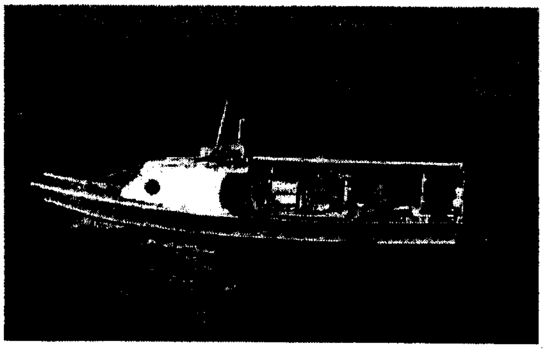
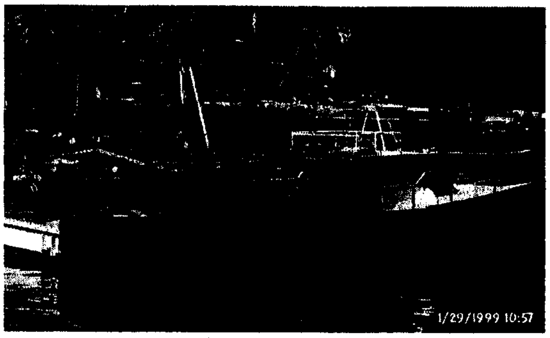
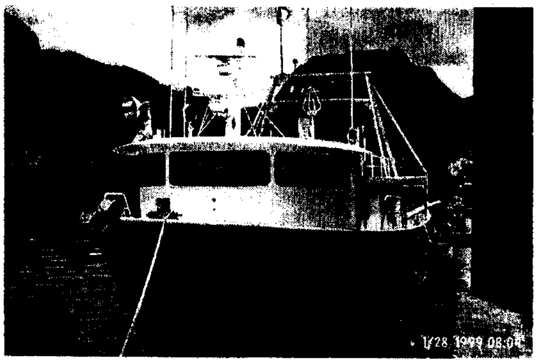
Pelagic Fisheries of the Western Pacific Region







1999 Annual Report

January 2001
Western Pacific Regional Fishery Management Council
Honolulu Hawaii

Pelagic Fisheries of the Western Pacific Region

1999 Annual Report

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February 2001

Prepared by the Pelagics Plan Team and Council Staff

for the

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

Cover photos: The three classes of fishing vessel currently operating in the American Samoa longline fishery. Top left is an older 28-ft alia catamaran, top right is a newer 40-ft catamaran capable of fishing further offshore, bottom is a large longliner similar to the type used in the Hawaiian longline fishery. Photos courtesy of NMFS Honolulu Lab and WPacFIN.

A report of the Western Pacific Regional Fishery Management Council pursuant to National Oceanic and Atmospheric Administration Award No. NA77FC0008

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Pelagic Fisheries of the Western Pacific Region — 1999 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.

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

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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.

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 1999, 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, Southwest Region (including Southwest Fisheries Science Center Honolulu Laboratory, Pacific Islands Area Office and Office of Law Enforcement)
- US Coast Guard, District 14
- Pelagic Fisheries Research Program, University of Hawaii

C. Report Appraisal

The report content has not changed significantly from previous years.

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.

1999 Pelagic Plan Team Members

American Samoa
Flinn Curren
Dept. of Marine & Wildlife Resources
PO Box 3730
Pago Pago, AS 96799
Tel: (684) 633-4456
Fax: (684) 633-5944

Guam
Jay Gutierrez
Div. of Aquatic and Wildlife Resources
192 Dairy Road
Mangilao, GU 96923
Tel: (671) 735-3958
Fax: (671) 734-6570

Hawaii
Christofer H. Boggs (Chair)
Russell Y. Ito
Pierre Kleiber
Dave Hamm
Samuel Pooley
Robert A. Skillman
Honolulu Laboratory
National Marine Fisheries Service
2570 Dole Street
Honolulu, HI 96822-2396
Tel: (808) 948-9706
Fax: (808) 943-1290

Walter N. Ikehara
Hawaii Division of Aquatic Resources
1151 Punchbowl Street, #330
Honolulu, HI 96813
Tel: (808) 587-0096
Fax: (808) 587-0115

John Sibert
SOEST/JIMAR
1000 Pope Road, MSB 312
Honolulu, HI 96822
Tel: (808) 956-4109
Fax: (808) 956-4104

Northern Mariana Islands
Floyd R. Masga
Division of Fish and Wildlife
Department of Land & Natural Resources
P.O. Box 10007
Saipan, MP 96950
Tel: (670) 322-9627
Fax: (670) 322-9629

Secretariat of the Pacific Community
Keith Bigelow
Oceanic Fisheries Programme
P.O. Box D5
Noumea Cedex 98858
New Caledonia
Tel: 011 (687) 26-0192
Fax: 011 (687) 26-3818

Council Staff
Paul Dalzell
Western Pacific Regional Fishery
Management Council
1164 Bishop St, #1400
Honolulu, HI 96813
Tel: (808) 522-8220
Fax: (670) 522-8226

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
Oceanic sharks	Alopiidae, Carcharinidae, Lamnidae, Sphynidae	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
Dogtooth tuna	*Gymnosarda unicolor*	Tagi	Hagatsuo	Dogtooth or white tuna	Ayul	Owel
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)

Table 2. Total 1999 pelagic landings[2] (in lbs) in the Western Pacific Region

Species	Am. Samoa	% change*	Guam	% change	Hawaii	% change	CNMI	% change	Total	% change
Barracuda	2,701	-39.63%	10,024	47.00%			37	-62.63%	12,762	12.03%
Kawakawa	110	34.15%	11,020	208.17%					11,130	204.26%
Mahimahi	38,761	12.61%	160,150	-36.29%	1,300,000	44.44%	10,305	-49.80%	1,509,216	25.11%
Marlin, Black	3,238								3,238	100.00%
Marlin, Blue	35,575	-25.25%	81,888	87.75%	1,400,000	0.00%	2,833	-15.71%	1,520,296	1.72%
Marlin, Striped					900,000	0.00%			900,000	0.00%
Misc. Billfish					600,000	50.00%			600,000	50.00%
Misc. Pelagics	58		12,403	-18.40%	300,000	0.00%	2,146	190.00%	314,607	-0.42%
Moonfish	7,994	357.06%			1,200,000	33.33%			1,207,994	33.96%
Pomfret									0	0.00%
Rainbow Runner	1,086	112.11%	15,745	716.65%			1,044	73.13%	17,875	487.41%
Sailfish	7,659	3.49%	1,700	142.86%			40	-51.81%	9,399	14.85%
Sharks	940	-87.30%	18,846	135.08%	6,300,000	1.50%			6,319,786	1.56%
Spearfish	1,086		120	-86.58%					1,206	34.90%
Swordfish	206	-93.89%			6,900,000	-4.17%			6,900,206	-4.21%
Tuna, Albacore	713,733	-29.81%			4,100,000	32.26%			4,813,733	16.93%
Tuna, Bigeye	19,031	234.17%			6,200,000	-18.42%			6,219,031	-18.23%
Tuna, Bluefin					20,000	-50.00%			20,000	-50.00%
Tuna, Dogtooth	73	-89.07%	7,105	1895%			9,053	-37.25%	16,231	5.06%
Tuna, Misc.		-100.00%					4,953	123.81%	4,953	92.05%
Tuna, Skipjack	87,231	57.78%	120,137	-37.12%	1,900,000	35.71%	85,087	-36.42%	2,192,455	23.16%
Tuna, Yellowfin	152,243	58.93%	126,858	-8.31%	3,900,000	2.63%	19,359	66.09%	4,198,460	3.77%
Wahoo	48,748	19.28%	76,958	-50.57%	1,000,000	25.00%	6,395	26.91%	1,132,101	13.03%
TOTAL	1,120,473	-16.49%	642,954	-21.36%	36,020,000	3.07%	141,252	-26.65%	37,924,679	1.73%

*1998 data for American Samoa was updated using the FoxPro algorithms. Data for the % change from 1998 was only available and calculated for mahimahi, blue marlin, sailfish, wahoo and albacore, skipjack and yellowfin tunas

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2 Landings are reported in island reports (Appendices 1-4), which include recreational and commercial domestic landings data, where available (e.g., for Hawaii, only commercial landings). In some cases, totals may not add precisely due to rounding. These do not include foreign transshipment or domestic cannery landings, which may be reported separately in island modules.

II. Summary [3]

A. Plan Administration

Two regulatory measures and one amendment for the pelagic fisheries in the Western Pacific Region were proposed by the Council in 1999. One regulatory measure addressing deficiencies in data collection for trolling in Pacific Remote Island Areas was initiated in 1998, and the Council took action in 1999. This regulatory measure is expected to be submitted to NMFS in 2000. In 1998, the Council hired a private contractor to test and quantify the effects of various techniques mitigating incidental seabird take. This study, carried out in 1998 and completed in 1999, became the basis for a regulatory measure drafted in 1999 which requires longline vessels to employ two bird deterrent methods while fishing in areas of historically high bird interaction. The measure was submitted for approval in 1999. An amendment instituting quotas for incidental shark catch and regulating demersal longline gear also began in 1999. Council action is expected in early 2000. See Issues (p.12) and Administrative Activities (p. 13) for details. No permits were requested by any foreign nations to fish in the US EEZ of the Western Pacific Region.

B. Island Areas

In **American Samoa,** total landings of all pelagic species dropped 16.5% from its upward trend that commenced in 1994. This drop is in spite of an increased effort in both longline and troll fishing in 1999. An estimated 1,120,473 lb (-16.5%) of pelagic fish were landed in 1999, of which 1,025,534 were commercial landings valued at $1,105,799 (-25%). The average price for all pelagics was $1.08/lb (- 11%).

Fifty-three vessels reported landing pelagic species in 1999, a 29% increase over 1998. Of these, 28 reported fishing as longliners (+12%), and 32 reported fishing as trollers (+33%). Trolling vessels made 373 trips, an increase of 18% from 1998 but one-half of the long term average. Longline data are derived from both creel survey extrapolations and through submitted logbooks. Logbook data reported 2100 sets for 1999, an increase of 17% from 1998. Creel survey extrapolation reported 2982 longline sets, a 15% increase. The average duration for trolling trips was 4.8 hr/trip, an 8% increase from 1998. Average longline trip length by calculated via logbooks was 6.7 hr/trip (+4%) and by creel survey was 7.9 hr/trip (+2%). Nevertheless, the fishery continues to shift from the troll to longline method. Since the longline fishery began in 1996, trolling trips have declined by 75% and longline trips have increased 400%. Data from the troll fishery suggests that the catch per unit effort (CPUE) in 1999 increased 22% from a 12 year low, and was 4% above the long term average. The overall average CPUE for longline fishing in 1999 was 32 fish/1,000 hooks. According to both monitoring methods, the CPUE for albacore has declined by more than 50% since 1996, while the average size has remained stable over the same period. Albacore accounts for 63% of the total longline catch. Overall longline catch rates (-19%) as well as albacore catch rates (-35%) dropped between 1998 and 1999.

Cannery landings at Pago Pago during 1999 comprised 133,079 t of skipjack, 39,765 t of yellowfin and 57,981 t of albacore. Most of the skipjack and yellowfin are caught in distant water

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

fisheries, predominantly in the western tropical Pacific, while albacore landings are made by vessels operating in cooler waters to the south of American Samoa. Landings have remained relatively stable during the 1990s for skipjack and yellowfin, with 1999 landings for all species above their long term averages. Landings for albacore has been continuously increasing over the past decade, with 1999 landings 54% above the long term average. This partially reflects the increased longline fishing activity in both American Samoa and Samoa (formerly Western Samoa).

In **Guam** landings of all pelagics amounted to 643,345 lb (-23%), with total revenues decreased to $458,638 (-36%). Non-Tuna PPMUS landings decreased similarly to 336,219 lb (30%), and adjusted revenues decreased to $320,462 (-36%). Tuna landings decreased to 265,941 lb (-21%), with a decrease in revenues (-38%) to $122,023. The overall landings have fluctuated around a relatively constant average for the past decade. Landings in 1999 followed the 1997 trend in Guam's pelagic fisheries towards targeting other PPMUS, principally mahimahi and wahoo, rather than tuna. Tunas comprised about 41% of the 1999 pelagic landings, similar to the previous three years where they formed between 39 and 41% of pelagic landings. Mahimahi comprised 25% of the total pelagic landings, followed by yellowfin tuna (20%), skipjack (19%), blue marlin (13%) and wahoo (12%). With the exception of blue marlin (up 88% from 1998), total catch for each of the major species was down between 8% (yellowfin) 51% (wahoo).

Guam's adjusted prices for pelagic fish remained fairly stable in 1999, following a general decline since 1980. The adjusted price ($/lb) of tuna has remained static since 1996, and non-tuna PPMUS has continued to increase since 1995 and rose by 5% between 1998 and 1999.

Virtually all the landings of pelagic fish are made by trolling vessels. The fleet size in 1998 was an estimated 449 vessels. The fleet size has remained stable for the past five years after a marked increase that began in 1980. The number of trips (14,233), hours fished (54,991) and hours per trip (3.9) has also remained stable since 1997.

Transhipment activity in Guam increased for total landings (+12%) and bigeye tuna (+56) in 1999, but decreased for yellowfin tuna (-21%). Yellowfin landings are still lower than prior to the 1997 climate changes (the strong El-Nino Southern Oscillation event), while bigeye landings are at a ten year high.

The **Hawaii** fisheries for PPMUS produced total pelagic landings of 36 million lb in 1999, a slight increase (3%) from 1998. Swordfish, sharks and bigeye were the dominant species, comprising 19.2%, 17.5 and 17.2% of the pelagic fishery, respectively. Other major components of the pelagic fishery include albacore (11.4%), yellowfin (10.8%), and skipjack (5.3%). Swordfish landings of 6.9 million lb in 1999 were 4.2% lower than in 1998. Bigeye tuna catch dropped significantly (-18%) from its high in 1998. Blue marlin catches remained unchanged in 1999 after a dramatic decline in 1997 while striped marlin catch has been steady for the past four years. The commercial catch of mahimahi, wahoo and moonfish all reached a 13 year high in 1999, 40%, 77% and 196% above the long-term average, respectively. Overall tuna landings were similar to 1998, with albacore and skipjack increases offsetting the drop in bigeye catch. The numbers of sharks retained for their fins increased slightly in 1999, with an estimated landed whole weight increase of 1.5%.

Total pelagics revenue increased by about 4% to $ 58.9 million, with an average price per pound for pelagic fish the same for 1999 as 1998. In 1999 the inflation adjusted ex-vessel revenue for the longline fishery equaled revenue from 1998, while the handline fishery increased by 49%, the troll fishery increased 12.5% and the 1998 aku baitboats increased by 51%.

Catch rate by trollers for wahoo, blue marlin and skipjack were up in 1999 (12.%, 5.5% and 17%, respectively). Catch rate by trollers for mahimahi and yellowfin were down in 1999 (1% and 4.5%, respectively). Catch rates by handliners in 1999 were higher for mahimahi (13.6%), wahoo (6.5%), blue marlin (21%) and albacore (+66%). Catch rates by handliners in 1999 were lower for swordfish (-8%), yellowfin (-18.2%) and bigeye tuna (-70%). Yellowfin and swordfish were the only species below the long term average.

The Hawaii longline fleet landed 22.2 million lb of fish, a 3% decrease from 1998 landings. Of the billfish landed in Hawaii, longlining accounted for almost all the swordfish (99%), striped marlin (89%) and blue marlin (56%). About 40% of the longline landings (8.9 million lb) were billfish, and 76% of billfish landings were swordfish. The longline fleet also accounted for most of the bluefin tuna (100%), bigeye tuna (97%), albacore (79%), moonfish (100%) and sharks (100%) landed in Hawaii. The bluefin landings have decreased 62% since 1995.

Fishing effort for the combined pelagic fisheries in Hawaii remained at a high level in 1999. The number of longline vessels participating in this fishery increased to its highest level since 1994 to 119 vessels active in the fishery. The number of trips has remained stable at 1,137 trips in 1999. The size of the longline fleet declined steadily between 1991 and 1996 from 141 to 103 vessels, although there are a maximum of 164 licenses available in the limited entry system. The number of trips by the troll fishery decreased in 1999 (-2%) to 21,980. This is higher than the 1979-1999 average of 18,512, but the fishery has been relatively static over the past ten years. The number of trips taken by aku baitboats (373) increased in 1999 (33%), but remains well below the average. The present level of aku boat activity, in terms of trips, is about one half the long term average. The number of handline trips in 1999 (5,681) was similar when compared with 1997.

Landings of all pelagics in the **Northern Mariana Islands** (NMI) decreased (-27%) between 1998 and 1999 to 141,252 lb and was 24% below its long term average. Skipjack landings of 85,087 lb were down (-36%) from 1998, also 36% below the 1983-1997 long term average. Yellowfin tuna landings rebounded from 1998 (+66%) and was 36% above the long term average. Landings of mahimahi continued a four year decline, down -50 % from 1998 and 64% since 1996. Mahimahi was significantly lower (-38%) than the long term average for only the second time in a decade. Wahoo landings increased (27%) from 1998 but were slightly (-5.6%) below the long term average. Blue marlin landings continued to decline (-16%), and were below the long term average for the first time in six years.

