-1990s. Recruitment has fluctuated with a large pulse in 1994 and very low recruitment in 1992. Changes in biomass and spawning stock biomass have been driven by recruitment. Yield per recruit estimates from the ADAPT modeling showed recent fishing mortality (F) exceeding Fmax. The status of the stock may be characterized as: 1) biomass appears to have recovered from a record low level in the late 1980s to a more intermediate level in recent years, largely due to better than average recruitment during the 1990s; 2) the SSB has generally declined since 1995 despite good recruitment and will likely continue to decline if recent fishing mortality rates continue; 3) recent fishing mortality is greater than Fmax, which has both economic implications and is an indicator of biological concern; and 4) the high fishing mortality on young fish (ages 0–2) and older fish (ages 6+) may be cause for concern with respect to maintaining a sustainable fishery in future years. Implications of the stock status include: 1) no further increases in fishing mortality (F) for any of the fisheries taking PBF; and 2) reduce the uncertainty associated with the assessment results by undertaking improvement in the data collection, data analyses, and assessment models used.

Stock status – north Pacific swordfish

Assessments of north Pacific swordfish in 2004 included: 1) three different analyses for standardizing CPUE – generalized linear model (GLM) and habitat-based both showing declining CPUE trend, with greater decreases in NW, 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 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 northwest portion of the study area; 2) a MULTIFAN-CL assessment also detected such a decline in the northwest region of the fishery; and 3) in all MULTIFAN-CL model runs, the model showed fisheries as playing no more than a modest role in causing declines in abundance.

Table 6. Estimates of stock status in relation to overfishing and overfished reference points for WPRFMC PMUS.

Stock	Overfishing reference point	Is overfishing occurring?	Overfished reference point	Is the stock overfished?	Assessment results	Natural mortality[1]	MSST
Skipjack Tuna (WCPO)	F_{2002}/F_{MSY}=0.12	No	B_{2002}/B_{MSY}=3.1	No	Langley et al. 2003	>0.5 yr^{-1}	0.5 B_{MSY}
Yellowfin Tuna (WCPO)[2]	F_{2002}/F_{MSY}=0.63	No, probability that F_{2002}/F_{MSY} is >1 is ~15%	B_{2002}/B_{MSY}=2.46	No	Hampton et al. 2004a	0.8-1.6 yr^{-1}	0.5 B_{MSY}
Albacore Tuna (S. Pacific)	F_{2002}/F_{MSY}=0.05	No	B_{2002}/B_{MSY}=1.3	No	Labelle & Hampton 2003	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)[2]	F_{2002}/F_{MSY}=0.98	Yes, probability that F_{2002}/F_{MSY} is >1 is at least 67%	B_{2002}/B_{MSY}=1.75	No	Hampton et al. 2004b	0.4 yr^{-1}	0.6 B_{MSY}
Blue Marlin (Pacific)	F_{1997}/F_{MSY}=0.50	No	B_{1997}/B_{MSY}=1.4	No	Kleiber et al. 2002	0.2 yr^{-1}	0.8 B_{MSY}
Swordfish (N. Pacific)[3]	F_{2002}/F_{MSY}=0.33	No	B_{2002}/B_{MSY}=1.75	No	Kleiber & Yokawa 2004	0.3 yr^{-1}	0.7 B_{MSY}
Blue Shark (N. Pacific)	F_{1999}/F_{MSY}=0.01	No	B_{1999}/B_{MSY}=1.9	No	Kleiber et al. 2001	Unknown	
Other Billfishes	Unknown		Unknown			Unknown	
Other Pelagic Sharks	Unknown		Unknown			Unknown	
Other PMUS	Unknown		Unknown			Unknown	

[1] Estimates based on Boggs et. al 2000

[2] Assessment results based on statistical habitat-based standardized (SHBS) effort time-series and a SRR steepness assumption of 0.75

[3] Assssment results based on natural mortality fixed at 0.2 yr^{-1}

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Appendix 6

Marine Recreational Fisheries of the Western Pacific Region

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 2000). 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.

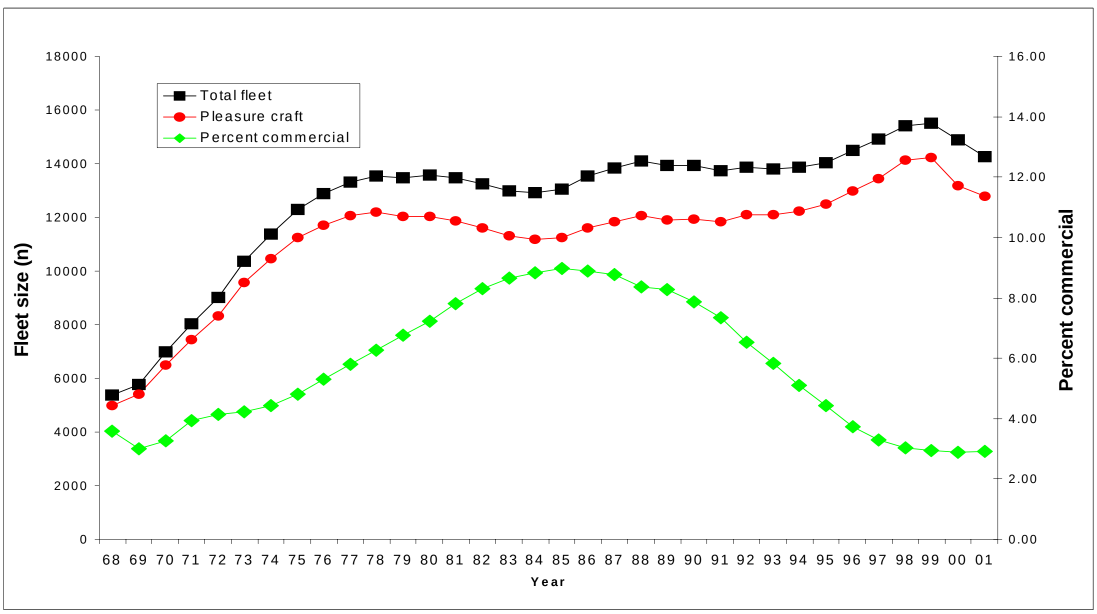

Figure 1. Annual number of small vessel fleet registrations in Hawaii. Figure shows total fleet size, and percentage of vessels being registered for commercial fishing (Source: Hawaii Division of Boating and Ocean Resources)

A major period of expansion of small vessel recreational fishing occurred between the late 1950s and early 1970s, through the introduction of fibreglass 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).

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.). These 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 spearfishing 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 (Anon 2000).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.

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).

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, ono 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. A similar exercise is conducted by the Honolulu Laboratory to generate recreational catch figures for Hawaii.

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

Location	Year	Total catch (lbs)	Unsold catch (lb)	Nominal recreational catch (lb)	Recr. catch as % of total catch	Total trips[3]	Recr. fishing trips	Recr. trips as % of total trips
American Samoa[1]	2003	57,351	10,291	7,892	13.8	597	272	45.6
Guam	2003	677,000	365,163	330,307	48.8	13,290	10,328	77.7
Hawaii[2]	2003	42,300,194	NA	18,938,550		509,417	378,729	93.1
NMI	2003	418,722	39,162	38,057	9.1	1,078	340	31.5

1.Small boat troll and bottomfish catch. Total commercial catch for American Samoa in 2003 was 11.2 million lbs
2.Hawaii recreational catch from Hawaii Marine Recreational Fisheries Survey. Recreational fishing trips as a percent of total trips based on Hamilton & Huffman 1997
3. Boat based fishing only

Charter vessel sportsfishing

Tables 2-6 present summaries of the charter vessel sportsfishing in the Western Pacific. Most charter fishing in Hawaii is focused on catching blue marlin, which in 2002 formed about 50 % of the total annual charter vessel catch by weight (Table 3). Although commercial troll vessels also take blue marlin, these only form about a quarter of their catch, with the majority of the target species being yellowfin, mahimahi, aku and ono (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 11% of the troll catch and 25 and 20% of the Guam blue marlin and mahi mahi catch respectively. (See Guam module in this volume). The Guam bottomfish charter fishery has continued to increase despite the drop in tourist volume from Japan, and accounts for about 10% of Guam's bottomfish fishing effort. The primary catch of the bottomfish charter fishery are goatfish and triggerfish, which are mostly released.