The 27% decrease in landings during 1999 were reflected by a 31% decrease in total adjusted revenues ($279,867) over those in 1998. This decrease in adjusted revenues was shared equally between tunas and other PPMUS.

The number of fishers making commercial pelagic landings increased in 1999 (19%) in 1998 to 89, but number of trips landing any pelagic fish decreased by 21% in 1999 and was much higher

(+34%) than the long term average. Thus the average number of trips per fisher in 1999 decreased to 17 from 25 trips per fisher in 1998.

The inflation adjusted prices of tunas and non-tuna PPMUS has remained relatively stable since data has been collected, with the exception of 1990-1992 when an increase corresponded with a notable decrease in skipjack landings. In 1999 the average adjusted price of tunas fell to $1.91/lb and of other PPMUS to $2.26/lb. Tuna prices are equal to the long term average while other PPMUS are 7% above the long term average.

C. Species

Mahimahi landings (39,709 lb) in American Samoa during 1999 were the highest since the fishery began, increasing 28% from 1998, and was almost four times higher than the long term average. Guam's 1999 mahimahi landings (160,150 lb) decreased substantially (-36%) from 1998, continuing a five year downward trend. 1999 landings were 15% below the long term average. Mahimahi landings in Guam have displayed wide, unexplained annual fluctuations since 1987. The trolling catch rate for mahimahi was at a seven year low in 1999 with a CPUE of 2.90 lbs/hr. Mahimahi landings (1,300,000 lb) made up 6.5% of the 1999 non-tuna PPMUS landings in Hawaii, an increase of 44%. The troll catch rate in Hawaii was 1% lower than the 1999 rate, but above the long-term average. Northern Marianas mahimahi landings declined substantially as did most other species and amounted to 10,305 lb (-50%). As with Guam, NMI experiences annual fluctuations in the catch of mahimahi. Mahimahi accounted for 32% of the total non-tuna PPMUS landings. The trolling catch rate in 1999 in the NMI was at a ten year low of 5.86 lb/trip, one half of the long term average.

Blue marlin catches in American Samoa decreased (-14%) after a seven year upward trend as a result of the expansion of the longline fishery, which took 98% of the total blue marlin catch. The decrease occurred in spite of a 59% increase in longline effort. Guam landings of blue marlin (81,888 lb) rebounded from a one year dip in 1998, doubling the annual landings. Despite the low landings in 1998, the blue marlin catch in Guam has been relatively stable for more than a decade. Blue marlin landings (1.4 million lb) in Hawaii were the same as in 1998. Longliners accounted for 56% of the total Hawaii blue marlin landings. Blue marlin landings in the Northern Marianas (2,833 lb) continued a four year decline, with 1999 landings only 41% of the 1996 level. 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 was the lowest in seventeen years at only 0.18 lb/hr, 74% lower than 1998. In Guam, blue marlin troll catch rate rebounded significantly (+115%) from 1998's 16 year low and was slightly above the long term average. In the Hawaii longline fishery, blue marlin tends to be caught incidentally at a higher rates on mixed trips than in either tuna trips or swordfish trips. The catch rate of blue marlin decreased on swordfish (-21%), tuna (-16%) and mixed (12%) trips between 1998 and 1999. The catch rate of blue marlin in the Hawaii commercial troll fishery increased 5.5%, but was 18% lower than the long-term average. In the Northern Marianas, the 1999 catch rate increased slightly (+6.6%) from 1998, but was 21% below the long-term average.

Striped marlin landings ranked third among the billfish in Hawaii (after swordfish and blue marlin), and in 1999 it accounted for 4.5% of the commercial landings of non-tuna PPMUS. The 1999 landings of 0.9 million lb were the same as the 1998 landings and lower than the long-term average. 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 1999 (61,000 lb, +7%) were up from 1998 but markedly reduced from previous years and about 33% below the long-term average. The species rarely appears in the domestic landings from other areas.

Sailfish landings were insignificant in most areas. American Samoa reported landings of 6,508 lb of sailfish in 1999, a 3% decrease on 1998 landings and triple the long-term average.

Estimated domestic landings of Hawaii **shark** increased by 26% between 1997 and 1998. The increase was due to a rise in the retention of shark fins, of which 95% are from blue sharks. Shark landings from other areas were relatively minor, although landings in Guam increased by 135% to 18,846 lbs. 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 [4], although the quantity has not been estimated.

Shortbill spearfish landings were reported for the first time in American Samoa at 610 lbs, while landings for Guam were down 87% at 120 lbs.

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 1999 amounted to 6.9 million lb, a large increase from the long term average for the fishery. The estimated average size of longline-caught swordfish was 188 lb in 1998, the largest average size since 1987 and above the 1987-1999 average by 19%. Swordfish comprised the largest proportion of the total non-tuna landings by all fisheries in Hawaii for the tenth consecutive year (35% in 1999, 38% in 1998, 37% in 1997, 38% in 1996, 38% in 1995, 60% in 1994, 72% in 1993, 73% in 1992, 62% in 1991, and 38% in 1990). The longline catch rate of swordfish in 1998 held steady in 1999, and remained 5% higher than the long-term average between 1991 and 1999. Swordfish landings from non-longline gear were negligible in comparison (1%). Other areas did not report landings of swordfish, apart from a few captures in the American Samoa longline fishery.

American Samoa reported landings of 713,733 lb of **albacore** during 1999, a 30% decline from 1998, but still the second highest landings recorded by the American Samoa fleet and almost a fourfold increase on 1996 landings. Hawaii total landings of albacore (4.1 million lb) was a 33% increase from 1998, and 125% above its long term average. Landings of albacore by longline vessels increased by 79% in 1998 and was double the long-term average. Other areas did not report landings of albacore.

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

Hawaii landings of bigeye tuna (6.2 million lb) were down 18% from 1998 with almost all (97%) caught by longline. No other areas reported bigeye landings apart from American Samoa, where the emergent albacore fishery caught 19,031 lb of bigeye tuna (+234%).

Skipjack tuna landings in American Samoa in 1999 (87,231 lb) continued to rebounded from the 1997 drop, gaining 58% for the second year in a row. Landings exceeded the long term average for the first time in four years. Increased effort resulted in increased landings for both the troll (106%) and longline (40%) fisheries. Due to the focus on longlining, troll landings were still 60% below the long term average. Trolling catch rate reached a seven year high at 17.8 lb/hr, and was 65% above the 1998 catch rate. Guam skipjack landings in 1999 (120,137 lb) continued a four year slide from the 1996 all time high of 239,006 lb. This represented a one year decrease of 37%, and a 50% decrease from 1996. Catch rates also dropped substantially (-31%) to 2.20 lb/hr in 1999. Hawaii skipjack landings of 1.9 million lb increased 36% but was remained below the long-term average for the second consecutive year. The skipjack were caught principally by baitboats, which landed 1.3 million lb of skipjack in 1999. Northern Marianas Islands 1999 skipjack landings were 36% lower (85,087 lb) than 1998, and the catch rate decreased by 19% from 1998 and was one half the long-term average.

Yellowfin tuna landings in American Samoa (152,243 lb) increased by 59%; the longline fleet caught 93% of the yellowfin which had catch rates (for both data methods) more than double that of 1998. Catch rates increased 13% in the troll fishery but was still below the long term average. Guam yellowfin landings (126,858 lb) decreased 8% in 1999. Catch rates were the same as 1997 (2.30 lb/hr) and 31% above the long-term average. The total Hawaii commercial landings of yellowfin (3.9 million lb) were 2.6% higher than 1998 and equal to the long-term average. Landings of yellowfin by commercial trollers and handliners in 1999 increased by 29%, while landings by longliners decreased by 34%. The commercial trolling catch rate of yellowfin decreased by 4.5% during 1999 and the catch rate from handline fishing decreased by 18%. Longline catch rates of yellowfin by directed tuna trips were 30% below 1998 rates. Northern Mariana Islands yellowfin landings rebounded in 1999 to 19,359 lb, a 66% increase from 1998 and 36% above the long term average. Catch rates in 1999 doubled from 1998 (11.01 lb/hr) and were 15% above the long-term average.

Wahoo landings in American Samoa continued its dramatic increase in 1999 (+19%) to the highest level yet, five and one half times the long term average. This increase in landings was generated from the longline fishery as catch from trolling was only 1% of the total. The trolling catch rate remained stable, but was 16% off the long term average at 0.37 lb/hr. Guam's wahoo landings have shown extreme yearly variability, dropping 51% in 1999 after a 140 % increase in 1998 and a 56% decrease in 1997. Wahoo landings in Hawaii increased from 800,000 lb to 1,000,000 lb between 1998 and 1999. The 1999 trolling catch rate for wahoo in Hawaii was up 12.5% and 41% above long-term average. Northern Marianas wahoo landings (6,395 lb) and catch rate (3.64 lb/trip) both increased by 27% and 61% respectively. The catch was 5.7% below the long term average and the catch rate was 23% below the long term average CPUE.

D. Gear

Troll fisheries continue to dominate the domestic fisheries in Guam and the Northern Mariana Islands, in contrast to American Samoa, where the emergent longline fishery now accounts for 96% of PPMUS landings. 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 1999 accounted for 77% of the landed volume of PPMUS.

III. Issues

Bycatch and protected species interactions continued to drive most of the management initiatives of the Western Pacific Council in 1999. The Council's seabird-longline mitigation project was completed in 1999, with a resulting framework measure voted on by the Council and sent into NMFS in December. This study was complemented in early 1999 by a mitigation study conducted by the NMFS Honolulu Laboratory from the NOAA research vessel *Townsend Cromwell.*

The Council also began action to create a management regime for the incidental catch of sharks, which continue to be kept for their fins, in the longline fishery. The potential proposal will likely included trip limits for non-blue sharks, an annual harvest guideline for blue sharks, and the prohibition of demersal longline gear which had been introduced to Hawaii in 1998 to target coastal sharks. No Council action on the proposed amendment occurred in 1999. Calls for a ban on finning from non-government environmental and conservation groups led to legislation introduced into the state government. No action was taken in the state legislature on this measure in 1999.

On February 24, 1999, Earthjustice Legal Defense Fund, on behalf of the Center for Marine Conservation and Turtle Island Restoration Network, filed a lawsuit against the National Marine Fisheries Service in Honolulu federal court. The plaintiff asserted that NMFS was in violation of the National Environmental Policy Act for failing to complete a proper Environmental Impact Statement for the pelagic fisheries and in violation of the Endangered Species Act for allowing longline fishing to continue in a manner that jeopardizes the continued existence of leatherback, olive ridley and loggerhead turtles. On December 27, 1999 NMFS issued a court-ordered injunction closing an area north of 28° between 168°W and 150°W to the Hawaii-based longline fleet. This closure, almost entirely within international waters, does not apply to other US fisheries or foreign fisheries. Non-Hawaiian-based fisheries account for approximately 97% of longline effort in the north Pacific and operate on the same fishing grounds with similar techniques.

A framework measure to implement a 50- and 30-nm area closure around the main islands and Swains Atoll, respectively, was sent to the SW Regional Administrator in 1998, but was subsequently disapproved. Work commenced again in 1999, following recommendations received from NMFS. The revised document is expected to be submitted in 2000. (see Administrative Activities, p. 13).

IV. 1999 Recommendations

1. **The Council should support an analysis of trends in mahimahi and ono landings and catch rates, and other incidental catches (i.e. opah pomfret rainbow runner etc), throughout the western Pacific region, including data from EEZ and distant water fisheries**

2. **Because the longline fishing is expanding in terms of ports of landings the Council should authorize NMFS to use VMS information to monitor logbook compliance. The Plan Team believes this information to be vitally important for other fishery monitoring and assessment purposes. At a minimum VMS data on noon positions should be provided to allow some approximate validation of logbook reported positions**

3. **All of the annual report modules should attempt to address bycatch reporting requirements of the SFA.**

4. **Council should seek similar provisions excluding tagged and/or released fish from being counted as bycatch as are given for Atlantic HMS.**

V. Plan Administration

A. Administrative Activities

A regulatory amendment proposed by the Council to close an area around American Samoa to fishing for PPMUS by vessels more than 50 feet in length was disapproved by NMFS on March 11, 1999. NMFS determined that the proposal was not consistent with National Standard 4 (allocations of fishing privileges among US fishermen must be fair and equitable), National Standard 5 (restricting large vessels' access to the near-shore fishery would impose economic costs, or inefficiencies, and the record for the proposal did not show those costs would have been outweighed by benefits to the stocks, fishing communities, or small vessel fishermen), and National Standard 7 (the closure would result in administrative and enforcement costs which did not appear justified in light of the projected benefits). Work commenced again in 1999, following recommendations received from NMFS. The revised document is expected to be submitted in 2000.

A second regulatory amendment proposed by the Council to require the use of a minimum of two seabird deterrents north of 25° while employing pelagic longline gear was submitted to NMFS in December 1999.

B. Longline Permits

During 1999, 164 permits, the maximum allowed under the FMP, were maintained in the Hawaii longline limited entry fishery. Administrative activities at PIAO primarily involved the transfer of 23 Hawaii longline limited permits. Of the 164 issued permit holders, 26 were without vessels for those permits. One receiving vessel permit was issued this year in Hawaii. PIAO also processed and issued Western Pacific general longline permits for the pelagic fisheries in American Samoa (63 permits), Guam (5 permits), and the Northern Mariana Islands (1 permit). The number of longline permits issued in American Samoa increased dramatically for the third straight year, with 16 new permits in 1998 and 14 new permits in 1999.

The names of vessels registered with Hawaii limited entry and Western Pacific longline 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 US has a Governing International Fishing Agreement.

Table 3. 1999 Hawaii longline limited entry permit holders

Hawaii limited entry longline fishery

VESSEL	PERMIT HOLDER
F/V ADRAMYTTIUM	THK Fishing Inc.
F/V ANNA	MTA Corp.
F/V ARROW	David Kelly
F/V BARBARA H	Arthur/Barbara Haworth
F/V BIG AL	R & R Fisheries Inc.
F/V BLUE DRAGON	B Dragon Corp.
F/V BLUE FIN	Liet An Lu/Mai Thi Do
F/V BLUE SKY	Blue Sky Fishing Producer
F/V BRANDI	Success Inc.
F/V CAPT. DAVIS	Ho Son Nguyen
F/V CAPT. DIAMOND	Capt. Diamond Inc.
F/V CAPT. GREG	Aquanut Co. Inc.
F/V CAPT. KEVIN	Kevin Tran LLC
F/V CAPT. LE	L & T Fishery Corp.
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 CAPT. VINCENT	Triple N Fishery Inc.
F/V CHRIS	Kan-Do Pesca Inc.
F/V CORI DAWN	Cori Dawn Corp.
F/V CRYSTAL	Davis B Inc.
F/V DAE IN HO	KYL Inc.
F/V DAE IN HO IV	Wynne Inc.
F/V DAEINHO III	Chunha Inc.
F/V DASHER II	DukSung Fishing Inc.
F/V DEBORAH ANN	Amko Fishing Co. Inc.
F/V DOUBLE D	Joseph Dettling
F/V EDWARD G	Edward G. Co. Inc.
F/V ELIZABETH VII	Tok Chun Son
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 Co., Inc.
F/V GLORY	Roy Yi
F/V GRACE	Sang Yeol Kim
F/V HAVANA	Thomas Webster
F/V HAWAII POWER	Intl. Quality Fishery Inc
F/V HEOLA	H & M Marine Inc.
F/V HOKUAO	White Inc.
F/V ICY POINT	Pacific Fisheries Corp.
F/V INDEPENDENCE	Independence Inc.
F/V JANTHINA	Trans World Marine Inc.
F/V JENNIFER	Kil Cho Moon
F/V KAIMI	Vessel Management Assoc.
F/V KALOKE ANA	Kaloke Ana Fishing Inc.
F/V KASATKA	Artemon Basargin
F/V KATHERINE II	K.A. Fishing Co. Inc.
F/V KATHERINE III	K.R. Fishing Inc.
F/V KATHERINE Y	Song Fishing Corp.
F/V KATY MARY	Vessel Management Assoc.
F/V KAY	K.Y. Fishing Inc.
F/V KELLY ANN	Kelly Ann Corp.
F/V KEMA SUE	Kema Sue Inc.
F/V KILAUEA	Aukai Fishing Co.Ltd.
F/V KIM THANH I	Kim Thanh I Inc.
F/V KIMMY I	Kim Tran
F/V KING DIAMOND II	Scotty Nguyen
F/V KINGFISHER	Quan Do
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 ANN MARGARET	Lady Ann Margaret Inc.
F/V LADY CHRISTINE II	Christine Tran Inc.
F/V LADY CHUL	Jong Ik Fishing Co. Inc.
F/V LADY LINDA	V Nam Inc.
F/V LEA LEA	M.S. Honolulu Inc.
F/V LIBERTY	Yu & AAS Corp.
F/V LIHAU	White Inc.
F/V LILA	Samuel Lee
F/V LUCKY I	Duoc Nguyen
F/V LUCKY THREE	Pacific Seafoods Inc.
F/V MAN SEOK	KMC & PCC Inc.
F/V MANA LOA	Two Bulls Inc.
F/V MARIE M	Viking V Inc.
F/V MARINE STAR	Viking V Inc.
F/V MIDNIGHT II	Albert K. Duarte
F/V MISSJANE	Palmer Pederson Fisheries
F/V MISS JULIE	Quan Do
F/V MISS LISA	Miss Lisa Inc.
F/V MOKULELE	Robert Cabos
F/V NORTHERN VENTURE	Vessel Management Assoc.
F/V OCEAN DIAMOND	Ocean Diamond Inc.
F/V PACIFIC DREAM	Pacific Seafoods Inc.
F/V PACIFIC FIN	Fishrite Inc.
F/V PACIFIC HORIZON	John Gibbs
F/V PACIFIC PARADISE	Twin N Fishery Inc.
F/V PACIFIC PRIDE	Pacific Seafoods Inc.
F/V PACIFIC REFLECTION	Gunn Pacific Reflection
F/V PACIFIC STAR	N. Pac Fishery Inc.
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 POHO NUI	Vessel Management Assoc.
F/V PRINCESS K	Princess K Fishing Corp.
F/V PURPLE MARCH	PN Inc.
F/V QUEEN DIAMOND	Santa Maria III 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 RED OCTOBER	Pacific Fishing & Supply
F/V ROBIN	Fat City Fishing
F/V ROBIN II	Robin Fishing Inc.
F/V RUBY STORM	Allen C. Witbeck Sr.
F/V SANDY DORY	Highliner Inc.
F/V SAPPHIRE	Hanh Thi Nguyen
F/V SEA DIAMOND	Nancy Nguyen
F/V SEA DIAMOND II	Sea Diamond II Inc.
F/V SEA DRAGON	Long Thanh Nguyen
F/V SEA DRAGON II	Sea Dragon II Inc.
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 QUEEN II	Thoai Van Nguyen
F/V SEA SPIDER	Paul Seaton, Trustee
F/V SEA SPRAY	Sea Spray LLC
F/V SEASPRAY	Hanson/Hanson Fishing Co.
F/V SEEKER II	Seeker Fisheries Inc.
F/V SEVEN STARS	Kwang Myong Co. Inc.
F/V SPACER K	Hwa Deog Kim
F/V ST. MICHAEL	Tony/Lorna Franulovich