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 sportfishing 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 2003

Location	Catch (lb)	Effort (trips)	Species
Guam	56,026	1,368	blue marlin, skipjack, mahimahi, wahoo
Hawaii	380,740	6,852	mahimahi, yellowfin, wahoo, blue marlin
Northern Mariana Is	11,690	297	mahimahi, yellowfin, skipjack, wahoo

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 patrons 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 cath 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, 2003

Species	Charter vessels		Commercial trollers	
	Landings (lb)	Percent	Landings (lb)	Percent
Blue marlin	129,677	34.06	183,834	11.57
Yellowfin tuna	82,822	21.75	412,356	25.95
Mahimahi	47,788	12.55	348,974	21.96
Wahoo	37,324	9.80	379,800	23.90
Skipjack tuna	18,017	4.73	161,283	10.15
Short-nose spearfish	16,661	4.38	10,904	0.69
Striped marlin	13,927	3.66	26,031	1.64
Others	34,526	9.07	65,720	4.14
Total	380,740	100.00	1,588,902	100.00

Table 4. Comparison of species composition of landings made by Guam pelagic charter vessels versus commercial troll vessels, 2003

Species	Charter vessels		Commercial trollers	
	Landings (lb)	Percent	Landings (lb)	Percent
Skipjack tuna	15,112	26.97	167,614	37.22
Blue marlin	13,097	23.38	52,961	11.76
Wahoo	10,575	19.20	52,528	11.67
Mahimahi	9,963	17.78	73,767	16.38
Yellowfin tuna	3,055	5.45	64,635	14.35
Others	4,042	7.21	38,779	8.61
Total Pelagics	56,026	100.00	450,284	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 2001, charter vessel catches on the island of Hawaii accounted for over half of the total charter vessel landings within the state, with Maui and Oahu charter vessels forming most of the remaining catch. The islands of Kauai and Molokai make minor contributions to the charter vessel catch, with no charter fishing on Lanai.

Table 5. Charter vessel catches in Hawaii by island, 2003

Island	Catch (lb)	Percent	Trips	Percent	CPUE (lb/trip)
Hawaii	220,262	57.85	4,214	61.50	52.27
Oahu	37,239	9.78	533	7.78	68.87
Maui County	48,626	12.77	1,383	20.18	35.16
Kauai	74,613	19.60	722	10.54	103.34
Molokai*					
Lanai*					
Total	380,740	100.00	6,852	100.00	55.57

* DAR confidentiality protocols prevent reporting 2002 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 two thirds of the charter vessel catch comprises blue marlin (Table 6). Elsewhere, mahimahi dominate charter vessel landings, with blue marlin comprising between 2% and 30% of catches. Other important species in the charter vessel catches, depending on location, comprise yellowfin, wahoo, spearfish and skipjack.

Table 6. Composition of charter vessel catches in the Main Hawaiian Islands, 2003

Hawaii Species	Landings (lb)	Percent	**Kauai** Species	Landings (lb)	Percent
Blue marlin	102,234	46.41	Yellowfin tuna	11,692	31.40
Yellowfin tuna	55,947	25.40	Ono	7,335	19.70
Ono	20,033	9.10	Mahimahi	6,253	16.79
Mahimahi	16,677	7.57	Aku	5,895	15.83
Striped marlin	9,331	4.24	Blue marlin	3,505	9.41
Others	16,042	7.28	Others	2559	6.87
Total	220,262	100.00	Total	37,239	100.00
Oahu			**Maui County**		
Species	Landings (lb)	Percent	Species	Landings (lb)	Percent
Mahimahi	26,153	35.05	Mahimahi	17,532	36.05
Yellowfin tuna	14,332	19.21	Blue marlin	10,603	21.81
Blue marlin	13,335	17.87	Ono	8,391	17.26
Ono	7,326	9.82	Striped marlin	3,807	7.83
Striped marlin	6,438	8.63	Short-nose spearfish	1,926	3.96
Others	7029	9.42	Others	6367.5	13.09
Total	74,613	100.00	Total	48,626	100.00

Recreational Fishing Data Collection in Hawaii

The Hawaii Marine Recreational Fishing Survey Project

Mike Nelson (HDAR) and Maury Osborn, (NMFS Office of Science and Technology) assisted by Walter Ikehara (HDAR), developed a cooperative agreement with NMFS to initiate the Hawaii Marine Recreational Fishing Survey (HMRFS) in 2001. 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 their national contractor beginning in January 2001. The HMRFS project commenced in July 2001, with Walter Ikehara as the HDAR coordinator and Mike Nelson as survey manager. Four surveyors were hired in the first year (July 2001 - June 2002) and began surveys of private boat and charter boat fishermen in late 2001. In December 2002 Dr. Matthew Parry took over as the HMRFS survey manager. The HMRFS continued to expand its efforts in 2003 and 2004 and now consists of 11 surveyors (3 on Oahu, 2 on Maui, and 3 on Hawaii, 2 on Kauai, and 1 on Molokai) and 1 data worker. The HMRFS expanded in 2004 to surveying Kauai and Molokai.

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. For more information on the MRFSS program and survey methods, please go to the MRFSS web site (http://www.st.nmfs.gov/st1/recreational/).

MRFSS weight estimates are calculated by multiplying the estimated number harvested in a cell (year/wave/state/mode/area/species) by the mean weight of the measured fish in that cell. Sometimes we have an estimate of harvest but no mean weight, either because

- the harvest is all reported by the anglers (B1), or
- because for some reason the interviewers couldn't weigh any fish (fish too big, already

gutted and gilled, etc.).

If a cell is missing a mean weight OR the variance of the mean weight = 0 (e.g. only 2 weights & they are same), and if we have at least two fish measured in the state (all fishing areas and modes combined),

- We substitute the mean for the whole state for that wave.
- We need two measured fish to get a variance estimate.

After state substitution, if the mean weight is still missing,

- We use the mean from the whole subregion for that wave.
- The "two fish rule" still applies.
- Hawaii is only state in subregion, hence if state pooling results in missing mean weight then we give up (as below) and leave a missing weight estimate.

After subregional substitution, if the mean weight is STILL missing, we give up and leave a missing weight estimate. At that point,

- It is up to the user to determine whether to substitute, and
- What substitution is most appropriate to use (a mean from the preceding and following waves, the whole year, same wave over years, whole Atlantic & Gulf coast, some complicated regression model, whatever).
- We don't make those decisions because the information needs and sensitivity of the data vary among species.

The phenomenon of missing weights is more widespread with rarely caught species and with large fish (i.e. tunas). The existence and/or extent of missing weights for your query can be examined by requesting data at the cell level: (by year/wave/state/by mode/by area/by species (time series)).

Results

A synopsis of the results of the HMRFS project for the year 2003 is shown in Tables 7 and 8 and Figures 2 - 6, which also show the 2002 data points. The total recreational catch for Hawaii was estimated to be 18,938,550 lbs, of which about 96% in terms of weight was caught from boats (Table 1). In terms of numbers of fish, about 80% of the catch came from boat-based recreational fishing, with 20% from shore line fishing Interestingly, in 2003 pelagics comprise the largest volume of fish landed by weight by shoreline fishing. Most of this volume of shoreline pelagic catch was mahimahi. Pelagic fish are caught from shore in Hawaii, particularly in locations where there is a steep drop-off. The HMRFS project also gives some insights into the volume of bycatch in recreational fishing. Live discards from pelagic fishing are small ranging from zero for shore-based fishing to one percent for boat based fishing. The discard rate for pelagic fish taken from boats was quite high in 2003, amounting to about 41% of all fish caught. By contrast, relatively little (about 4%) of the other species catch from boat-based fishing was discarded, with an overall discard rate of about 18%. The discard rate for shore based fishing was much higher, with about

45% of pelagic fish and 62% of other species being discarded.

The contributions by the six major pelagic fishes caught by boat-based recreational fishing are shown in Figures 2 and 3. Skipjack was the most commonly caught pelagic taken by recreational fishermen in terms of numbers in 2002 and dominated catches in 2003. Other important components of the boat based recreational catch in 2003 were yellowfin tuna, wahoo and mahimahi. Skipjack made a more modest contribution to the recreational boat catch by weight in 2003 with yellowfin tuna dominating catches. As might be expected the yellowfin CPUE was considerably higher in 2003 compared with 2002 (Figure 6). The CPUEs of wahoo, skipjack and mahi were all higher in 2002 compared with 2003. By contrast blue marlin and striped marlin CPUEs were lower in 2003 compared to the previous year. Recreational fishing activity in 2002 ranged from between 55,000 to 133,000 recreational trips per two month period (Figure 5), with a peaks in fishing activity between May and August, and between November to December.