F/V SUNFLOWER III	Le's Brothers Fishing Inc.
F/V SWORDMAN I	Swordman Inc.
F/V SYLVIA	B-52 Inc.
F/V TUCANA	Pacific Boat Corp. Inc.
F/V ULHEELANI	Ulheelani Corp.
F/V VENTURER I	Hai Van Nguyen
F/V VICTORIA	Victoria Inc.
F/V VIRGINIA CREEPER	Sylvan Seafoods Inc.
F/V VUI VUI II	Vui Vui, A Limited Partne
F/V VUI-VUI	Santa Maria III Inc.
F/V WHITE NIGHT	Natalia/Kiril Basargin
F/V WONIYA	Sierra Fisheries Inc.

Hawaii longline permit holders without vessels

B.E.L. Leasing Inc.
James Chan Song Kim
Shaman Partnership
Vedoy Enterprises Inc.
Master Vincent Inc.
Hanh Thi Nguyen
Vessel Management Assoc.
Ocean Associates Corp.
Khanh Truong
H & M Marine Inc.
Lindgren-Pitman Inc.
All Star Fishery Inc.
Vessel Management Assoc.
Hana Like Inc.
Andy Hoang
Theodore Benjestorf
David B.H. Ho
Pacific Fishing & Supply
Karen Thi Tran
Tom C.Y. Kim
Larry DaRosa
Frank W. James
Vessel Management Assoc.
Vessel Management Assoc.
Craig Yeackel
Vessel Management Assoc.

1999 Western Pacific General Longline Permit

American Samoa Pelagic Fishery

VESSEL	PERMIT HOLDER
F/V 38 SPECIAL	Peter Reid
F/V AAONE	Asaua Fuimaono
F/V ALEUTIAN BEAUTY	Dan Gunn
F/V ALIA O SINA	Afoa Moega Lutu
F/V AMIGO	Jay Vaoalii
F/V ANO	Steve Vaiau
F/V CAPTAIN JUSTIN LUTU	Afoa Lures
F/V CLASSIC CAT	Frank Gaisoa
F/V DOS GRIS	George Poysky III
F/V EAGLE II	Steve Haleck
F/V EVERGREEN	Palota Faapoi
F/V FAISUA	Sui Aveina
F/V FAIVAIMOANA I	Faivaimoana Fishing Co Ltd
F/V FAUVASA	Lemaisu Fesili
F/V FOTOLUPE	Lautogia Taula
F/V FUATINO	Nana Aveina
F/V GREEN PEACE I	Maselino Ioane
F/V GREEN PEACE II	Maselino Ioane
F/V ISABELLA	Jose Lugo
F/V JOHANNA	Luis Diaz
F/V JOHN G	South Pacific Aquatics
F/V LADY ALAMAI	Faiivae Galeai
F/V LADY ALVINA	Afoa Moega Lutu
F/V CARMEN	Eliseo Mamani
F/V LADY ELINOR	Afoa Lures
F/V LADY FRANCELLA	Faamausili Pola
F/V LADY GEORGIA	Paepae Simi
F/V HANNACHO II	Afoa Lutu
F/V LADY HERMINA	Jadran Satalic
F/V LADY LU	Lu's Fish Grotto
F/V LADY POLATAI	Tagaimamao Masaniai
F/V LADY RUTA	Tau Malae
F/V LADY TIANA	Polone Savea
F/V LADYSMITH	Coastal&Offshore Pac Corp
F/V LUPESINA	Maselino Ioane
F/V MAHI MAHI	Lorn Cramer
F/V MALIA	Uili Talimao
F/V MERRY EMMELY	Malua/Henry Nickel
F/V MISS MIHI	Timothy Jones
F/V MONA OF THE OCEAN	Terry Chang
F/V MOSI I	Fiavivini Atofao
F/V MOSI II	Fiavivini Atofao
F/V MTC	Faatauvaa Kitiona
F/V NORTH STAR	Richard Mathisen
F/V NORTHWEST	Harbor Refuse & Environm
F/V OFIRA	Asaua Fuimaono
F/V ORION NO. I	Laszlo Lukacs
F/V PRINCESS DANIELA	Afoa Lures
F/V PTL LIGHT BOAT	Lino Schwenke
F/V RACHEL	Bethel Inc.
F/V REEL CAT	Dave Haleck
F/V SAVANNA	PJ Wulf Engineering
F/V SEA VENTURE	Daniel/Douglas Gunn/Williscroft
F/V SILVER BULLET	David Pedro
F/V SINATALA	Valavala Enosa
F/V SINATALA II	Valavala Enosa
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 TABU SORO	Bruce A. Mounier Jr.
F/V TAE SUNG	Byoung In Ki
F/V WILD CAT	Neil/Alfred Annandale

Guam Pelagic Fishery

VESSEL	PERMIT HOLDER
F/V ATALOA	Jim/Nathan Elliott
F/V KARIYUSHI	Guam YTK Corp.
F/V LADY KATHERINE	Ocean Bounty Inc.
F/V MAIKAZE	Robert Joslin
F/V PIONEER	Sunbeam Seafoods Inc.

Commonwealth of the Northern Mariana Islands Pelagic Fishery

VESSEL	PERMIT HOLDER
F/V CHARITO	Renato Azucenas

Hawaii Receiving Vessel Permit

VESSEL	PERMIT HOLDER
F/V NESIKA	Jamie Lee Razov

D. Protected Species Conservation

The Hawaii longline fishery targeting swordfish and tunas has been monitored under a mandatory observer program since February 1994. Beginning March 1994, branch personnel have conducted daily shoreside dock rounds in Honolulu to determine which fishing vessels are in port. These dock rounds are used to obtain an estimate of fishing effort on a real-time basis by assuming that a vessel is fishing when it is absent from the harbor. Approximately 1,138 vessels departed port between January 1, 1999, and December 31, 1999, 38 of which carried observers, representing about 3.3% observer coverage. The following table summarizes protected species interactions for all observed trips that returned during calendar year 1999. Total observed fishing effort was approximately 687,703 hooks and 463 sets; 30 sea turtle and 4 marine mammal interactions were observed.

Loggerhead turtles were the species most often involved in observed interactions (Table 4) with longline gear, followed by olive ridleys, then greens and leatherbacks. Of the 30 turtles observed taken, 27 were released alive, 0 were released injured and 3 released dead (Table 4).

Table 4. Observed longline gear/turtle interactions, 1999

Turtle Species	Condition		
	Released Alive	Dead	Total
Loggerhead	17	0	17
Olive Ridley	6	1	7
Leatherback	1	1	2
Unidentified Hardshell	1	0	1
Green	2	1	3
Hawksbill	0	0	0
TOTAL	27	3	30

Estimating total incidental turtle take and mortality for the longline fleet has continued to be a problem for the NMFS Honolulu Laboratory. This is due in part to the low observer coverage (<5%), the rarity of longline-turtle interactions and the different targeting strategies of the elements that comprise the longline fleet. During 1998, the NMFS Honolulu Laboratory produced a report[5] that included the most statistically reliable estimated takes and kills of turtles in the longline fishery based on a classification and regression tree model. These estimates, the allowable take and kill levels, determined from the 1994 biological opinion under Section 7 of the Endangered Species Act, were introduced in 1997. This year, a detailed report explaining the

5. Kleiber, P. 1998. Estimating annual takes and kills of sea turtles by the Hawaiian longline fishery, 1991-97, from observer program and logbook data. Honolulu Laboratory, Southwest Science Center, National Marine Fisheries Service, NOAA, Administrative Report H-98-08, 15 pp.

statistical methodology used to estimate total turtle take and mortality in the Hawaiian longline fishery was produced by the NMFS Honolulu Lab. This report builds on the 1998 report cited on the previous page.

Table 5. Estimated fleet-wide turtle takes and kills in the Hawaiian longline fishery, 1994-1999

Species	Allowable Level	Estimated Takes					
		1994	1995	1996	1997	1998	1999
Loggerhead	489 (305*)	501	412	445	371	407	369
95% CL		315-669	244-543	290-594	236-482	259-527	234-466
Olive Ridley	168 (152*)	107	143	153	154	157	164
95% CL		70-156	90-205	103-210	103-216	102-221	111-231
Leatherback	244 (271*)	109	99	106	88	139	132
95% CL		68-153	62-141	69-148	55-124	79-209	76-193
Green	52 (119*)	37	38	40	38	42	45
95% CL		15-65	15-70	19-70	14-73	18-76	18-82
Species	**Allowable Level**	**Estimated kills**					
		1994	1995	1996	1997	1998	1999
Loggerhead	103 (46*)	88	72	78	65	71	64
95% CL		36-141	31-115	34-127	28-102	32-112	28-102
Olive Ridley	46 (41*)	36	47	51	51	52	55
95% CL		8-64	7-84	11-90	8-92	11-92	11-96
Leatherback	19 (23*)	9	8	9	7	12	11
95% CL		0-22	0-21	1-21	0-18	1-28	1-27
Green	15 (18*)	5	5	5	5	5	6
95% CL		0-16	0-17	1-17	0-17	1-19	1-19

Data from SWFSC Administrative Report H-00-06

*Numbers in parenthesis indicate authorized take and kill levels for 1994-1997. Current authorized take and kill levels are for 1998-1999.

Marine mammal and seabird interactions were also recorded by the observers and are summarized below in Tables 6, 7 and 7a.

Table 6. Observed longline gear/marine mammal interactions, 1999

Marine mammal species	Condition		
	Released alive	Released dead	Total
Monk Seals	0	0	0
Humpback whales	0	0	0
False killer whales	0	0	0
Other whales	2	0	2
Dolphins	2	0	2
Total	4	0	4

Table 7. Observed longline gear/seabird interactions, 1999

Seabird Species	Condition		
	Released alive	Returned dead	Total
Black-footed albatross	7	36	48
Laysan albatross	7	21	28
Total	14	57	71

Table 7a. Total observed longline gear/seabird interactions, 1994-1999

Species	Condition				
	Released alive	Released Injured	Returned dead	Unknown	Total
Black-footed albatross	2	90	384	1	477
Laysan albatross	12	106	242	1	361

* In 1999, NMFS data did not differentiate between released alive and returned dead. Subsequently, all 1999 released alive seabirds were added to the Released Injured column of Table 7a.

Concern for the numbers of albatross taken by the Hawaiian longline fleet has been an important concern for the NMFS Honolulu Laboratory. Estimates of total incidental seabird take and mortality for the longline fleet have been determined in the same fashion as were for the turtle takes. Similar problems with low observer coverage (<5%), the rarity of longline-seabird interactions and the different targeting strategies of the elements that comprise the longline fleet exist for these estimates as well. These numbers are based on a similar classification and regression tree model. These estimates and the allowable take and kill levels, determined from the 1994 biological opinion under Section 7 of the Endangered Species Act, were introduced in 1998 and will continue in future reports.

Table 8. Estimated fleet-wide seabird takes in the Hawaiian longline fishery, 1994-1999

Species	**Estimated takes**					
	1994	1995	1996	1997	1998	1999
Blackfoot albatross	1830	1134	1472	1305	1283	1301
95% CI	1457-2239	899-1376	1199-1811	1077-1592	1028-1601	1021-1600
Laysan albatross	2067	844	1154	985	981	1019
95% CI	1422-2948	617-1131	835-1600	715-1364	679-1360	688-1435

E. <u>USCG Enforcement Activities</u>

The USCG conducted roughly 800 hours of fisheries patrols with C-130 aircraft in the Central and Western Pacific ocean during fiscal year 1999. The C-130 surveillance of the eight non-contiguous EEZs was broken down as follows: 140 hours in the Main Hawaiian Islands, 90 hours in the Northwest Hawaiian islands, 420 hours in Guam and the Northern Mariana Islands, 25 hours in American Samoa, 20 hours in Palmyra Atoll/Kingman Reef, 40 hours in Jarvis Island, and 30 hours in Howland/Baker Islands.

In FY 1999, over 250 cutter days of fisheries patrol was conducted in the Central and Western Pacific ocean. There was a total 401 fishing vessel boardings. The breakdown of vessels boarded is as follows: 302 were U.S and 99 were foreign.

It is estimated that 44 EEZ encroachments by foreign fishing vessels occurred in FY 1999 and twelve suspected violators were intercepted by Coast Guard units. The Coast Guard responded to several significant MFCMA violations by U. S. fishing vessels cued by the NMFS Vessel Monitoring System in FY 1999, including:

F/V LEA LEA was boarded in January 1999 after the NMFS VMS indicated an incursion into the Protected Species Zone around Necker Island. The closed area violation was documented and a case package forwarded to NMFS for disposition.

F/V NORTHERN VENTURE was boarded in March 1999 after the NMFS VMS indicated an incursion into the Longline closed area around Oahu. The closed area violation was documented and a case package forwarded to NMFS for disposition.

F/V KING DIAMOND was boarded in June 1999 after the NMFS VMS indicated an incursion into the Protected Species Zone around Necker Island. The closed area violation was documented and a case package forwarded to NMFS for disposition.

There were numerous other violations documented on commercial fishing vessels in the region.

Vessel Monitoring System

The NMFS OLE currently operates a satellite-based fishing vessel monitoring system to help determine the location and activity of vessels fishing around the Hawaiian Islands. VMS can also be used to receive catch and effort data from the fleet, transmit and receive messages, and accurately locate vessels during an emergency. While VMS is currently used only for fisheries around the Hawaiian Islands, this past year the NMFS tested the system in another fishery in the western Pacific, and has considered the potential in all areas of the western Pacific where the United States exercises jurisdiction over about 1.5 million square miles of ocean.

A four-month VMS demonstration project in American Samoa with the voluntary participation by four vessels, and the assistance of the American Samoa Government Division of Marine and Wildlife Resources has been completed. Two prototype Argos transmitters were tracked successfully from Hawaii, and demonstrated that small boats with limited electrical power could be monitored reliably in remote areas.

The Hawaii Vessel Monitoring System (VMS), monitored in the 14th District Command Center by NMFS and USCG, continues to be an effective surveillance and enforcement tool. In 1999, there were 146 fisheries investigations opened, cued by the VMS information. Using "signature analysis" USCG and NMFS identify possible incursions into the main Hawaiian Island (MHI) longline closure area and the Northwest Hawaiian Island (NWHI) Protected Species Zone (PSZ). This information is passed to patrolling cutters for investigation during at-sea enforcement boarding.