Table 7. Hawaii recreational catch in weight from boat-based and shoreline fishing, 2003

Fish	Catch (lb)	
	Boat fishing	**Shoreline fishing**
Pelagics	17,199,469	515,371
Other species	1,013,591	210,119
Total	18,213,060	725,490

Table 8. Hawaii recreational catch and live discards by number, 2003

	Boat			Shoreline		
	Catch	**Discards[1]**	**%**	**Catch**	**Discards[1]**	**%**
Pelagics	831,284	341,264	41.1	34,344	15,369	44.7
Other species	1,397,031	57,335	4.1	883,700	551,385	62.3
Total	2,228,315	398,599	17.9	918,044	556,754	60.6

1. Discard category may include fishes that are filleted and identified by fishermen

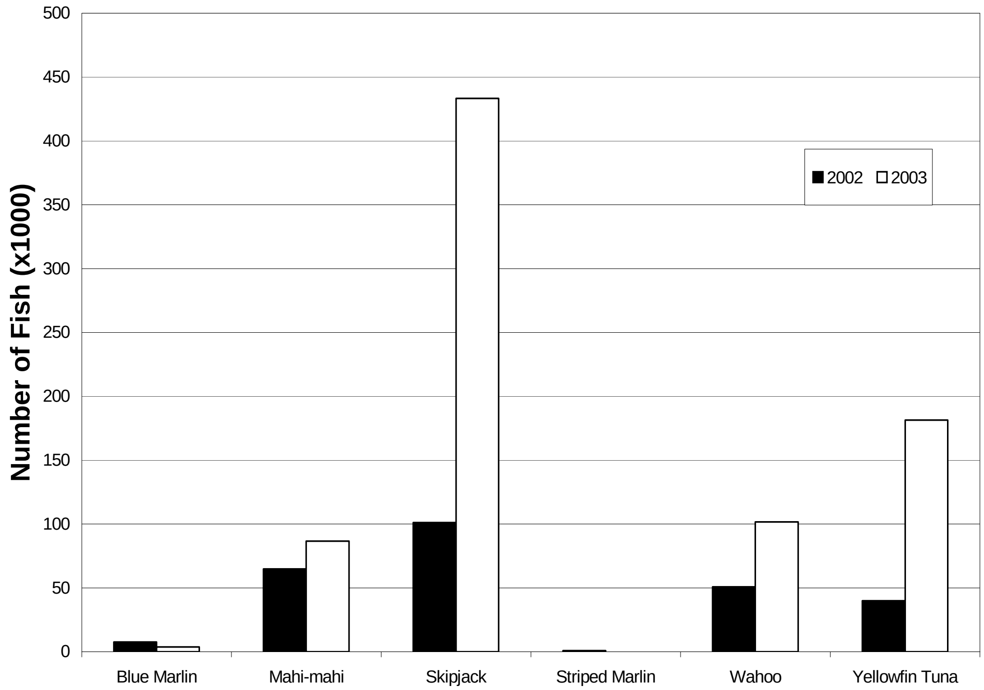

Figure 2. Estimated recreational private boat catch of PMUS by number, 2002 & 2003.

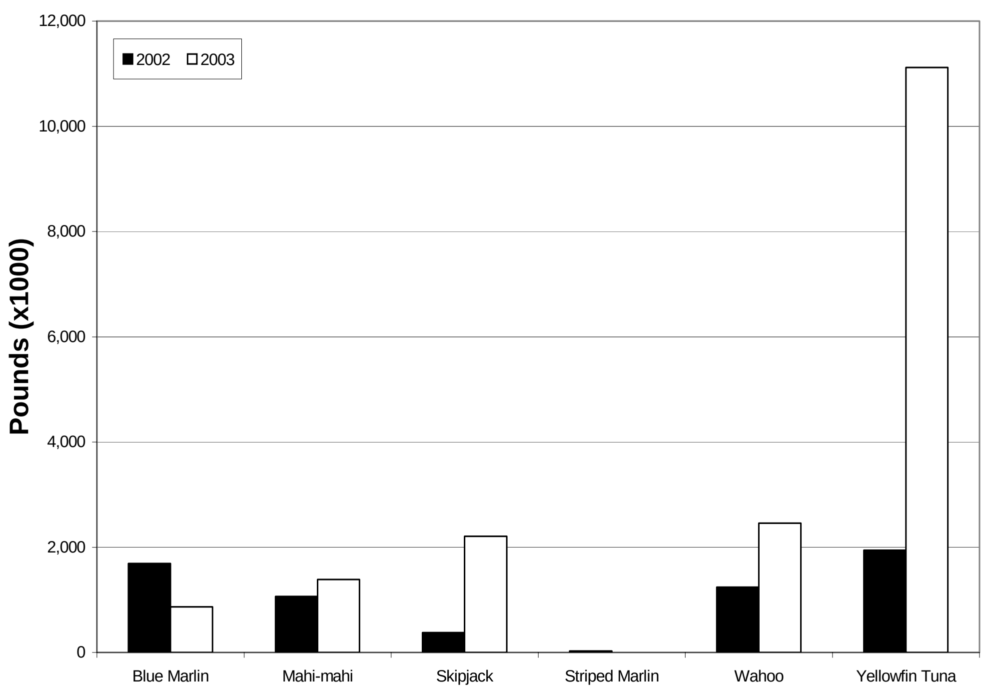

Figure 3. Estimated recreational private boat catch of PMUS by weight, 2002 & 2003.

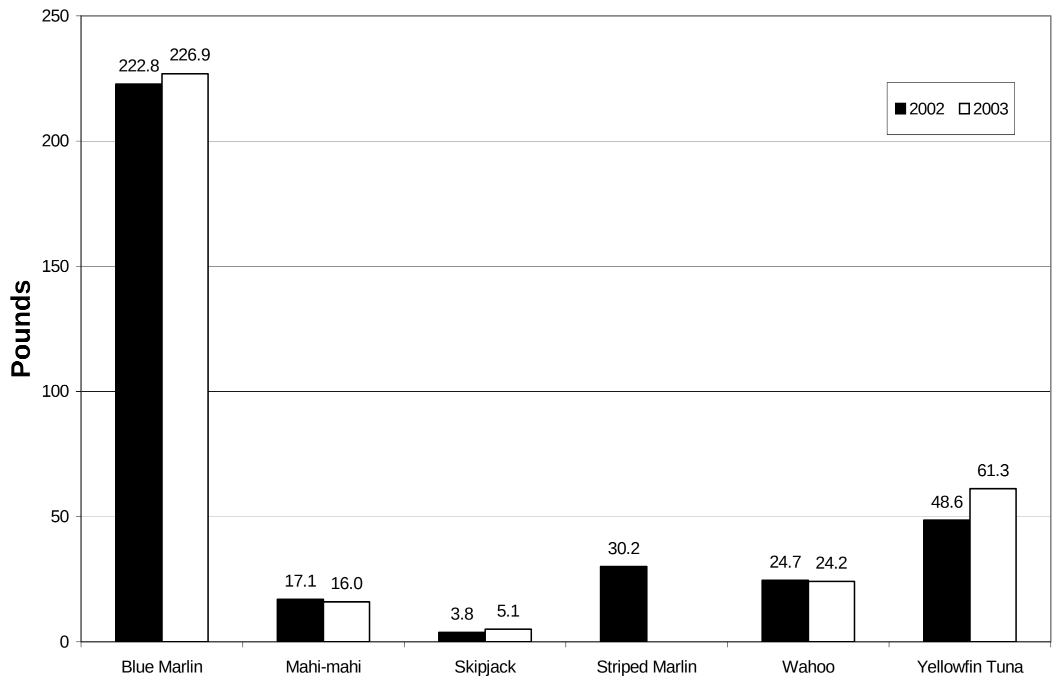

Figure 4. Average weight of PMUS catch taken by recreational private boats, 2002 & 2003.