The Southwest Vessel Monitoring program has also provided assistance in monitoring the longline observer program. Daily updates to the list of observed vessels, and vessels with observer waivers, have been incorporated into the VMS control center. In addition, the NMFS VMS control center has also been upgraded to enhance security, and to allow investigators access to federal permit information via the VMS database.

Meetings and Conferences

Throughout 1999, the 14th District Law Enforcement Branch actively participated in meetings and conferences in support of the protection of living marine resources. These events ranged from informal gatherings of fisheries enforcement officials to our participation in two meetings of the Multilateral High Level Conference (MHLC4 and 5) on Highly Migratory Species.

F. NMFS enforcement activities

Special agents of the NMFS, Office for Law Enforcement conducted investigations of alleged violations of NOAA statues and regulations, including the Magnuson-Stevens Fisheries Conservation and Management Act (MSFCMA), the Lacey Act, the Marine Mammal Protection Act, and the Endangered Species Act. During 1999, special agents were assigned to Honolulu, Hawaii, Pago Pago, American Samoa; and Honiara, Solomon Islands. NMFS Enforcement maintained liaison activities with the FFA throughout 1999. Most notably in 1999, a foreign fishing vessel was fined $105,000 for illegally fishing in the Exclusive Economic Zone (EEZ) of American Samoa.

Enforcement Activities continue at the Humpback Whale National Marine Sanctuary on Maui, Hawaii. Moreover, NMFS special agents contributed to a comprehensive public education program sponsored by the Sanctuary in 1999.

Table 9. Ex-vessel value of commercial fishery landings by domestic and foreign vessels at major US ports.

Port	Value of Landings -Million Dollars-		
	1997	1998	1999
Pago Pago, American Samoa	192.7	232.0	187.3
Dutch Harbor-Unalaska, Alaska	122.6	110.0	140.8
New Bedford, Massachusetts	103.2	93.5	129.9
Agana, Guam	NA	NA	99.0
Kodiak, Alaska	88.6	78.7	100.8
Brownsville-Port Isabel, Texas	46.1	64.2	65.2
Honolulu, Hawaii	53.7	49.0	52.1
Key West, Florida	54.9	44.8	51.9
Reedville, Virginia	29.5	42.6	32.4
Point Judith, Rhode Island	47.6	41.8	51.2

Sources: National Marine Fisheries Service and Western Pacific Fishery Management Council.

Appendix 1

Territory of American Samoa
1999

Introduction

The pelagic fishery in American Samoa has historically been an important component of the traditional domestic fisheries. The fishery was first monitored in the mid 1970s and operated on a similar small scale until 1995 when a local longline fishery began developing. Prior to 1985, only commercial landings were monitored. From October 1985 to the present, data were collected through a creel survey that included subsistence and recreational fishing as well as commercial fishing. In 1999 53 vessels participated in the fishery.

The "troll" data mentioned in this report includes all non-longline caught pelagic species which contain some pelagic species, such as barracuda and dogtooth tuna, caught with bottomfishing or spearfishing method. These species include barracuda and dogtooth tuna. Newly discovered "peculiarities" in the historical data, the emergence of a new stratum of boats, and the need to include landings of the large domestic inboards necessitates amending algorithms that expands American Samoa's survey sample data. WPacFIN staff have been working diligently on FoxPro data processing systems to address these data concerns to better reflect the status of the territory's pelagic fisheries. Thus the historical data (1982-1999) in this report have been re-expanded with the new FoxPro data processing. Note that there are some changes to the historical data due to the new re-expanded data. As a result, the graph presentations have also changed.

Prior to 1995 the pelagic fishery was largely a troll-based fishery. In mid-1995 four vessels began longlining and in 1997, 33 vessels had permits to longline: approximately 17 of those were actively fishing on a monthly basis. In 1998, 50 local vessels received federal permits to longline but only 26 did longline. This year 59 local vessels received federal permits to longline but only 28 participated in the longline fishery. The horizontal method of longlining was introduced to the Territory by Western Samoan fishermen a few years ago. 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. Apart from a couple of bigger (>40ft) inboards participating, the vessels most frequently used are the "alias", twin-hulled (wood with fiberglass or aluminum) boats about 30 feet long, and powered by small 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 about a day long (about 8 hours) with the exception of 2 boats which go out fishing more than one day. These boats are much bigger than the regular 30 feet alia. 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.

On July of 1999, 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. During 1999, the logbooks submitted by the local longliners were edited for any missing data and then were sent to the NMFS Honolulu Lab every week for further editing and data processing.

Both Offshore Creel Survey and Longline Logbook Data showed almost no By-Catch or Released species during 1999. No fishing tournaments occurred during 1999.

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 by surveying domestic pelagic fishing activities throughout the year. Except for the last figure (figure 21) it does not contain data on distant-waters landings at the canneries. This report partially fulfills the national standard requirement for a Stock Assessment and Fishery Evaluation (SAFE) report.

Summary

During 1999, a decrease of 16% in total landings of all pelagic species was recorded (Figure 1), but trolling effort increased about 27%. Prices for pelagic species remained relatively the same with a slight decrease this year. Estimated commercial landings decreased about 18% this year with a total of 1,025,535 pounds.

This year, only 28 vessels longlined out of a total 59 boats that received federal longline permits. Local boats have been targeting albacore mostly for the cannery market and have caused the albacore harvest to increase 54% in1998, but a decrease of 30% this year even though there was an increase in longline effort. This apparently illustrates decreased abundance of albacore in 1999. The local longline fleet deployed 2102 sets and a total of 912,742 hooks. Local longlining this year recorded 32 fish per 1000 hooks and an average 34 pounds per fish. Trolling catch rates for blue marlin and wahoo have dropped since 1996, but this may not be related to the increase in longline activity. However, we may be seeing evidence of "localized over-fishing" and gear interactions.

1998 Recommendations and **current status:**

1. Integrate creel survey and federal logbook data to provide a more complete picture of the domestic longline fishery, preferably in next years report.

Efforts to integrate creel survey and federal logbook data are in the programming phase with WPacFIN programmers at the present. Some comparative data are presented in this report.

2. Add CPUE comparison between creel survey and log book data in future reports.

Preliminary comparison data is presented in Table 3 of this report.

3. Continue to work with WPacFIN to improve and implement algorithms that better represent all offshore fisheries in American Samoa.

WPacFIN is closely working with DMWR personnel at the present to improve and implement algorithms so DMWR can better represent all offshore fisheries for American Samoa in the future. Improved data is included in this report

1999 Recommendations:

1. Local based fishing activity has increased substantially on Aunu'u, the small island about 1 mile off Tutuila's coast. Direct monitoring of this growing fishery needs to be addressed and, if appropriate, a sampler hired on Aunu'u to collect data on an on-going basis.
2. Develop and implement algorithms to include the Faivaimoana I, one of the local longline boats not included in the longline creel survey total landings. The catch, effort, and landings revenues from this vessel, and any future vessels which may begin landing directly at the cannery, should be integrated with the creel survey expansion data to better estimate the total local longline fishery.
3. During 1999, many of the longline boats began landing their catches gilled and gutted to obtain higher prices at the canneries. The new data systems need to be modified to implement size/weight conversion algorithms to calculate appropriate round weights for all species.
4. Continue to record bycatch data and to implement algorithms to include these data in future reports

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20 American Samoa average inflation-adjusted revenue per trip landing pelagic species for trolling method. 30

21 American Samoa average inflation-adjusted revenue per trip landing pelagic species for longline method. 32

22 Total cannery landings for Skipjack, Yellowfin, and Albacore tuna. 34

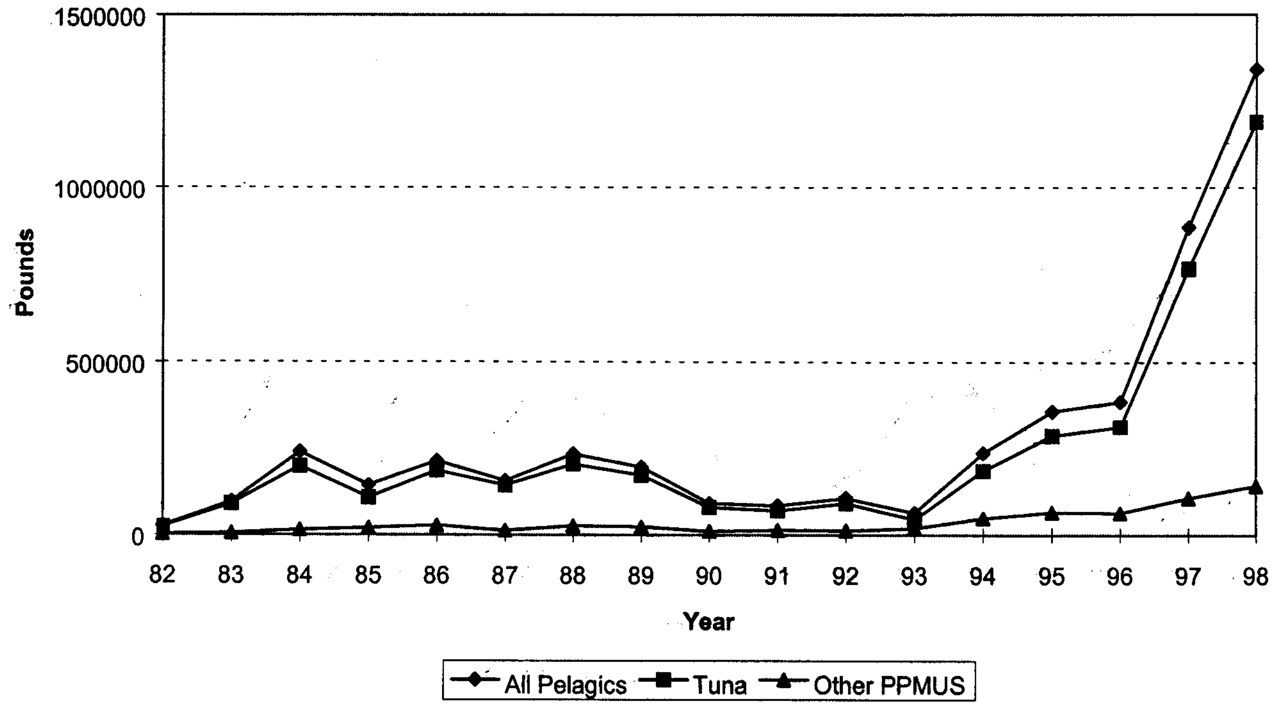
Table 1. American Samoa 1999 estimated total landings of pelagic species by gear type.

Species	LongLine Pounds	Troll Pounds	Other Pounds	Total Pounds
Skipjack Tuna	56711	30521	0	87231
Albacore	713733	0	0	713733
Yellowfin Tuna	141946	10297	0	152243
Kawakawa	0	110	0	110
BigeyeTuna	19031	0	0	19031
TUNAS SUBTOTALS	931421	40928	0	972349
Mahimahi	36569	2193	0	38761
Black marlin	3087	151	0	3238
Blue marlin	34986	590	0	35575
Wahoo	48113	618	17	48748
Dogtooth tuna	0	37	36	73
Other Sharks	940	0	0	940
Swordfish	206	0	0	206
Sailfish	7475	184	0	7659
Spearfish	1086	0	0	1086
OTHER PPMUS SUBTOTALS	132460	3773	53	136286
Barracudas	1757	765	179	2701
Rainbow runner	131	954	0	1086
Moonfish	7994	0	0	7994
Oilfish	58	0	0	58
MISC SUBTOTALS	9940	1719	179	11839
TOTAL PELAGICS	**1073821**	**46420**	**232**	**1120473**

Table 2. American Samoa 1999 estimated commercial landings, value and average price of pelagic species.

Species	Pounds	$/LB	Value($)
Skipjack Tuna	45788	$0.76	$34627
Albacore	710917	$1.01	$720864
Yellowfin Tuna	138423	$1.27	$175663
Kawakawa	71	$1.61	$113
BigeyeTuna	18438	$1.45	$26773
TUNAS SUBTOTALS	913636	$1.05	$958040
Mahimahi	28611	$1.52	$43347
Black marlin	3027	$0.89	$2699
Blue marlin	31902	$0.94	$29924
Wahoo	39853	$1.47	$58424
Dogtooth tuna	43	$2.36	$102
Sailfish	5136	$1.38	$7064
Spearfish	534	$1.50	$801
OTHER PPMUS SUBTOTALS	109105	$1.30	$142361
Barracudas	915	$1.81	$1657
Rainbow runner	104	$1.83	$189
Moonfish	1776	$2.00	$3552
MISC SUBTOTALS	2794	$1.93	$5398
TOTAL PELAGICS	**1025534**	**$1.08**	**$1105799**

Figure 1. American Samoa total annual estimated landings: all pelagics, tuna and other PPMUS



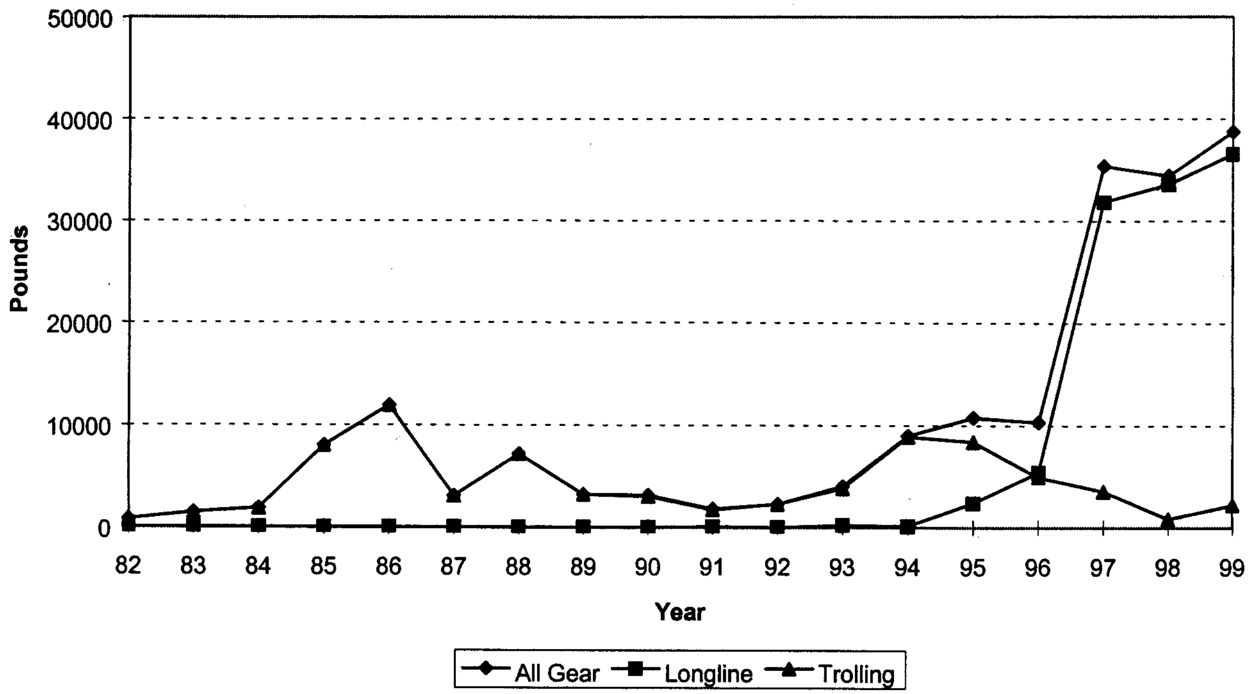
Interpretation: Total landings increased by 51% in 1998 but decreased about 16% this year even though number of boats and fishing effort increased both for longlining and trolling. Most of the pelagic species overall catch rates increased this year excluding albacore and blue marlin.This apparently indicates decreased abundance of albacore tuna and blue marlin during this period.

	Pounds Landed		
Year	**All Pelagics**	**Tuna**	**Other PPMUS**
1982	26396	23042	2106
1983	96318	90057	4806
1984	241099	198961	15121
1985	143212	107659	19686
1986	214932	186257	27433
1987	157040	144121	12526
1988	234774	205995	26344
1989	197811	173145	23006
1990	92388	80165	11212
1991	86075	71026	14446
1992	106373	92473	12654
1993	64465	45079	19033
1994	238856	187530	49479
1995	358824	288099	65727
1996	386467	315349	64529
1997	886071	767829	107774
1998	1341718	1190375	142156
Average	**286636**	**245127**	**36355**

Calculation: Estimated landing for tunas and other PPMUS were calculated by summing the total landings for the species in each category. Estimated landings for all pelagics represent the sum of tuna and other PPMUS plus landings from the miscellaneous category (see Table 1).

These figures include both commercial and recreational/subsistence components of the fishery.

Figure 2. American Samoa annual estimated landings for Mahimahi by gear.