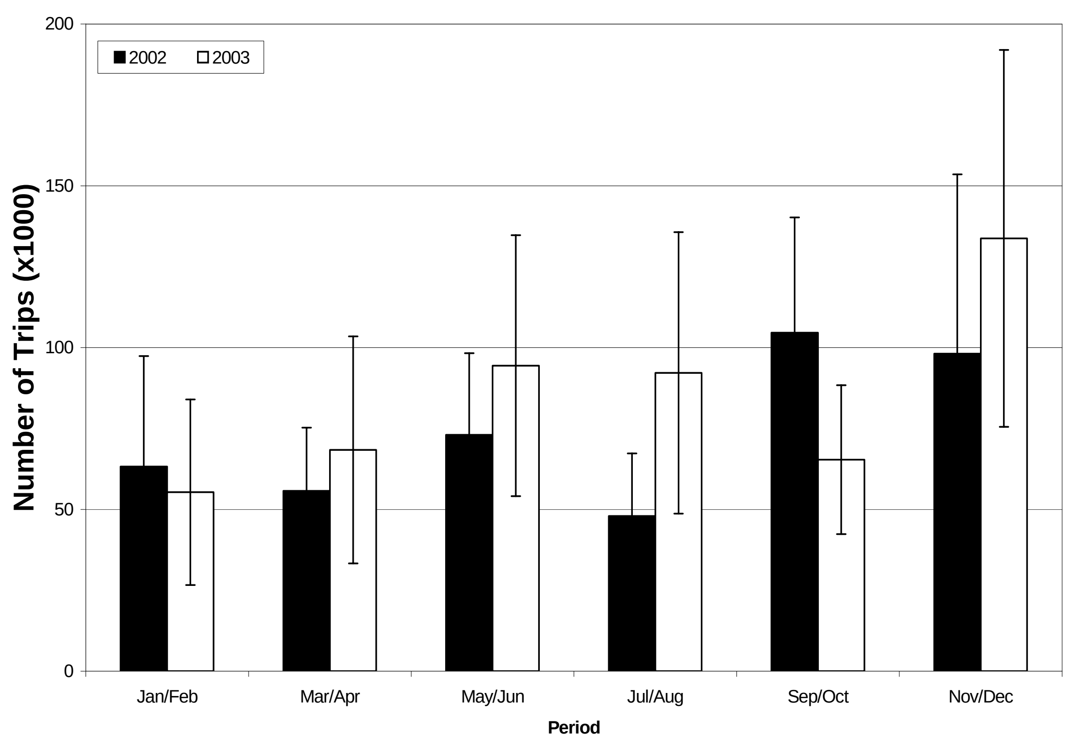

Figure 5. Recreational boat trips for all waters within EEZ boundary

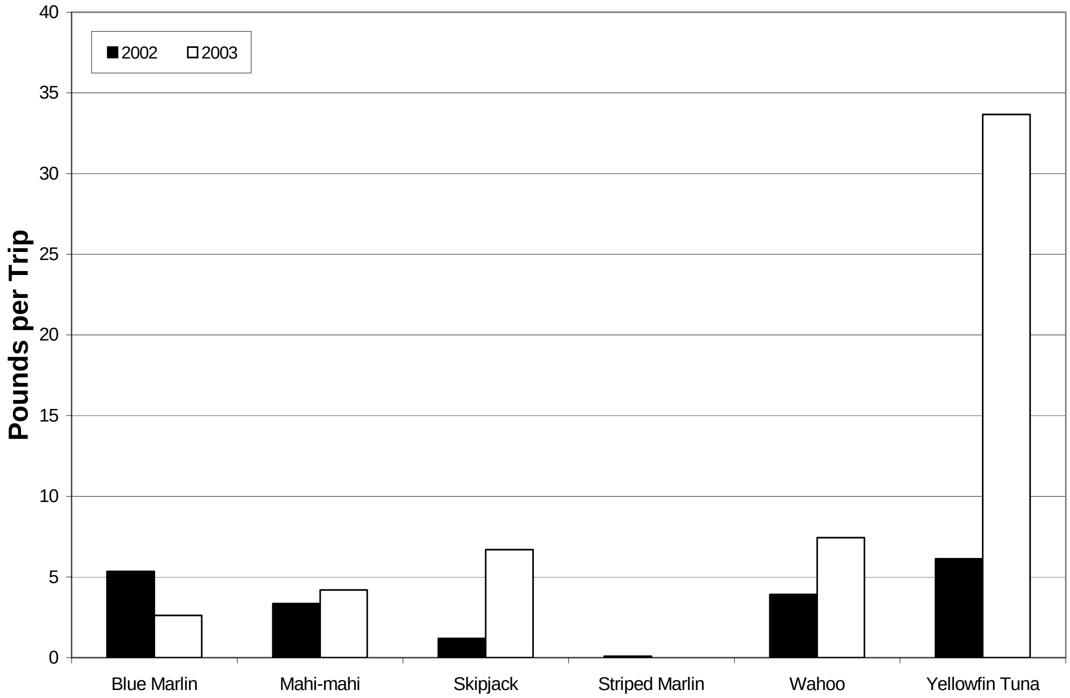

Figure 6. CPUE for PMUS in waters between 3 miles offshore and EEZ boundary

The NMFS/Council Pelagic Fisheries Research Program Recreational Fisheries Meta Data Project

The Recreational Meta Data Project was initiated to document and compile into database formats sources of Hawaii's pelagic recreational and sports fishing information from the past 50 years. Recreational fishery data has not been routinely collected in the State of Hawaii over the past 50 years, although there are several sources of information including previous recreational and small fishing boat surveys, boating registration data, angling club records, fishing tournament records, newspapers, and fishermen logbooks. Much of the existing literature is unpublished or "gray literature", and difficult for fishery scientists and researchers to obtain. This project has collected over 80 papers and reports and incorporated them as part of the database files. Further, the data tabulated therein has been re-entered into spreadsheet files so as to make them available to other researchers.

The project has also received information on 27 different fishing tournaments from 7 different angling and boat clubs and expects to obtain information covering an additional four more tournaments. Several of these tournaments are well documented and the project has amassed annual information covering over 40 years of catch and effort in Hawaiian waters. The number of boats participating in different tournaments has ranged from 6 to 260 boats. The majority of tournament catch is caught by fishing in association with Fish Aggregating Devices (FADs), which may provide valuable feedback to the Hawaii Division of Aquatic Resources (HDAR) in monitoring the success of its FAD deployment program, Pervious attempts by HDAR to monitor FAD performance through voluntary recreational fishery reporting have been unsuccessful.

Information on effort, catch, and tournament totals reflect the unique nature of each tournament's reporting procedures. Most tournaments do not differentiate between bigeye tuna (*Thunnus obesus)* and yellowfin tuna (*T. albacares*) and these species are listed simply as "ahi". Marlin reports can also be comprised of one or more billfish species, and skipjack tuna *(Katsuwonus pelamis*) may or may not be included in the radio logs and weigh in slips. The potential for constructing weight frequency charts from tournament radio logs to monitor size trends in tournament catches was investigated, but was confounded by the practice of rounding estimated weights in conjunction with species identification problems. Despite these limitations, this information does provide insight into hook up rates, catch composition, and average weight of catch. Time series catch rate data from a single tournament are also useful in elucidating cyclical peaks in species catch abundance. Although catching a thousand pound marlin continues to be a major goal of most tournament participants, catches of mahimahi (*Coryphaena hippurus*) and ahi are the mainstay of the tournament catches in Hawaii.

The project terminated in 2004 and the following two reports are currently in preparation:

1. Pelagic fishing tournaments, clubs and organizations throughout the State of Hawaii, 2003.

2. Recreational metadata: using tournament data to describe a poorly documented pelagic fishery.

Both reports will be published in the University of Hawaii's School of Oceanography and Earth Science and Technology (SOEST) technical report series in 2005.

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Appendix 7

Pelagic fisheries production from the Pacific West Coast States

Introduction

The following tables include time series for pelagic fisheries production along the US West Coast between the early 1980s to 2003. The 1997 annual report discusses these trends in some detail and these explanations remain current.

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
1983	9,574	55,741	44,995	21	764	1,758	1,331	9	96	217	7
1984	12,657	35,063	31,251	126	635	2,890	1,279	9	57	160	2
1985	7,301	15,025	2,977	7	3,254	3,418	1,190	<.05	95	149	1
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

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
1983	19,142,864	92,971,187	57,729,430	72,202	1,670,878	10,729,636	2,301,209	13,282	142,526	360,974	7,201
1984	26,146,708	56,409,588	37,467,700	264,792	1,395,492	17,701,329	2,485,275	11,649	71,349	287,733	3,572
1985	12,214,354	18,206,638	2,826,414	25,900	4,127,982	19,538,942	2,660,903	843	140,433	283,043	3,319
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