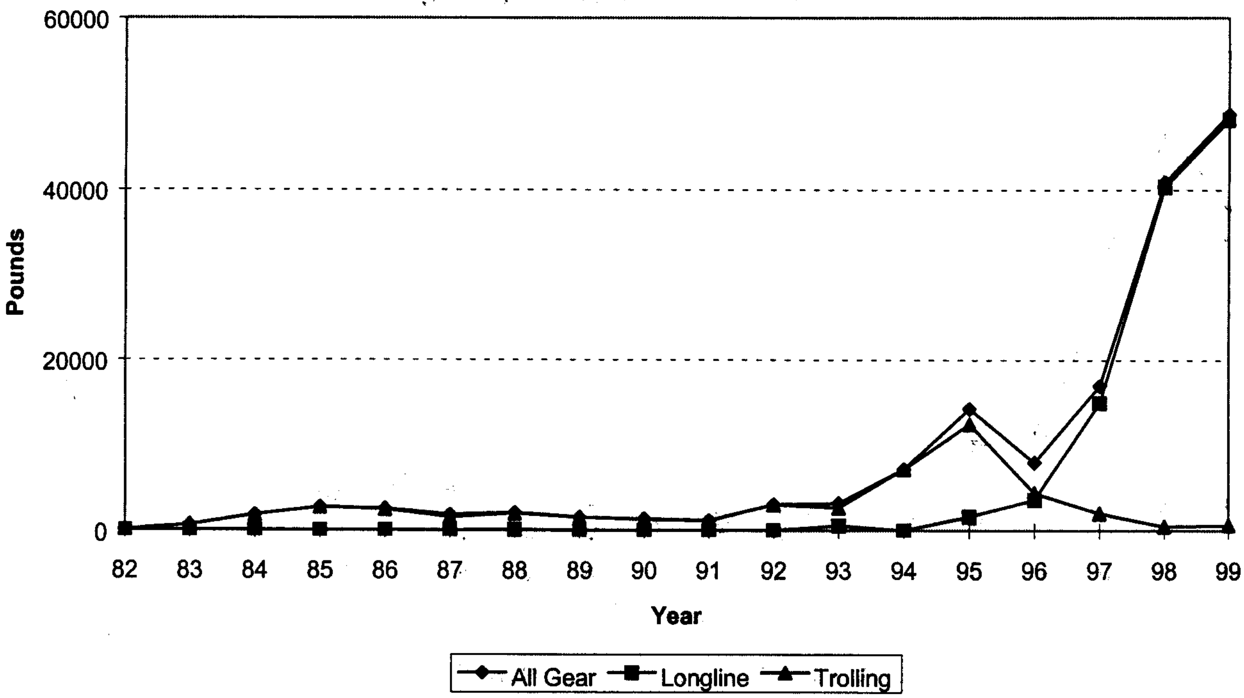


Interpretation: Mahimahi landings are variable across time, similar fluctuations occur in other WPacFIN regions. From 1984-1988 American Samoan fishermen exported mahimahi to Hawaii so landings were uniquely high. 1997 mahimahi landings were the largest since then, due to the influxed in longlining starting in 1995. Mahimahi landings in 1998 remained relatively the same. This year, longliners caught 94% of the mahimahi (Table 1).

Calculation: Estimated landings for mahimahi were summed for all gears.

	Pounds Landed		
Year	**All Methods**	**Longline**	**Trolling**
1982	777	0	777
1983	1443	0	1443
1984	1844	0	1844
1985	8011	0	8011
1986	11883	0	11883
1987	3051	0	3051
1988	7165	0	7165
1989	3201	0	3201
1990	3112	0	3011
1991	1785	52	1733
1992	2242	0	2242
1993	4024	215	3809
1994	8976	98	8878
1995	10750	2373	8377
1996	10301	5395	4906
1997	35377	31860	3517
1998	34422	33578	843
1999	38761	36569	2193
Average	**10396**	**6119**	**4271**

Figure 3. American Samoa annual estimated landings for Wahoo by gear.

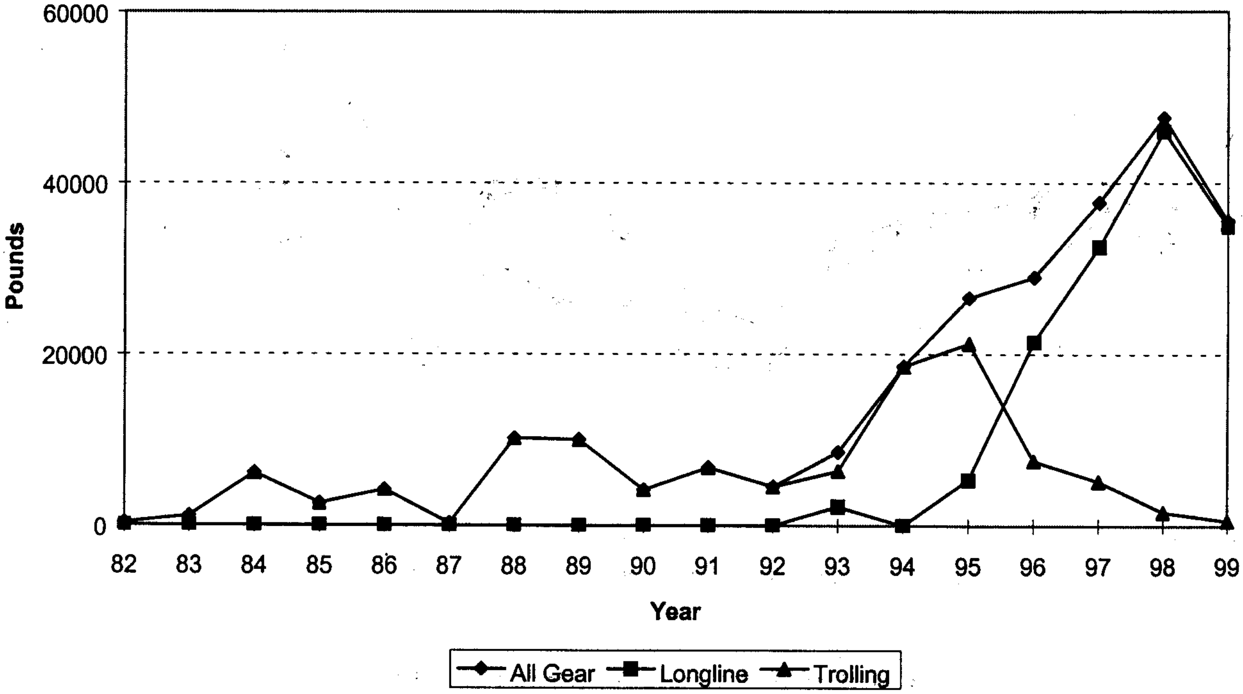


Interpretaion: Wahoo landings have increased dramatically since 1996 and continued to increase this year by 19%. Longliners took in 99% of wahoo in 1999 (Table 1). The continuous increase in wahoo landings is due to increases in longline trips and efforts.

Calculation: The estimated total yearly landings for wahoo were summed for all gears.

	Pounds Landed		
Year	**All Methods**	**Longline**	**Trolling**
1982	114	0	114
1983	632	0	632
1984	1777	0	1777
1985	2678	0	2678
1986	2513	0	2413
1987	1798	0	1506
1988	2039	84	1956
1989	1489	0	1489
1990	1319	0	1310
1991	1123	0	1123
1992	2994	0	2994
1993	3179	552	2627
1994	7125	0	7125
1995	14245	1642	12425
1996	7929	3574	4355
1997	16918	14917	2001
1998	40870	40324	487
1999	48748	48113	618
Average	**8749**	**6067**	**2646**

Figure 4. American Samoa annual estimated landings for Blue marlin by gear.

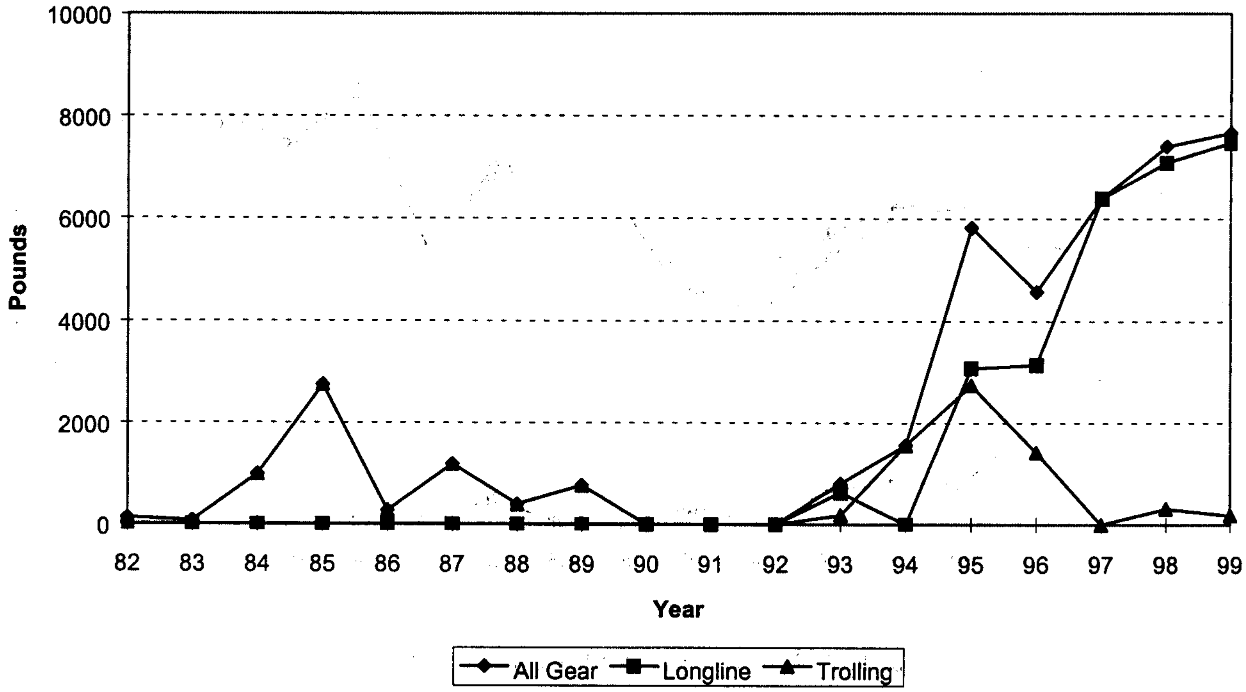


Interpretation: Increases in blue marlin landings for 1997 and 1998 were due to the increase in longlining trips and efforts, however there was a decrease of 25% this year. In 1999 longliners took in 98% of blue marlin landings whereas trolling took in only 2%; a dramatic decrease from the 26% and 14% for 1996 and 1997 respectively.

Calculation: The estimated yearly total landings of blue marlin were summed for all gears

	Pounds Landed		
Year	**All Methods**	**Longline**	**Trolling**
1982	315	0	315
1983	1083	0	1083
1984	6097	0	6097
1985	2574	0	2574
1986	4171	0	4171
1987	265	0	265
1988	10175	0	10175
1989	10012	0	10012
1990	4166	0	4166
1991	6727	0	6727
1992	4524	0	4524
1993	8523	2193	6330
1994	18542	0	18542
1995	26580	5339	21241
1996	28997	21450	7547
1997	37717	32558	5159
1998	47592	46000	1592
1999	35575	34986	590
Average	**14091**	**7918**	**6173**

Figure 5. American Samoa annual estimated landings for Sailfish by gear.

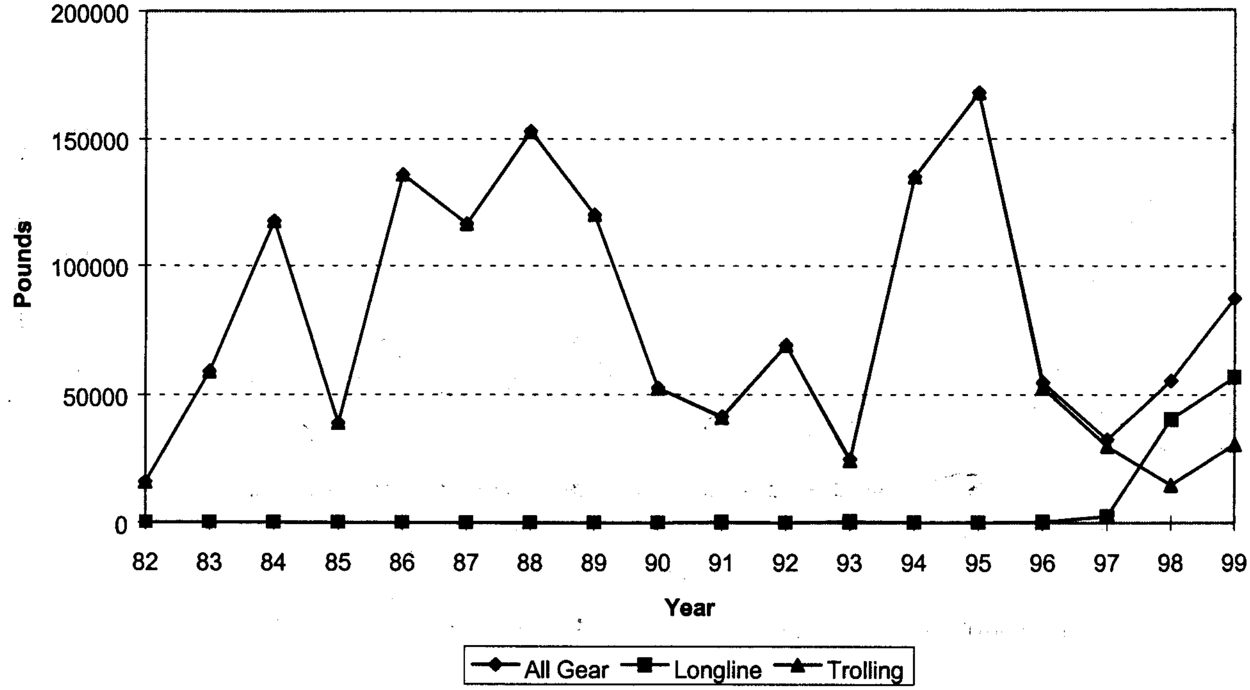


Interpretation: Sailfish were caught more by longlining (69% in 1996, 100% in 1997, 96% in 1998, and 98% in 1999), which may explain the general increase in 1995-1997, a period of influx longlining.

Calculation: The estimated total yearly landings of sailfish were summed for all gears.

	Pounds Landed		
Year	All Methods	Longline	Trolling
1982	127	0	127
1983	74	0	74
1984	989	0	989
1985	2744	0	2744
1986	275	0	275
1987	1188	0	1188
1988	392	0	392
1989	767	0	767
1990	0	0	0
1991	0	0	0
1992	0	0	0
1993	808	626	183
1994	1561	0	1561
1995	5821	3078	2743
1996	4565	3146	1420
1997	6387	6387	0
1998	7401	7086	314
1999	7659	7475	184
Average	**2264**	**1544**	**720**

Figure 6. American Samoa annual estimated landings for Skipjack tuna by gear.

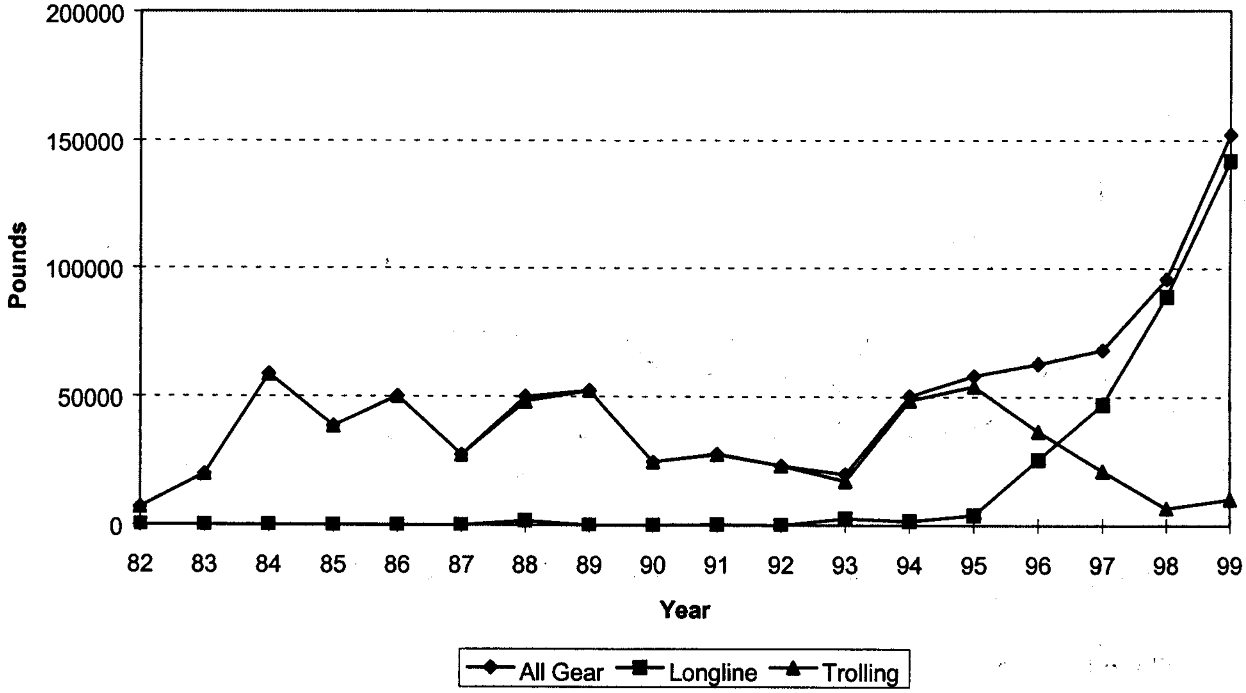


Interpretaion: An increase of 58% of skipjack tuna landings this year was due to increase in fishing trips and efforts both for longline and troll in 1999. In addition, a couple of new boats that entered the fishery in 1999 began trolling before obtaining their longline permits to longline.

Calculation: The estimated yearly total landings of skipjack tuna were summed for all gears.

	Pounds Landed		
Year	All Methods	Longline	Trolling
1982	15877	0	15877
1983	58997	0	58997
1984	117693	0	117693
1985	38902	0	38902
1986	135984	0	135984
1987	116505	0	116505
1988	153025	0	152803
1989	120171	0	120171
1990	52477	0	52458
1991	41364	345	41019
1992	68977	0	68977
1993	24797	539	24258
1994	135106	101	135005
1995	168153	160	167993
1996	54622	434	52586
1997	32433	2512	29891
1998	55288	40436	14822
1999	87231	56711	30521
Average	**82089**	**5624**	**76359**

Figure 7. American Samoa annual estimated landings for Yellowfin tuna by gear.

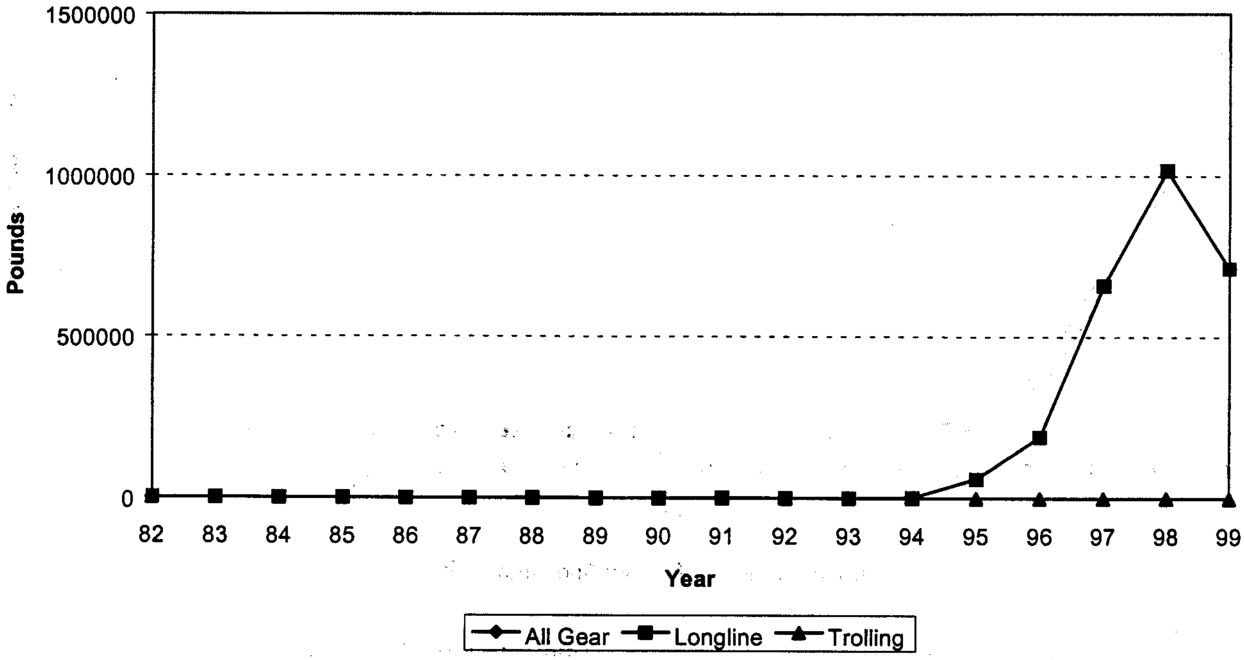


Interpretation: Yellowfin tuna landings continue to rise with an increase of 60% for all methods this year. Longlining caught 93% of yellowfin tuna in 1999. This may be due to increase in longlining effort.

Calculation: The estimated yearly total landings of yellowfin tuna were summed for all fishing gears.

	Pounds Landed		
Year	All Methods	Longline	Trolling
1982	7038	0	7038
1983	19789	0	19789
1984	58704	0	58704
1985	38586	0	38586
1986	50166	0	50166
1987	27467	0	27467
1988	49877	1775	48101
1989	52350	0	52350
1990	24635	0	24635
1991	27807	262	27545
1992	23247	0	23247
1993	19873	2662	17210
1994	50207	1637	48569
1995	58094	4053	54041
1996	62761	25655	36556
1997	68232	47006	21217
1998	95793	89021	6762
1999	152243	141946	10297
Average	**49271**	**17445**	**31793**

Figure 8. American Samoa annual estimated landings for Albacore by gear.

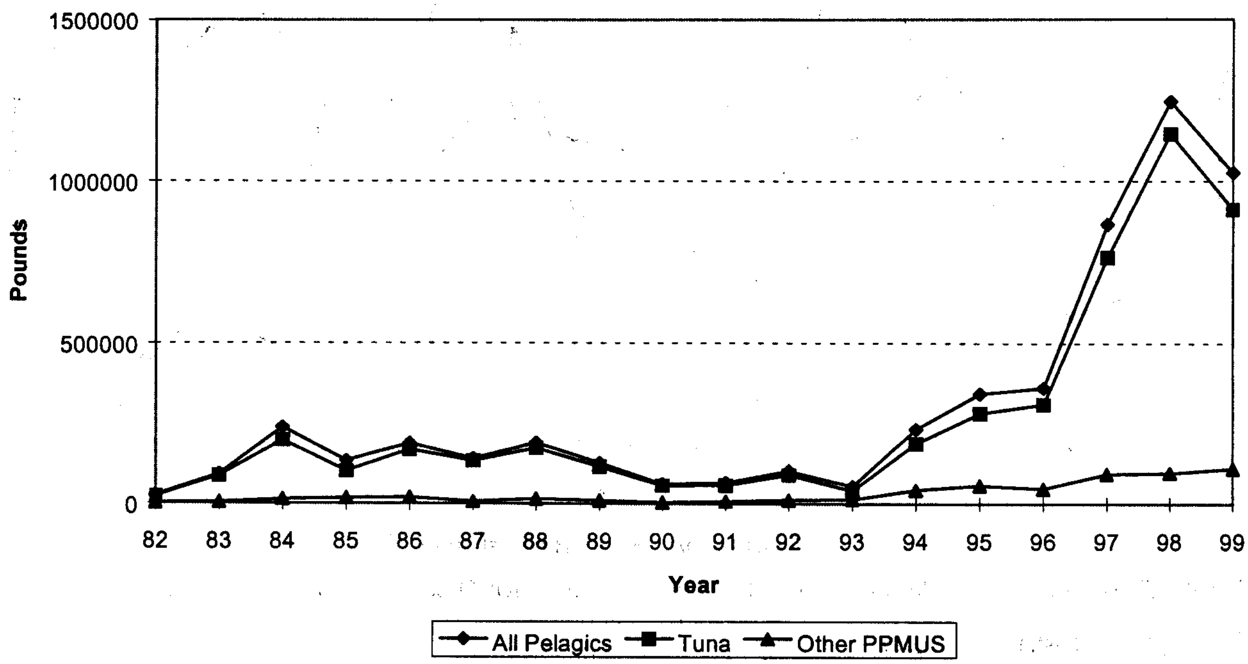


Interpretation: Increased albacore landings are due to the increase in longlining effort that began in 1995. Longlining took 100% of the albacore during 1995-1999. There is a decrease of 30% of the total albacore landings this year even though there is an increase in longlining effort.

Calculation: The estimated yearly total landings of albacore tuna is summed for all fishing gears.

	Pounds Landed		
Year	**All Methods**	**Longline**	**Trolling**
1982	0	0	0
1983	0	0	0
1984	0	0	0
1985	0	0	0
1986	0	0	0
1987	0	0	0
1988	1875	1875	0
1989	0	0	0
1990	0	0	0
1991	1730	1730	0
1992	0	0	0
1993	231	231	0
1994	1572	1572	0
1995	58954	58954	0
1996	189210	189210	0
1997	658827	658827	0
1998	1016796	1016796	0
1999	713733	713733	0
Average	**146829**	**146829**	**0**

Figure 9. American Samoa annual commercial landings: all pelagics species, tunas and other PPMUS.

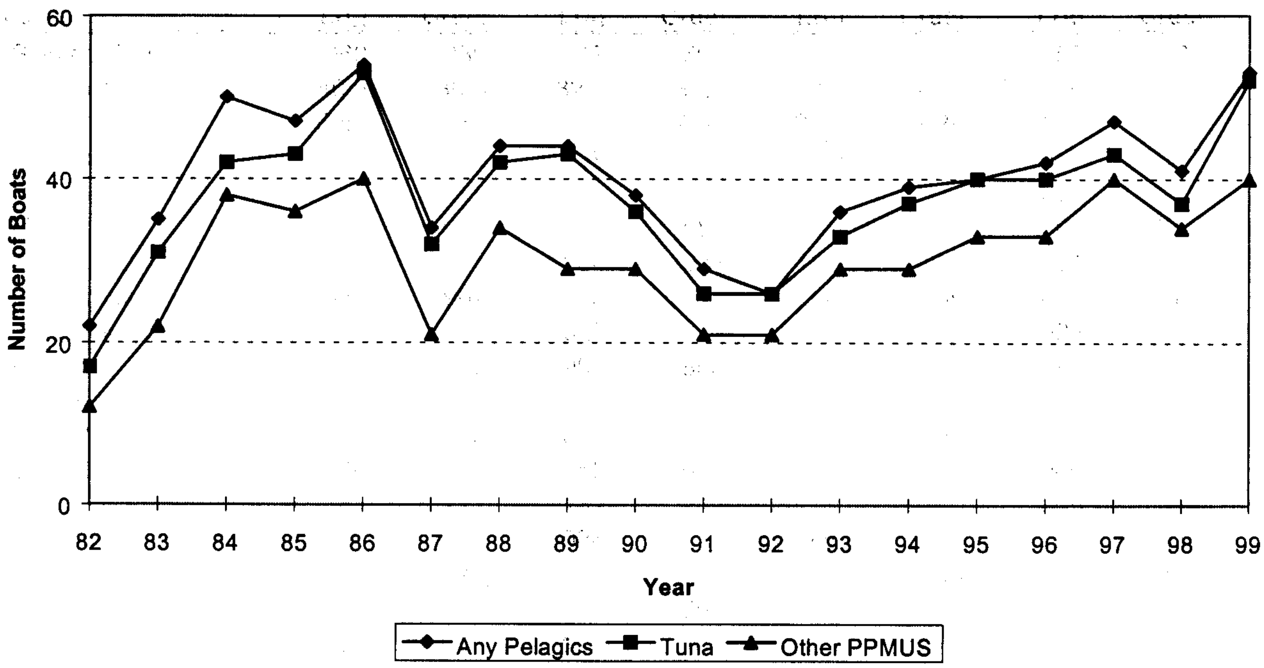


Interpretation: Commercial landings represent 93% of the landings for pelagic species in 1998 and about 92% this year. Much of the increase in landings since 1995 was due to a surge in the longlining effort, however there was a decrease of 17% this year.

Calculation: Estimated commercial landings for tunas and other PPMUS were calculated by summing commercial landings for the speices in each category (Table 2). Estimated landings for all pelagics represent the sum of tunas and other PPMUS plus landings for the miscellaneous category (Table 1).

	Pounds Landed		
Year	**All Pelagics**	**Tuna**	**Other PPMUS**
1982	24820	22065	1515
1983	90744	85069	4441
1984	236216	196100	13458
1985	131310	99987	17515
1986	186274	166379	18958
1987	138809	132316	6319
1988	188147	171787	14702
1989	125446	114454	9623
1990	60694	55966	4304
1991	64926	57073	7460
1992	101524	88825	11452
1993	53482	40130	13095
1994	230931	186270	42825
1995	342340	281250	56514
1996	360636	309176	46274
1997	867574	765719	92559
1998	1243717	1144888	95482
1999	1025534	913636	109105
Average	**304062**	**268394**	**31422**

Figure 10. Number of American Samoa boats landing any pelagic species, tunas and other PPMUS.

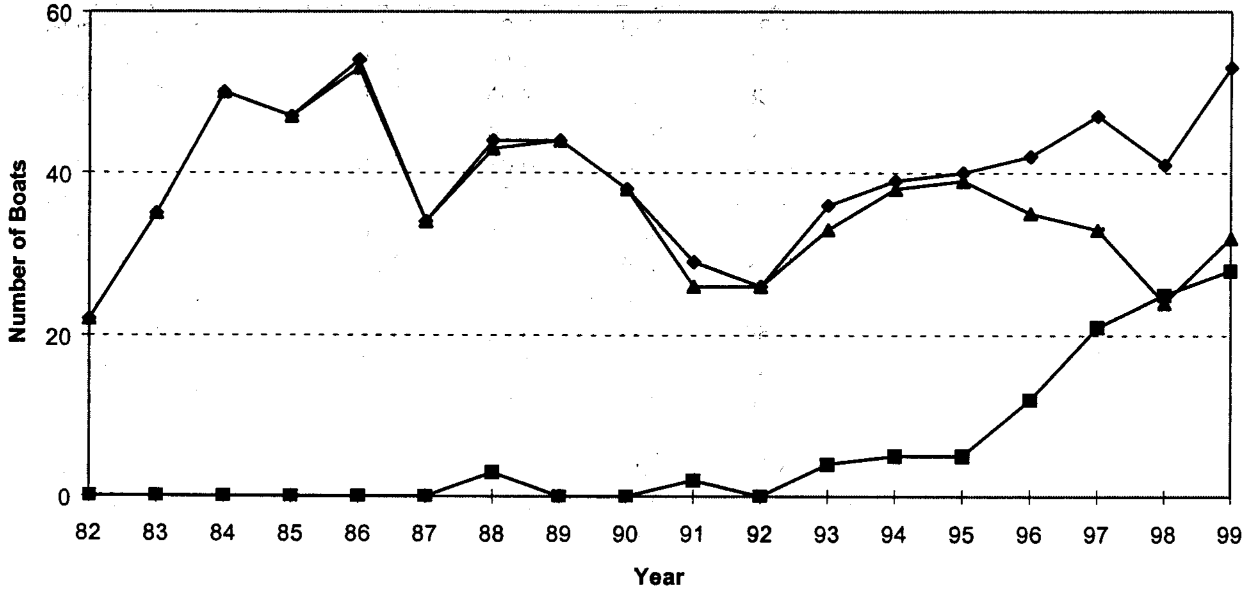


Interpretation: The number of boats participating in the pelagic fishery decreased by 13% in 1998. In 1999, an increase of 29% number of boats (53) landed any pelagic species this year. This reflects the increase in the number of trips and increase in effort both for longlining and trolling.

Calculation: The sampling program is extensive enough, and the number of boats small enough, to use raw database counts of the number of vessels in a given year. Each boat counted here made at least one recorded landing of at least one pelagic species during a given year.