[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, 1982-2003

Year	Albacore	Yellowfin	Skipjack	Bigeye	Bluefin	Swordfish	Common Thresher	Pelagic Thresher	Bigeye Thresher	Shortfin Mako	Blue Shark
	Landings (mt)										
Washington											
1983	530	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	<.05
1984	67	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	<.05
1985	172	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	<.05
1986	845	N.A.	0	N.A.	0	0	82	N.A.	N.A.	N.A.	<.05
1987	529	N.A.	0	N.A.	0	0	65	N.A.	N.A.	N.A.	<.05
1988	1,900	N.A.	0	N.A.	0	2	6	N.A.	N.A.	N.A.	<.05
1989	855	N.A.	0	N.A.	0	0	3	N.A.	N.A.	N.A.	0
1990	1,225	N.A.	0	N.A.	0	0	<.05	N.A.	N.A.	N.A.	0
1991	428	N.A.	<.05	N.A.	0	0	<.05	N.A.	N.A.	N.A.	<.05
1992	1,864	N.A.	<.05	N.A.	0	0	1	N.A.	N.A.	N.A.	<.05
1993	2,167	N.A.	0	N.A.	0	1	<.05	N.A.	N.A.	N.A.	<.05
1994	5,377	N.A.	0	N.A.	0	0	<.05	N.A.	N.A.	N.A.	0
1995	3,413	N.A.	0	N.A.	0	<.05	5	N.A.	N.A.	N.A.	<.05
1996	4,969	N.A.	0	N.A.	0	0	4	N.A.	N.A.	N.A.	<.05
1997	3,775	N.A.	0	N.A.	0	0	2	N.A.	N.A.	N.A.	<.05
1998	6,517	N.A.	0	N.A.	0	0	6	N.A.	N.A.	N.A.	<.05
1999	2,074	N.A.	0	N.A.	12	4	65	N.A.	N.A.	N.A.	0
2000	3,185	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	<0.5
2001	4,152	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	0
2002	5,358	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	0
2003	0	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	0
Oregon											
1983	1,541	<.05	<.05	N.A.	0	0	0	N.A.	N.A.	0	0
1984	737	<.05	0	N.A.	0	0	0	N.A.	N.A.	0	0
1985	692	0	0	N.A.	0	0	2	N.A.	N.A.	0	0
1986	1,116	<.05	<.05	N.A.	0	0	424	N.A.	N.A.	0	0
1987	1,038	0	0	N.A.	<.05	0	92	N.A.	N.A.	0	0
1988	1,799	0	0	N.A.	0	0	81	N.A.	N.A.	0	0
1989	490	0	0	N.A.	0	0	<.05	N.A.	N.A.	0	0
1990	943	0	0	N.A.	0	0	<.05	N.A.	N.A.	0	<.05
1991	571	0	0	N.A.	0	0	0	N.A.	N.A.	0	<.05
1992	1,764	0	0	N.A.	0	0	1	N.A.	N.A.	0	<.05
1993	2,157	0	0	N.A.	0	0	<.05	N.A.	N.A.	0	<.05
1994	2,131	0	0	N.A.	0	0	0	N.A.	N.A.	0	<.05
1995	2,283	<.05	<.05	N.A.	<.05	3	1	N.A.	N.A.	0	<.05
1996	4,059	<.05	0	N.A.	<.05	16	<.05	N.A.	N.A.	0	1
1997	4,158	<.05	<.05	N.A.	1	6	<.05	N.A.	N.A.	0	<.05
1998	4,808	0	0	N.A.	3	35	<.05	N.A.	N.A.	1	2
1999	2,064	<.05	0	N.A.	6	6	1	N.A.	N.A.	<.05	<.05
2000	3,972	0	0	N.A.	0	0	0	N.A.	N.A.	0	1
2001	4,058	0	0	N.A.	0	0	0	N.A.	N.A.	0	2
2002	1,979	0	0	N.A.	0	0	0	N.A.	N.A.	0	<0.5
2003	4,139	0	0	N.A.	0	0	0	N.A.	N.A.	0	<1
California											
1983	7,503	55,740	44,995	21	764	1,758	1,331	9	96	217	7
1984	11,854	35,063	31,251	126	635	2,890	1,279	9	57	160	2
1985	6,437	15,025	2,977	7	3,254	3,418	1,188	<.05	95	149	1
1986	3,282	21,517	1,361	29	4,731	2,530	468	<.05	48	312	2
1987	1,592	23,201	5,724	50	823	1,803	405	2	20	403	2
1988	1,209	19,520	8,863	6	804	1,634	414	1	9	322	3
1989	870	17,615	4,505	1	1,019	1,357	501	<.05	17	255	6
1990	862	8,509	2,256	2	925	1,236	356	1	31	373	20
1991	677	4,178	3,407	7	104	1,029	584	0	32	219	1
1992	1,257	3,350	2,586	7	1,087	1,546	291	<.05	22	142	1
1993	1,827	3,795	4,539	26	559	1,770	275	1	44	122	<.05
1994	3,177	5,056	2,111	47	916	1,700	330	<.05	37	128	12
1995	832	3,038	7,037	49	714	1,159	264	5	31	95	5
1996	5,146	3,347	5,455	62	4,687	1,175	316	1	20	96	<.05
1997	3,358	4,774	6,070	82	2,250	1,442	317	35	32	132	<.05
1998	2,459	5,799	5,846	53	1,946	1,343	319	2	11	97	1
1999	5,491	1,353	3,759	105	161	1,982	253	10	5	62	<.05
2000	1,884	1,148	780	87	312	2,612	250	3	5	80	<0.5
2001	2,972	642	57	53	196	2,194	360	2	2	46	0
2002	2,692	544	236	10	9.7	1,697	315	N.A.	N.A.	82	41
2003	1,711	465	349	35	36	2,126	294	4	5	68	0

Table 4. Pacific coast real commercial ex-vessel revenues (1999)[1] from highly migratory species by state, 1982-2003

	Revenues ($)										
Year	**Albacore**	**Yellowfin**	**Skipjack**	**Bigeye**	**Bluefin**	**Swordfish**	**Common Thresher**	**Pelagic Thresher**	**Bigeye Thresher**	**Shortfin Mako**	**Blue Shark**
Washington											
1983	1,002,286	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	201
1984	137,861	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	11
1985	292,000	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	183
1986	1,348,513	N.A.	0	N.A.	0	0	303,270	N.A.	N.A.	N.A.	170
1987	1,160,514	N.A.	0	N.A.	0	0	298,466	N.A.	N.A.	N.A.	580
1988	4,666,429	N.A.	0	N.A.	0	13,526	31,385	N.A.	N.A.	N.A.	65
1989	1,730,680	N.A.	0	N.A.	0	0	10,541	N.A.	N.A.	N.A.	0
1990	2,693,806	N.A.	0	N.A.	0	0	33	N.A.	N.A.	N.A.	0
1991	818,179	N.A.	17	N.A.	0	0	287	N.A.	N.A.	N.A.	52
1992	5,014,569	N.A.	82	N.A.	0	0	655	N.A.	N.A.	N.A.	39
1993	4,603,209	N.A.	0	N.A.	0	5,907	953	N.A.	N.A.	N.A.	34
1994	10,609,267	N.A.	0	N.A.	0	0	102	N.A.	N.A.	N.A.	0
1995	6,429,656	N.A.	0	N.A.	0	328	16,541	N.A.	N.A.	N.A.	16
1996	9,515,982	N.A.	0	N.A.	0	0	11,619	N.A.	N.A.	N.A.	44
1997	7,000,641	N.A.	0	N.A.	0	0	10,922	N.A.	N.A.	N.A.	10
1998	8,962,842	N.A.	0	N.A.	0	0	19,243	N.A.	N.A.	N.A.	71
1999	3,637,282	N.A.	0	N.A.	27,772	9,445	144,232	N.A.	N.A.	N.A.	0
2000	5,837,871	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	9
2001	7,951,774	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	0
2002	7,441,030	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	0
2003	0	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	0
Oregon											
1983	2,961,338	118	13	N.A.	0	0	0	N.A.	N.A.	0	0
1984	1,367,247	277	0	N.A.	0	0	0	N.A.	N.A.	0	0
1985	1,204,367	0	0	N.A.	0	0	3,064	N.A.	N.A.	0	0
1986	1,891,052	173	4	N.A.	0	0	874,406	N.A.	N.A.	0	0
1987	2,319,249	0	0	N.A.	9	0	214,998	N.A.	N.A.	0	0
1988	4,444,898	0	0	N.A.	0	0	180,477	N.A.	N.A.	0	0
1989	1,142,060	0	0	N.A.	0	0	19	N.A.	N.A.	0	0
1990	2,167,028	0	0	N.A.	0	0	664	N.A.	N.A.	0	69
1991	1,166,314	0	0	N.A.	0	0	0	N.A.	N.A.	0	73
1992	4,554,091	0	0	N.A.	0	0	1,228	N.A.	N.A.	0	99
1993	4,350,334	0	0	N.A.	0	0	498	N.A.	N.A.	0	130
1994	4,103,617	0	0	N.A.	0	0	0	N.A.	N.A.	0	93
1995	4,332,302	336	9	N.A.	454	25,141	1,681	N.A.	N.A.	0	192
1996	7,801,152	9	0	N.A.	1,203	125,422	234	N.A.	N.A.	0	438
1997	7,567,729	536	424	N.A.	3,332	51,790	199	N.A.	N.A.	0	209
1998	6,665,217	0	0	N.A.	15,783	263,820	114	N.A.	N.A.	2,726	5,628
1999	3,782,057	198	0	N.A.	38,117	46,955	2,588	N.A.	N.A.	787	48
2000	7,487,569	0	0	N.A.	0	0	1,190	N.A.	N.A.	0	529
2001	7,544,089	0	0	N.A.	0	0	0	N.A.	N.A.	0	1,211
2002	2,951,707	0	0	N.A.	0	0	0	N.A.	N.A.	0	244
2003	6,125,406	0	0	N.A.	0	0	0	N.A.	N.A.	0	677
California											
1983	15,179,240	92,971,069	57,729,417	72,202	1,670,878	10,729,636	2,301,209	13,282	142,526	360,974	7,001
1984	24,641,599	56,409,311	37,467,700	264,792	1,395,492	17,701,329	2,485,275	11,649	71,349	287,733	3,561
1985	10,717,987	18,206,638	2,826,414	25,900	4,127,982	19,538,942	2,657,839	843	140,433	283,043	3,136
1986	5,656,107	25,475,116	1,367,383	129,108	6,618,473	18,256,026	1,234,483	277	95,181	611,399	1,716
1987	3,606,229	33,183,108	5,982,568	244,701	2,902,331	15,405,478	1,125,308	2,560	30,721	989,632	1,986
1988	3,168,789	34,161,742	12,618,821	33,772	4,445,064	12,994,405	1,099,073	1,097	13,328	868,676	2,858
1989	2,000,622	24,112,994	5,086,365	3,004	1,684,134	10,579,050	1,192,430	191	31,313	707,408	4,631
1990	2,050,187	10,485,225	2,361,619	10,928	1,433,788	8,811,042	785,836	2,067	42,599	909,368	15,765
1991	1,365,494	4,721,908	3,130,632	50,650	137,612	7,497,271	1,144,714	0	28,944	491,477	767
1992	3,645,713	4,412,452	1,606,481	51,444	1,360,230	8,709,765	520,038	693	17,108	266,344	1,918
1993	4,048,179	6,440,417	3,498,178	238,527	841,129	10,056,643	518,669	509	32,498	248,651	517
1994	7,580,459	4,947,988	1,916,462	336,130	1,834,094	10,504,630	632,452	46	37,579	270,088	17,479
1995	1,615,269	3,260,593	5,125,378	268,465	1,128,552	6,987,810	492,511	9,389	26,730	177,076	2,785
1996	11,265,909	3,388,527	4,185,411	273,321	4,237,475	6,238,375	622,640	1,635	18,591	174,621	135
1997	5,961,123	5,253,506	5,639,039	370,331	2,893,118	6,245,568	598,164	64,543	35,781	232,737	67
1998	3,440,213	5,976,102	5,322,183	277,238	3,042,986	5,788,972	555,437	2,635	9,513	170,623	395
1999	10,102,663	1,468,544	2,748,208	639,668	895,534	8,253,140	469,587	18,424	5,876	108,980	35
2000	3,829,200	1,294,388	483,242	579,384	576,439	11,770,080	485,073	2,736	4,636	136,698	294
2001	5,191,333	445,861	32,878	320,753	472,785	8,695,855	584,636	2,767	8,428	75,572	0
2002	3,899,203	588,677	128,245	87,304	33,148	6,320,439	517,427	N.A.	N.A.	124,522	18,351
2003	2,600,649	450,925	159,961	262,768	73,863	7,796,022	475,014	2,907	3,463	113,502	0