	Number of Boats Landing		
Year	**Any Pelagics**	**Tuna**	**Other PPMUS**
1982	22	17	12
1983	35	31	22
1984	50	42	38
1985	47	43	36
1986	54	53	40
1987	34	32	21
1988	44	42	34
1989	44	43	29
1990	38	36	29
1991	29	26	21
1992	26	26	21
1993	36	33	29
1994	39	37	29
1995	40	40	33
1996	42	40	33
1997	47	43	40
1998	41	37	34
1999	53	52	40
Average	**40**	**37**	**30**

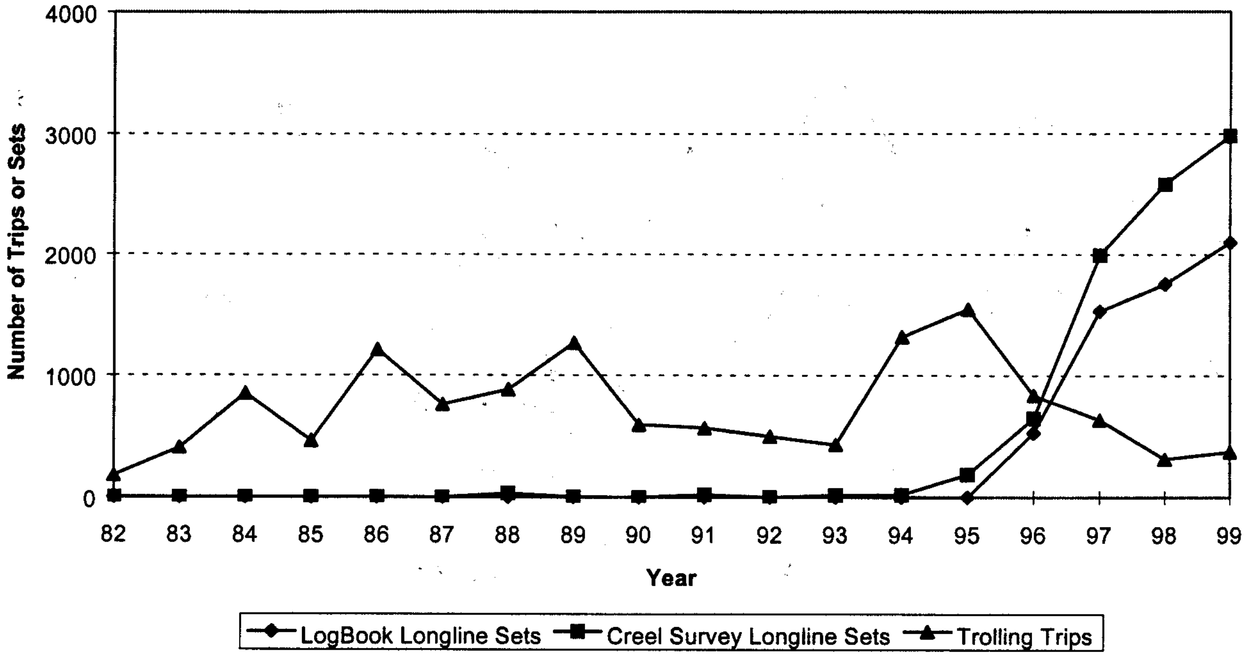
Figure 11. Number of American Samoa boats landing any Pelagic Species, by Longlining, Trolling and All Methods.



Interpretation: Boats using longline method increased by 12% this year, whereas boats using trolling method increased by 33%. In 1998, only 26 boats used longline gear from a total of 50 that received federal permits. This year 28 boats participated in the longline fishery from a total of 59 that received federal permits. Some of the boats did some trolling activities before obtaining their permits to lonline, thus some of the boats may be counted twice as using longlining and trolling method in 1999.
Calculation: The number of boats that did any longlining or trolling method were summed for each year.

	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	54	0	53
1987	34	0	34
1988	44	3	43
1989	44	0	44
1990	38	0	38
1991	29	2	26
1992	26	0	26
1993	36	4	33
1994	39	5	38
1995	40	5	39
1996	42	12	35
1997	47	21	33
1998	41	25	24
1999	53	28	32
Average	**40**	**6**	**36**

Figure 12. American Samoa fishing trips or sets for all pelagic species by method.

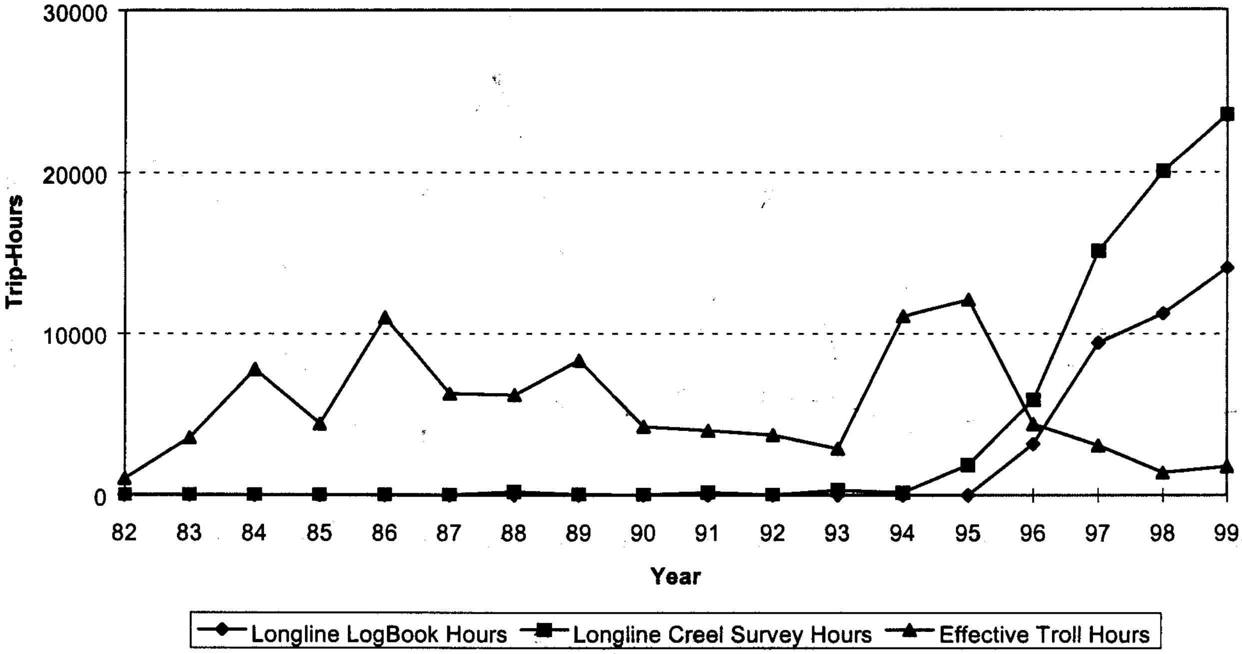


Interpretation: Trolling trips increased by 18% while longline number of sets for creel survey increased by 15% and longline number of sets for logbooks submitted increased by 17%. These data were collected from an on going offshore creel survey expansion system and the federal logbook system which requires the fisherman to submit their logbooks each Monday following each longline fishing trip. These two systems are then compared so as to get a better estimate of the local fishery.

		Longline Sets	
Year	**Troll Trips**	**Logbook**	**Creel Survey**
1982	177	0	0
1983	406	0	0
1984	853	0	0
1985	464	0	0
1986	1208	0	0
1987	763	0	0
1988	885	0	31
1989	1264	0	3
1990	596	0	0
1991	570	0	21
1992	500	0	0
1993	433	0	17
1994	1316	0	19
1995	1545	0	187
1996	837	528	650
1997	638	1530	1994
1998	316	1754	2583
1999	373	2100	2982
Average	**730**	**328**	**472**

Calculation The number of trips is calculated by dividing the estimated total hours of effort by the average length of a trolling trip. For 1995 through 1999, total longline landings were subtracted from the total landings prior to using the above calculation, standardizing non-longline effort to trolling effort. The number of logbooks reported longline sets were summed for all trips.

Figure 13. American Samoa fishing effort for all pelagic species by method.

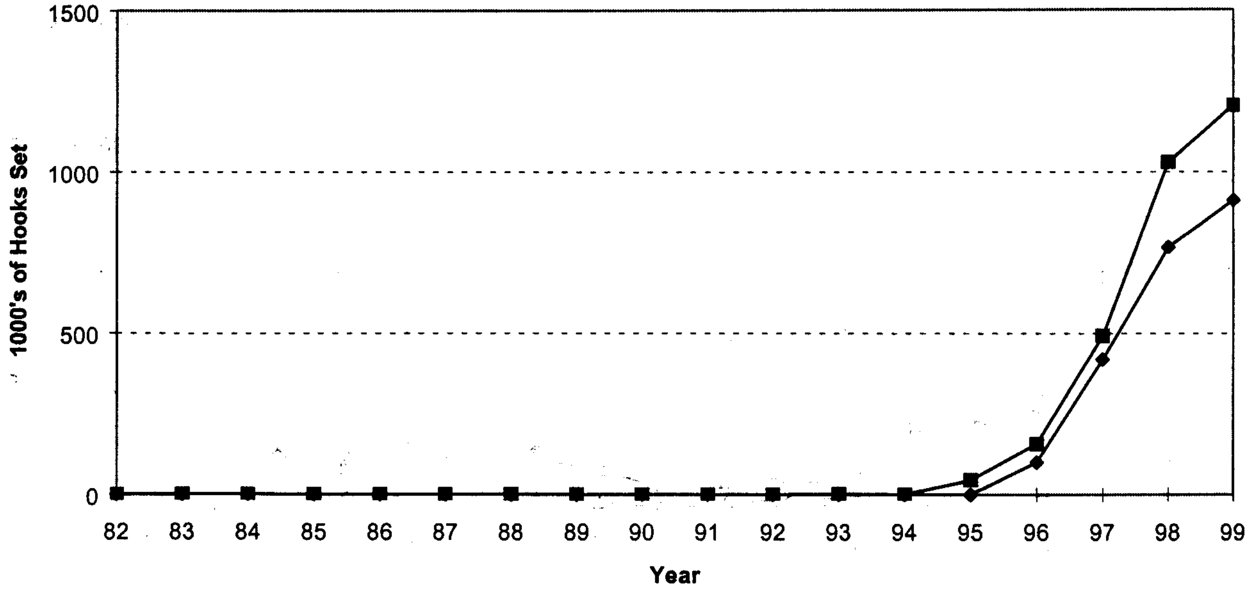


Interpretation: Trolling effort increased by 27% whereas longline effort increased by 20%. The creel survey longline hours and trolling hours were obtained from an ongoing creel survey program which samples two weekdays and one weekend per week. The logbook longline hours (end set time-begin haul time) were obtained from a newly established Federal Longline Logbook system which DMWR now operates. The 1998 to 1999 increase in the number of trolling and longlining hours reflects the increase in the number of boats (figure 10 & 11) participating in the pelagic fisheries.

	Number of Trip-Hours Using		
Year	Trolling (Effective)	Longline Logbook	Longline Creel
1982	1019	0	0
1983	3513	0	0
1984	7785	0	0
1985	4394	0	0
1986	11016	0	0
1987	6271	0	0
1988	6186	0	198
1989	8339	0	14
1990	4213	0	0
1991	3964	0	164
1992	3700	0	0
1993	2862	0	299
1994	11090	0	156
1995	12116	0	1860
1996	4377	3158	5877
1997	3059	9440	15137
1998	1405	11257	20049
1999	1780	14088	23509
Average	**5394**	**2108**	**3737**

Calculation: For trips where trolling was used exclusively, and where effort was recorded, the total catch was divided by the total number of trolling hours to obtain catch/hour or CPUE. The effective trolling hours were obtained by dividing the catch of pelagic fish using both the trolling and mixed troll/bottom methods by the CPUE. Data were from two sources; 1982-84 are from the commercial catch monitoring system, and 1985-99 were from the creel survey program. Logbook longline hours (end set time-begin haul time) and creel survey longline hours were summed for all trips.

Figure 14. American Samoa number of longline hooks (x1000) set from logbook and creel survey data.

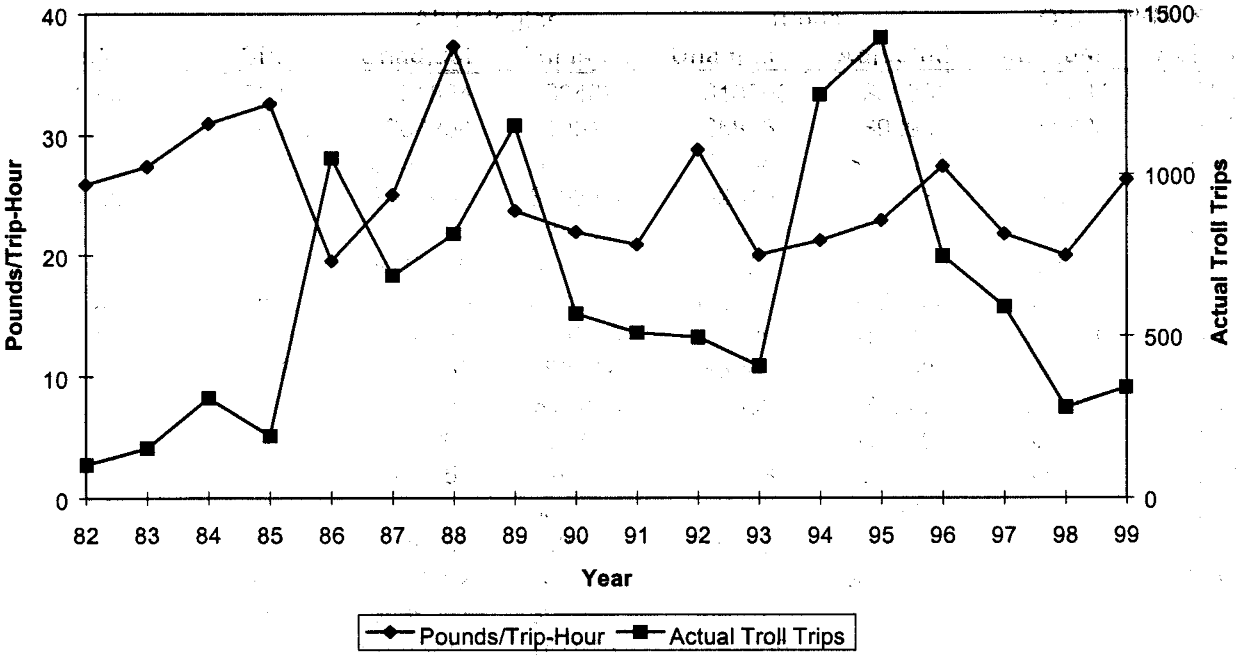


Interpretation: The number of hooks used in 1999 increased by 17% according to the creel survey and by 19% according to the logbook monitoring system. A steady increase in the number of hooks set by the longline fishery has been seen since 1996. However, the rate of increase is slowing indicating that the fishery is stabilizing.

Calculation: The total number of hooks was summed for each year both for creel survey longline and logbook longline fisheries.

	1000's of Hooks From	
Year	Logbook Data	Creel Survey
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	493
1998	767	1030
1999	912	1204
Average	**122**	**163**

Figure 15. American Samoa overall pelagic catch per hour of trolling.



Interpretation: Total pelagic species CPUE is predominantly the combined skipjack and yellowfin CPUE shown in Figure 17, as these two species contributed about 86% of the total troll catch. 1998 CPUE was lower than 1997 due to decreased CPUEs for most species caught by trolling (Figure 15 and 16). The 22% increase in the number of trips in 1999 may be due to increase in the number of boats that participated in the pelagic fishery.

Calculation: For trips where trolling was used exclusively, and where effort was recorded, the total catch was divided by the total number of trolling hours to obtain CPUE. Data were from two sources; 1982-1984 were from the commercial catch monitoring system, and 1985-1999 were from the creel survey program.

Year	CPUE	Trips
1982	25.91	104
1983	27.41	156
1984	30.97	311
1985	32.59	193
1986	19.51	1054
1987	25.04	686
1988	37.35	817
1989	23.72	1155
1990	21.93	568
1991	20.86	509
1992	28.75	495
1993	20.00	407
1994	21.23	1250
1995	22.89	1426
1996	27.36	746
1997	21.73	589
1998	19.93	280
1999	26.21	341
Average	25.19	616

Table 3. American Samoa 1996 - 1999 catch rates by species for the 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	.060	.289	1.17	.604	3.66	4.01	4.59	4.69
Albacore	40.6	30.3	32.3	31.2	27.1	20.4	18.0	13.3
Yellowfin Tuna	6.50	4.32	2.70	2.52	2.44	2.29	6.23	4.38
BigeyeTuna	1.33	1.06	.339	.139	.286	.109	.657	.197
Bluefin Tuna					.015		.003	
Mahimahi	2.29	1.31	2.28	2.85	1.74	1.85	2.08	1.77
Black marlin	.232		.084	.023	.040		.201	.034
Blue marlin	.927	.902	.613	.613	.533	.499	.461	.384
Striped Marlin	.181		.029		.033		.026	
Wahoo	.827	.515	.900	.853	2.21	2.03	1.89	1.54
Dogtooth tuna						.004		
Other Sharks	.071	.373	.012	.174	.046	.094	.010	.028
Swordfish	.030	.013	.055	.008	.040	.022	.040	.009
Sailfish	.181	.227	.182	.219	.057	.140	.005	.129
Spearfish	.050		.026		.029		.005	.013
Barracudas		.573		.615		.398		.188
Rainbow runner				.006		.009		.023
Moonfish	.081		.090	.161	.073	.074	.068	.124
Oilfish	.030		.038		.029	.039	.016	.007
Pomfret	.020		.006		.004		.028	
Other Pelagic Fish	.020	.114	.017		.222		.231	

Interpretation: The longline fishery in American Samoa is a newly emerging fishery since 1995. In 1995 4 boats longlined in American Samoa waters, 13 boats longlined in 1996, 22 in 1997, 26 in 1998, and 28 boats longlined this year. From 1996 to 1998 there was not a great deal of change in catch rates. However, according to both monitoring programs there has been a significant decline in the catch rate of albacore, the primary target species, for the past 2 years.

Calculation: Catch rate for the creel survey were obtained from interview data being collected two weekdays and one weekend day each week. The number of the fish caught were divided by the number of hooks used to catch them and then multiplied by 1,000 for each species. Catch rate for the logbook data were obtained from the Federal Logbook data submitted by the fishermen. The number of fish caught were divided by the number of hooks used to catch them and then multiplied by 1,000 for each species.
Note: One of the local longliner (50 ft.) catch rate is not included in this table.