Appendix 8

NMFS Pacific Island Fisheries Science Center 2003 Publications

In April 2003, NMFS created a new region, the Pacific Islands Region. This new region created a Regional Office and a Regional Science Center. The Honolulu Laboratory was then changed to the new Pacific Islands Fisheries Science Center (PIFSC).

At the Pacific Island Fisheries Science Center (PIFSC), scientists assess and investigate the dynamics of various tuna and billfish species in the central Pacific Ocean as well as Pacific island resources such as bottomfish, lobster, deep sea shrimp, and other fishery resources associated with deep-sea seamounts. This work contributes to basic fisheries science and supports the Western Pacific Regional Fishery Management Council. PIFSC scientists conduct research and recovery work on the threatened green sea turtle and the endangered Hawaiian monk seal and increasingly have focused on issues concerning fisher-protected species interactions. Staff scientists study the effects of environmental changes and human activities on fisheries and marine animal habitats and ecosystems and there is a new research emphasis oriented towards coral reef ecosystems.

This research collectively supports two primary goals of NMFS: to build sustainable fisheries and to recover protected species. These goals support the Magnuson-Stevens Fishery Conservation and Management Act, the Marine Mammal Protection Act, and the Endangered Species Act. Geographic areas of study are wide ranging, from the mid-Pacific pelagic oceanic environment, to the Northwestern Hawaiian Islands and the main Hawaiian Islands, to other central and western Pacific islands, including American Samoa, Guam, and the Northern Mariana Islands. Key programs include ecosystem and environment, stock assessment, fish biology and ecology, fishery management and performance, and protected species.

The following list of publications (both formal and informal) summarizes the basic science and statistics work pertaining to pelagic fisheries and related issues conducted by the Honolulu Laboratory over the past year, and as it became the Pacific Island Fisheries Science Center. The publications listed for 2003 are separated as coming from the SWFSC/Honolulu Laboratory (pre-April 2003) and PIFSC (after April 2003).

Recent publications (from 2003)

SOUTHWEST FISHERIES SCIENCE CENTER HONOLULU LABORATORY

Publications

Baker, J. D., and T. C. Johanos.
2003. Abundance of the Hawaiian monk seal in the main Hawaiian Islands. Biol. Conserv. 116:103-110.

Bidigare, R. R., C. Benitez-Nelson, C. L. Leonard, P. D. Quay, M. L. Parsons, D. G. Foley, and M. P. Seki.
2003. Influence of a cyclonic eddy on microheterotroph biomass and carbon export in the lee of Hawaii. Geophysical Research Letters, Vol. 30, No. 6.

DeMartini, E. E., G. T. DiNardo, and H. A. Williams.
2003. Temporal changes in population density, fecundity, and egg size of the Hawaiian spiny lobster (*Panulirus marginatus*) at Necker Bank, Northwestern Hawaiian Islands. Fish. Bull. 101:22-31.

DeMartini, E. E., F. A. Parrish, and R. C. Boland.
2002. Comprehensive evaluation of shallow reef fish populations at French Frigate Shoals and Midway Atoll, Northwestern Hawaiian Islands (1992/93, 1995-2000). U.S. Dep. Commer., NOAA Tech. Memo. NOAA-TM-NMFS-SWFSC-347, 68 p.

Kleiber, P., M. G. Hinton, and Y. Uozumi.
2003. Stock assessment of blue marlin (*Makaira nigricans*) in the Pacific using MULTIFAN-CL. Marine and Freshwater Research 54:349-360.

Musyl, M. K., R. W. Brill, C. H. Boggs, D. S. Curran, T. K. Kazama, and M. P. Seki.
2003. Vertical movements of bigeye tuna (*Thunnus obesus*) associated with islands, buoys, and seamounts near the main Hawaiian Islands from archival tagging data. Fish. Oceanogr. 12:3, 152-169.

Olson, K. R., H. Dewar, J. B. Graham, and R. W. Brill.
2003. Vascular anatomy of the gills in a high energy demand teleost, the skipjack tuna (*Katsuwonus pelamis*). J. Exp. Zool. 297A:17-31.

O'Malley, J. M., and S. G. Pooley
2002. Economic and operational characteristics of the Hawaii-based longline fleet in 2000. SOEST (University of Hawaii) Report 03-348.

Polovina, J. J., E. Howell, D. M. Parker, and G. H. Balazs.
2003. Dive-depth distribution of loggerhead (*Carretta carretta)* and olive ridley (*Lepidochelys olivacea)* sea turtles in the central North Pacific: Might deep longline sets catch fewer turtles? Fish. Bull. 101(1):189-193.

Russell, D. J., G. H. Balazs, R. C. Phillips, and A. K. H. Kam.
2003. Discovery of the sea grass *Halophila decipiens* (Hydrocharitaceae) in the diet of the Hawaiian green turtle, *Chelonia mydas*. Pac. Sci. 57(4):393-397.

Sibert, J. R., M. K. Musyl, and R. W. Brill.
2003. Horizontal movements of bigeye tuna (*Thunnus obesus*) near Hawaii determined by Kalman filter analysis of archival tagging data. Fish. Oceanogr. 12:3, 141-151.

Vaillancourt, R. D., J. Marra, M. P. Seki, M. L. Parsons, and R. R. Bidigare.
2003. Impact of a cyclonic eddy on phytoplankton community structure and photosynthetic competency in the subtropical North Pacific Ocean. Deep-Sea Research Part I 50:829-847.

Vroom, P. S., and C. M. Smith.
2003. Life without cells. Biologist 50:222-226.

Work, T. M., G. H. Balazs, M. Wolcott, R. Morris.
2003. Bacteraemia in free-ranging Hawaiian green turtles *Chelonia mydas* with fibropapillomatosis. Dis. Aquat. Org, 53:41-46.

Abstracts

Antonelis, G. A.
2003. Hawaiian monk seal (*Monachus schauinslandi*): status and conservation issues. [Abstr.] To be presented at the annual meeting of the International Association for Aquatic Animal Medicine (IAAAM), Kohala, Hawaii, May 10-14, 2003.

Asher, J. M., M. Timmers, and M. Donohue.
2003. The occurrence of live corals on derelict fishing gear in the Northwestern Hawaiian Islands. [Abstr.] PACON (Pacific Congress on Marine Science and Technology), Kaohsiung, Taiwan, June 19-July 2, 2003.

Goldstein, T., F. M. D. Gulland, R. C. Braun, G. A. Antonelis, T. Rowles, J. A. K. Mazet, J. L. Scott, and B. M. Aldridge.
2003. Molecular identification of a novel gamma herpesvirus isolate in Hawaiian monk seals (*Monachus schauinslandi*). [Abstr.] IAAAM Meeting, Hilton Waikaloa Village, Island of Hawaii, May 10-14, 2003.

Hawn, D. R., M. P. Seki, and R. Nishimoto.
2003. An update on opah and monchong life history and ecology studies. [Abstr.] Tuna Conference, Lake Arrowhead, California, May 13-16, 2003.

Howell, E. A., and J. J. Polovina.
2003. Recent changes in the central North Pacific monitored using remotely sensed oceanographic data. [Abstr.] For the 30th International Symposium on Remote Sensing of Environment, Honolulu, Hawaii, November 10-14, 2003.

Howell, E. A., and J. J. Polovina.
2003. Assessing interannual variability in catch of tuna around the Palmyra Fishing Grounds from 1991 to 2002. [Abstr.] Annual Tuna Conference, Lake Arrowhead, California, May 13-16, 2003.

Ito, R. Y., W. A. Machado, and F. Dowdell.
2003. The Hawaii-based longline logbook collection program. [Abstr.] Annual Tuna Conference, Lake Arrowhead, California, May 13-16, 2003.

Timmers, M., and M. Donohue.
2003. Challenges in identifying putative source fisheries from derelict fishing gear recovered in the Northwestern Hawaiian Islands. [Abstr.] PACON (Pacific Congress on Marine Science and Technology) meeting, Kaohsiung, Taiwan, June 19-July 2, 2003.

PACIFIC ISLAND FISHERIES SCIENCE CENTER

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Vroom, P. S., and C. M. Smith.
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2003. Fishery Statistics of the Western Pacific. Volume 18. Pacific Islands Fish. Sci. Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96822-2396. Pacific Islands Fish. Sci. Cent. Admin. Rep. H-03-02.

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2003. Updated weight-on-length relationships for pelagic fishes caught in the central North Pacific Ocean and bottomfishes from the Northwestern Hawaiian Islands. Pacific Islands Fish. Sci. Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96822-2396. Pacific Islands Fish. Sci. Cent. Admin Rep. H-03-01, 40 p.

Abstracts

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2003. Movements of monk seals relative to ecological depth zones in the lower Northwestern Hawaiian Islands. [Abstr.] NWHI Symposium, Convention Center, Honolulu, Hawaii, April 2004.

Antonelis, G. A., J. D. Baker, and T. C. Johanos.
2003. Hawaiian monk seal (*Monachus schauinslandi*): status and conservation issues. [Abstr.] 15th Biennial Conference on the Biology of Marine Mammals, Johnathon S. Coury Convention Center, Greensboro, North Carolina, December 14-19, 2003.

Baker, J. D.
2003. Evaluation of closed capture-recapture methods to estimate abundance of Hawaiian monk seals, *Monachus schauinslandi*. [Abstr.] 15th Biennial Conference on the Biology of Marine Mammals, Johnathon S. Coury Convention Center, Greensboro, North Carolina, December 14-19, 2003.

Becker, B. L., A. Harting, J. D. Baker, and T. C. Johanos.
2003. Non-metrical photo identification system for the Hawaiian monk seals, *Monachus schauinslandi*. [Abstr.] 15th Biennial Conference on the Biology of Marine Mammals, Johnathon S. Coury Convention Center, Greensboro, North Carolina, December 14-19, 2003.

Boland, R. C., and F. Parrish.
2003. A description of the fish assemblages in the black coral beds off Lahaina, Maui. [Abstr.] American Geophysics Union, January 26-30, 2004, Portland, Oregon.

DeMartini, E. E.
2003. Patterns and processes in shallow-water reef fishes of the NWHI. [Abstr.] NWHI Symposium, Convention Center, Honolulu, Hawaii, April 2004.

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2003. Surface velocity and profiling drifters track potential larval pathways, Northwestern Hawaiian Islands. [Abstr.] For presentation at the 2004 Ocean Research Conference, February 15-20, 2004, Honolulu, Hawaii.

Howell, E. A., and J. J. Polovina.
2003. Recent changes in the central North Pacific monitored using remotely sensed oceanographic data. [Abstr.] 30th International Symposium on Remote Sensing of Environment, November 10-14, 2003, Honolulu, Hawaii.

Hyder, P., and K. Bigelow.
2003. Migration and abundance of bigeye tuna (*Thunnus obesus*) inferred from catch rates and their relation to variations in the ocean environment. [Abstr.] 2004 Ocean Research Conference, February 15-20, 2004, Hawaii Convention Center, Honolulu, Hawaii.

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2003. Mass coral bleaching on high-latitude reefs in the Hawaiian Archipelago. [Abstr.] For presentation at the Third Scientific Symposium on Resource Investigations in the Northwestern Hawaiian Islands, April 5-9, 2004, Honolulu, Hawaii.

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Aeby, G. S., J. C. Kenyon, J. E. Maragos, and D. C. Potts.
2002. First record of mass coral bleaching in the Northwestern Hawaiian Islands. Coral Reefs.

Baker, J. D.
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Boland, R. C., and M. J. Donohue.
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Appendix 9

The Pelagic Fisheries Research Program

The Pelagic Fisheries Research Program (PFRP) was established in 1992 after the Magnuson Fishery Conservation and Management Act (1976) was amended to include "highly migratory fish." The PFRP was created to provide scientific information on pelagic fisheries to the Council for use in development of fisheries management policies

The PFRP is located at the Joint Institute for Marine and Atmospheric Research (JIMAR), under the University of Hawaii's School of Ocean and Earth Science and Technology (SOEST). The first PFRP projects were established in late 1993, and work on these projects began in 1994. In order for the Council to determine "optimum use" of these valuable fishery resources, information is required from a broad spectrum of research disciplines, e.g., biology, genetics, statistics, socio-cultural. The PFRP has funded more than 75 research projects and solicits for new research proposals as federal funding permits. Most project investigators are affiliated with regional research institutes, such as the National Marine Fisheries Service (NMFS), Secretariat of the Pacific Community (SPC), and other universities.

PPFRP Projects receiving funding in calendar year 2003:
(A= Administration, S=Statistics & Modeling, E=Economics, O=Oceanography, B=Biology, P=Protected Species)

A - JIMAR Visiting Scientist Program
A - Pelagic Fisheries Research Program, Management Portion
S - Pelagic Fisheries Research Program, Modeling Portion
S- Incorporating Oceanographic Data in Stock Assessment of Blue Sharks and Other Species Incidentally Caught in the Hawaii-Based Longline Fishery
S - Mixed Resolution Models for Investigating Individual to Population Scale Spatial Dynamics
S - Comparisons of Catch Rates for Target and Incidentally Taken Fishes in Widely Separated Areas of the Pacific Ocean
E - Economic Fieldwork on Pelagic Fisheries in Hawaii
E- Regulatory Impact Analyses Framework for Hawaii Pelagic Fishery Management - a Multilevel and Multiobjective programming model
O - The Role of Oceanography in Bigeye Tuna Aggregation and Vulnerability in the Hawaii Longline Fishery from Satellite, Moored and Shipboard Time Series
O - Development of Oceanographic Atlases for Fisheries and Resource Management of the Exclusive Economic Zones of the U.S. Pacific Islands
O - Trophic Structure and Tuna Movement in the Cold Tongue-Warm Pool Pelagic Ecosystem of the Equatorial Pacific
O - Oceanographic Characterization of the American Samoa Longline B - Survivorship, Migrations, and Diving Patterns of Sea Turtles Released from Commercial Longline Fishing Gear, Determined with Pop-Up Satellite Archival Transmitters
B - Pop-Off Satellite Archival Tags to Chronicle the Survival and Movements of Blue Shark Following Release from Longline Gear

B- Investigating the Life History and Ecology of Opah and Monchong in the North Pacific
B - Describing the Vertical Habitat of Bigeye and Albacore Tunas and Post Release Survival for Marlins in the Central Pacific Longline Fisheries with Pop-Up Archival Transmitting Tags
B - Evaluating Biochemical and Physiological Predictors of Long Term Survival in Released Pacific Blue Marlin Tagged with Pop-Up Satellite Archival Transmitters (PSATs)
Fishing Grounds for Albacore, Thunnus alalunga.
B - Instrumented Buoys as Autonomous Observatories of Pelagic Ecosystems
P - A General Bayesian Integrated Population Dynamics Model for Protected Species
P - Integrated Statistical Model for Hawaiian Albatross Populations
P - Development of a Hierarchical Model to Estimate Sea Turtle Rookery Contributions to Mixed Stocks in Foraging Habitats

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Nemoto, Keiichi, and Samuel Pooley. Regulatory impact analysis framework for Hawaii pelagic fishery management. Poster presentation for the JIMAR Program Review, March 4-5, 2004.

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Seki, Michael, Donald Hawn, and Robert Nishimoto. Studies on the biology and ecology of Opah (*Lampus guttatus*) and Monchong (*Taractichthys steindachneri*) in the North Pacific. Poster presentation for the JIMAR Program Review, March 4-5, 2004.

Sibert, John. Parametric representation of animal trajectories. Poster presentation for the JIMAR Program Review, March 4-5, 2004.

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Walsh, William A. Analysis of Blue Marlin (*Makaira nigricans*) Catch Rates in the Hawaii-based Longline Fishery with a Generalized Additive Model and Commercial Sales Data. Poster presentation for the JIMAR Program Review, March 4-5, 2004.

Ward, Peter. Causes of Rapid Declines in World Billfish Catch Rates. Presentation at the PFRP Principal Investigators Meeting, Honolulu, Hawaii, December 9-11, 2003.

Appendix 10

GLOSSARY

TERM	DEFINITION
Alia	Samoan fishing catamaran, about 30 feet long, constructed of aluminum or wood with fiberglass. Used for various fisheries including trolling, longline, and bottomfishing
AP	Advisory Panel. Appointed industry/government/educational representatives functioning in an advisory capacity to the Council.
AS	American Samoa. Includes the islands of Tutuila, Manua, Rose and Swains Atolls.
ASDPW	Department of Public Works, American Samoa. Also, DPW.
Bycatch	Fish caught in a fishery but discarded or released, except in a recreational fisheries catch and release program.
Commercial	Commercial fishing, where the catch is intended to be sold, bartered, or traded.
CNMI	Commonwealth of the Northern Mariana Islands. Also, Northern Mariana Islands, Northern Marianas, and NMI. Includes the islands of Saipan, Tinian, Rota, and many others in the Marianas Archipelago.
CPUE	Catch-Per-Unit-Effort. A standard fisheries index usually expressed as numbers of fish caught per unit of gear per unit of time, eg., number of fish per hook per line-hour or number of fish per 1,000 hooks. The term catch rate is sometimes used when data are insufficiently detailed to calculate an accurate CPUE.
DAWR	Division of Aquatic & Wildlife Resources, Territory of Guam.
DBEDT	Department of Business, Economic Development & Tourism, State of Hawaii.
DFW	Division of Fish & Wildlife, Northern Mariana Islands.
DLNR	Department of Land & Natural Resources, State of Hawaii. Parent agency for Division of Aquatic Resources (HDAR).
DMWR	Department of Marine & Wildlife Resources, American Samoa. Also, MWR.
EEZ	Exclusive Economic Zone, refers to the sovereign waters of a nation, recognized internationally under the United Nations Convention on the Law of the Sea as extending out 200 nautical miles from shore. Within the U.S., the EEZ typically is between three and 200 nautical miles from shore.
ESA	Endangered Species Act. An Act of Congress passed in 1966 that establishes a federal program to protect species of animals whose survival is threatened by habitat destruction, overutilization, disease etc.
FAD	Fish Aggregating Device; a raft or pontoon, usually tethered, and under which, pelagic fish will concentrate.
FDCC	Fishery Data Coordinating Committee, WPRFMC.
FFA	Forum Fisheries Agency. An agency of the South Pacific Forum, which comprises the independent island states of the South Pacific, Australia and New Zealand. The FFA formed to negotiated access agreements between FFA member countries and distant water fishing nations such as Japan and the USA.
FMP	Fishery Management Plan.
Guam	A U.S. territory in the Marianas Archipelago. South of and adjacent to the Commonwealth of Northern Marianas Islands.

Hawaii	U.S. state. See MHI, NWHI. Composed of the islands, atolls and reefs of the Hawaiian Archipelago from Hawai'i to Kure Atoll, except Midway Islands. Capitol - Honolulu.
HDAR	Hawaii Division of Aquatic Resources. Also, DAR.
HIMB	Hawaii Institute of Marine Biology, University of Hawaii.
HURL	Hawaii Undersea Research Lab.
JIMAR	Joint Institute of Marine and Atmospheric Research, University of Hawaii.
IATTC	Inter-American Tropical Tuna Commission.
Ika-shibi	Hawaiian term for nigh tuna handline fishing method. Fishing for tuna using baited handlines at night with a nightlight and chumming to attract squid and tuna.
Incidental Catch	Fish caught that are retained in whole or part, though not necessarily the targeted species. Examples include monchong, opah and sharks.
Interaction	Catch of protected species, which is required to be released. Examples: Hawaiian monk seals, marine turtles and albatrosses.
Logbook	Journal kept by fishing vessels for each fishing trip; records catch data, including bycatch and incidental catch. Required in the federally regulated longline and crustacean fisheries in the Hawaiian EEZ**.**
Longline	Fishing method utilizing a horizontal mainline stretching from several hundred yards to many miles in length, suspended for the surface by floats, to which droppers with baited hooks are attached.
Longliner	Fishing vessel specifically adapted to use the longline fishing method.
MFCMA	Magnuson Fishery Conservation and Management Act of 1976. Also, Magnuson-Stevens Fishery Conservation and Management Act of 1996. Sustainable Fisheries Act.
MHI	Main Hawaiian Islands (comprising the islands of Hawai'i, Mau'i, Lana'i, Moloka'i, Kaho'olawe, O'ahu, Kauai', Ni'ihau and Ka'ula).
MSY	Maximum Sustainable Yield.
NMFS	National Marine Fisheries Service, National Oceanic and Atmospheric Administration, Department of Commerce. Also NOAA Fisheries.
NOAA	National Oceanic and Atmospheric Administration, Department of Commerce.
NWHI	Northwestern Hawaiian Islands. All islands in the Hawaiian Archipelago, other than the Main Hawaiian Islands (MHI).
OFP	Oceanic Fisheries Program of the South Pacific Commission.
OY	Optimum Yield.
Palu-ahi	Hawaiian term for day tuna handline fishing. Fishing for tuna using baited handlines and chumming with cut bait in a chum bag or wrapped around a stone. Also, drop-stone, make-dog, etc.
PAO	Pacific Area Office, National Marine Fisheries Service. Also, NMFS/PAO.
Pelagic	The pelagic habitat is the upper layer of the water column from the surface to the thermocline. The pelagic species include all commercially targeted highly migratory species such as tuns, billfish and some incidental-catch species such as sharks, as well as coastal pelagic species such as akule and opelu.
PFRP	Pacific Pelagic Fisheries Research Program, JIMAR, University of Hawaii. Also PPFRP.

PMUS Pacific Pelagic Management Unit Species. Also, PPMUS. Species managed under the Pelagics FMP.

Pole-and-Line Fishing for tuna using poles and fixed leaders with barbless lures and chumming with live baitfish. Poles can be operated manually or mechanically. Also, fishing vessels called baitboats or aku-boats (Hawaii).

Protected Refers to species which are protected by federal legislation such as the Endangered Species Act, Marine Mammal Protection Act, and Migratory Bird Treaty Act. Examples: Black-footed and Laysan albatrosses, marine turtles, dolphins.

PT or PPT Pelagic Plan Team. Advisory body to the Council composed of scientists and fishermen who monitor and manage the fisheries under the jurisdiction of the Pelagics FMP.

Purse seine Fishing for tuna by surrounding schools of fish with a very large net and trapping them by closing the bottom of the net.

Recreational Recreational fishing for sport or pleasure, where the catch is not sold, bartered or traded.

SAFE Stock Assessment and Fishery Evaluation, NMFS.

Sanctuary Protected area. Commercial/recreational fishing may be restricted.

Secretary When capitalized and used in reference to fisheries within the U.S. EEZs, it refers to the U. S. Secretary of Commerce.

Small pelagics Species such as akule (big-eye scad - *Selar* spp.) And opelu (mackerel scad - *Decapterus* spp). These fish occur mainly in shallow inshore waters but may also be found in deeper offshore waters. Not part of the PMUS.

SPC South Pacific Commission. A technical assistance organization comprising the independent island states of the tropical Pacific Ocean, dependant territories and the metropolitan countries of Australia, New Zealand, USA, France and Britain.

SPR Spawning Potential Ratio. A term for a method to measure the effects of fishing pressure on a stock by expressing the spawning potential of the fished biomass as a percentage of the unfished virgin spawning biomass. Stocks are deemed to be overfished when the SPR<20%.

SSC Scientific & Statistical Committee, an advisory body to the Council comprising experts in fisheries, marine biology, oceanography, etc.

Trolling Fishing by towing lines with lures or live-bait from a moving vessel.

USCG U.S. Coast Guard, 14th District, Department of Transportation.

USFWS U.S. Fish & Wildlife Service, Department of Interior. Also, FWS.

VMS Vessel Monitoring System. A satellite based system for locating and tracking fishing vessels. Fishing vessels carry a transponder which can be located by overhead satellites. Two-way communication is also possible via most VMS systems.

WPacFIN Western Pacific Fishery Information Network, NMFS.

WPRFMC Also, the Council. Western Pacific Regional Fishery Management Council. One of eight nationwide fishery management bodies created by the Magnuson Fisheries Conservation and Management Act pf 1976 to develop and manage domestic fisheries in the U.S. EEZ. Composed of American Samoa, Guam, Hawaii, and Commonwealth of Northern Mariana Islands.