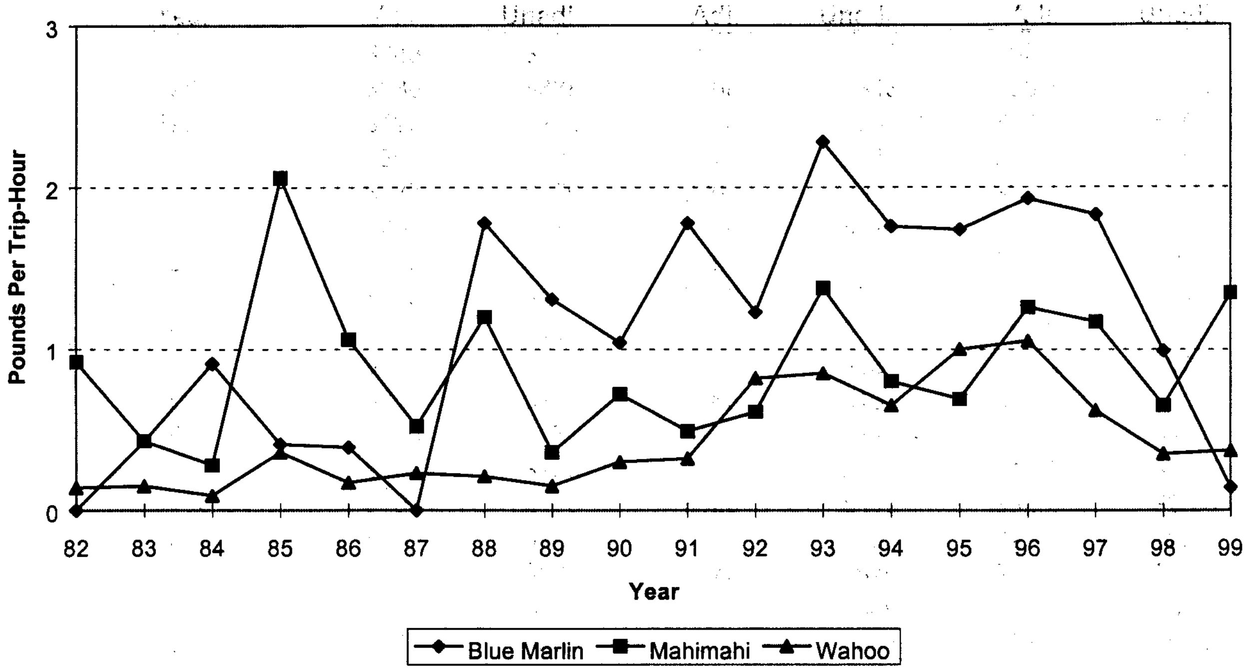
Table 4. American Samoa 1996-1999 estimated average lbs. per fish by species for the longline fishery.

	Average Lbs. per Fish			
Species	**1996**	**1997**	**1998**	**1999**
Skipjack Tuna	9.6	8.4	12.4	9.7
Albacore	39.9	44.0	45.7	42.7
Yellowfin Tuna	37.9	44.2	46.4	33.5
BigeyeTuna	52.3	82.8	79.2	57.1
Mahimahi	26.2	25.6	23.3	22.3
Black marlin		148.3		101.9
Blue marlin	151.8	117.7	119.5	101.5
Wahoo	44.3	38.4	26.3	27.3
Dogtooth tuna			10.0	
Other Sharks	112.3	96.8	112.1	38.0
Swordfish	150.0	100.0	212.6	12.0
Sailfish	88.4	69.0	67.0	61.8
Spearfish				46.0
Barracudas	13.5	14.4	14.8	10.8
Rainbow runner		14.0	17.5	6.5
Moonfish		68.6	33.5	57.7
Oilfish			12.7	10.0
Other Pelagic Fish	61.8			

Interpretation: Average size for most of the pelagic species slightly decreased in 1999. 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. WPacFIN is developing a new data system to implement size/weight conversion algorithms to calculate appropriate round weights for all species.

Calculation: Average pounds per species were calculated from the creel survey interview data by dividing the total pounds of each species by the number of fish of that species caught.

Figure 16. American Samoa trolling catch rates: Blue marlin, Mahimahi, and Wahoo.

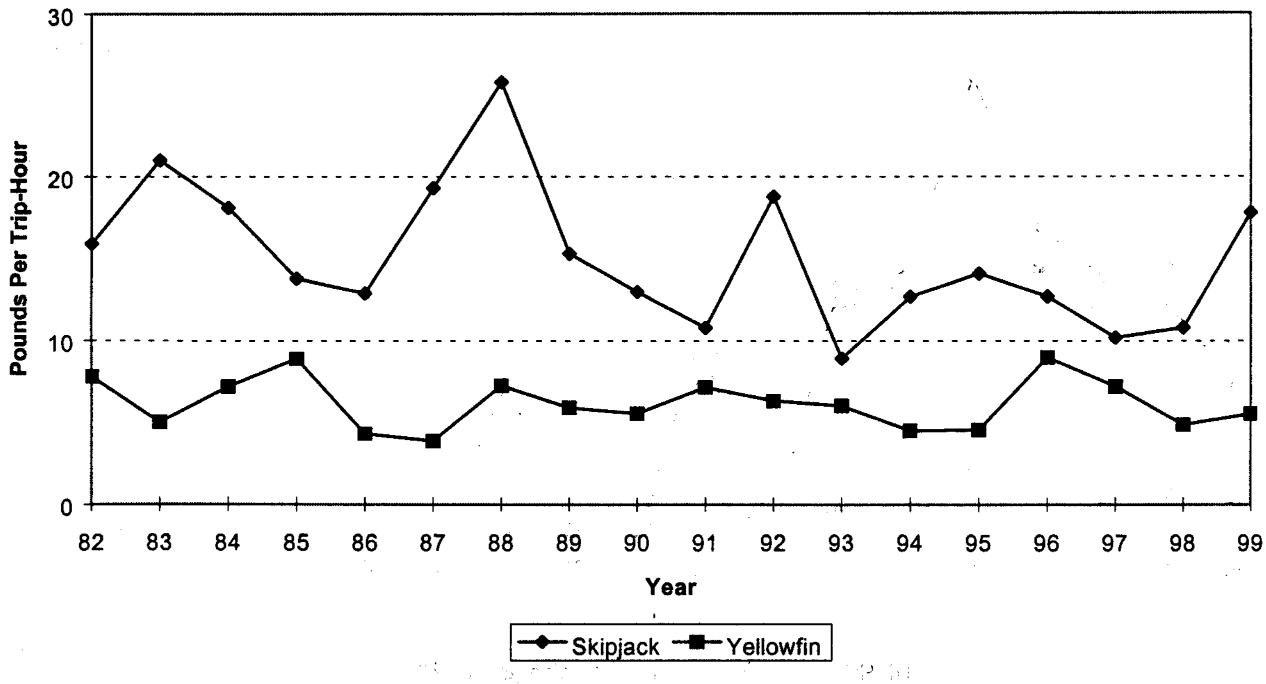


Interpretation: Blue marlin CPUE is variable but generally increased over time until about 1996 when it began a notable decrease. It is not known if this decrease has any relationship to the huge growth in the longline fishery during this time span. Mahimahi CPUE peaked in the mid-eighties, when an exported market existed for this species. Since that time, mahimahi CPUE has been variable and dropped to a 7-year record low in 1998, but had a 99% increase to establish a new 7-year record high in 1999. Wahoo CPUE seemed fairly stable in the 1980s and then increased substantially from 1992-1996. Since 1996 wahoo catch rates have dropped similar to blue marlin, but this may not be related to the increase in longline activity. On the other hand, this could an indication of "localized over-fishing" and interactions.

	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	1.06	0.17
1987	0.00	0.52	0.23
1988	1.78	1.20	0.21
1989	1.31	0.36	0.15
1990	1.04	0.72	0.30
1991	1.78	0.49	0.32
1992	1.23	0.61	0.82
1993	2.28	1.38	0.85
1994	1.76	0.80	0.65
1995	1.74	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	0.14	1.35	0.37
Average	**1.11**	**0.89**	**0.44**

Calculation: For trips where trolling was used exclusively, and where effort was recorded, the total catch by species was divided by the total number of trolling hours to obtain CPUE.

Figure 17. American Samoa trolling catch rates: Skipjack and Yellowfin tuna

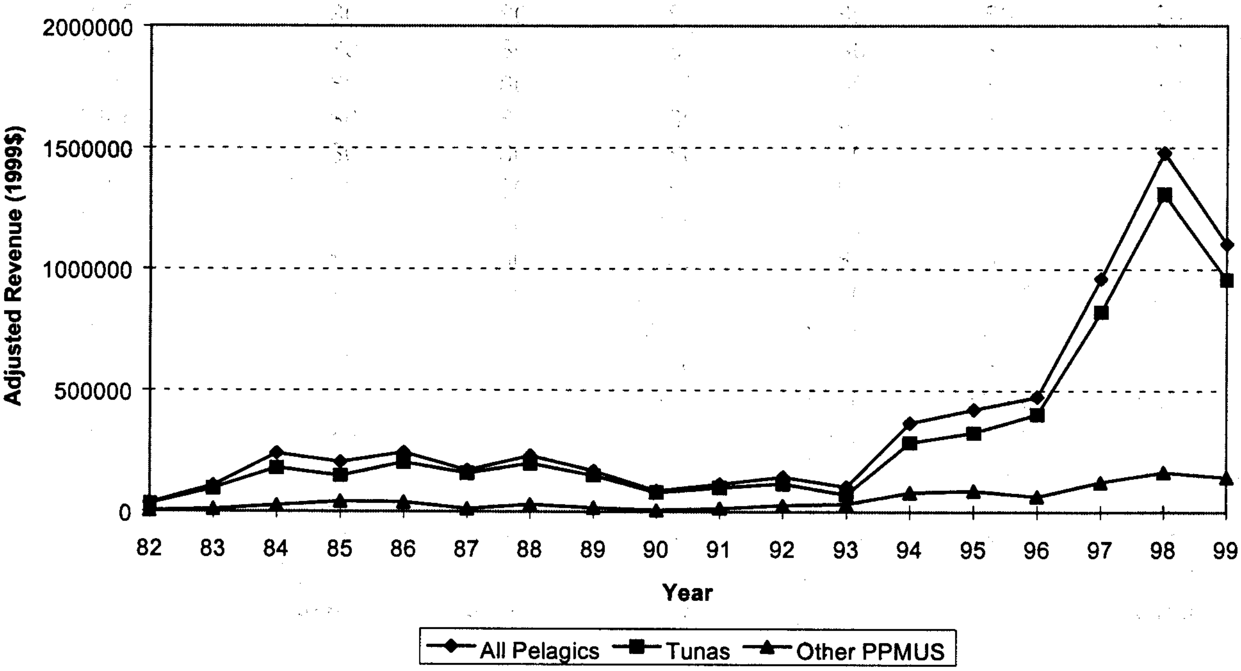


Interpretation: Skipjack CPUE has been highly variable through the years with a declining trend. This year skipjack CPUE increased by 65% slightly higher than the 18-year average. Yellowfin tuna CPUE has been fairly stable over the time series but increased by 13% this year to a little below the 18 year average.

Calculation: For trips where trolling was used exclusively, and where effort was recorded, the total catch by species was divided by the total number of trolling hours to obtain CPUE.

	Pounds Caught Per Trolling Hour	
Year	**Skipjack**	**Yellowfin**
1982	15.90	7.80
1983	21.00	5.04
1984	18.10	7.20
1985	13.80	8.90
1986	12.90	4.31
1987	19.30	3.88
1988	25.80	7.27
1989	15.30	5.91
1990	13.00	5.56
1991	10.80	7.17
1992	18.80	6.34
1993	8.94	6.03
1994	12.70	4.50
1995	14.10	4.57
1996	12.70	8.99
1997	10.20	7.21
1998	10.80	4.89
1999	17.80	5.54
Average	**15.11**	**6.17**

Figure 18. American Samoa annual inflation-adjusted revenue for commercially landed pelagic species.

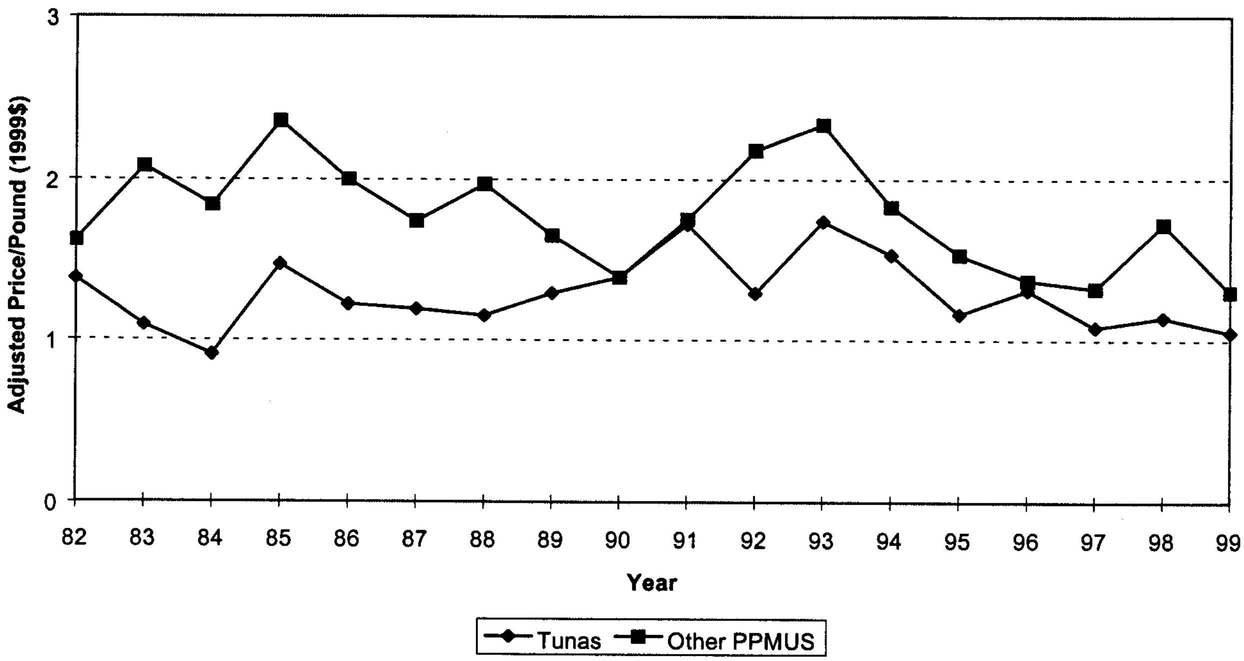


Interpretation: Revenues for commercial landings of all pelagic species increased in 1998 but decreased for all pelagic species this year. This is due to the 17% decrease in commercial landings for 1999 and to a decrease in the average price for most species (Figure 19).

Calculation: Revenues from commercial landings for all pelagic species were adjusted for inflation by multiplying a given year's revenue by the quotient of the 1999 consumer price index (CPI) divided by the CPI for that year.

		Revenue ($)					
		All Pelagics		Tunas		Other PPMUS	
Year	CPI	Unadjust	Adjusted	Unadjust.	Adjusted	Unadjust.	Adjusted
1982	100.0	$21824	$34897	$18990	$30365	$1534	$2453
1983	100.8	$66254	$105145	$58561	$92936	$5828	$9249
1984	102.7	$153571	$239110	$114981	$179025	$15938	$24815
1985	103.7	$131961	$203484	$95157	$146731	$26800	$41326
1986	107.1	$162161	$242107	$135768	$202702	$25445	$37990
1987	111.8	$117730	$168471	$109807	$157133	$7686	$10999
1988	115.3	$166073	$230344	$142792	$198053	$20933	$29034
1989	120.3	$124928	$166154	$111090	$147750	$11940	$15880
1990	129.6	$68253	$84225	$62830	$77532	$4865	$6004
1991	135.3	$94725	$111965	$83086	$98208	$11039	$13048
1992	140.9	$125261	$142171	$100881	$114500	$22038	$25013
1993	141.1	$89154	$101101	$61532	$69777	$27052	$30676
1994	143.8	$329564	$366475	$256649	$285394	$70507	$78404
1995	147.0	$388035	$422182	$300179	$326594	$79696	$86710
1996	152.5	$453402	$475618	$384977	$403840	$60452	$63414
1997	156.4	$939047	$960645	$805769	$824302	$119027	$121764
1998	158.4	$1464114	$1478755	$1295859	$1308818	$162162	$163784
1999	159.9	$1105799	$1105799	$958040	$958040	$142361	$142361
Average	**129.3**	**$333436**	**$368814**	**$283164**	**$312317**	**$45295**	**$50162**

Figure 19. American Samoa average inflation-adjusted price for tunas and other PPMUS.

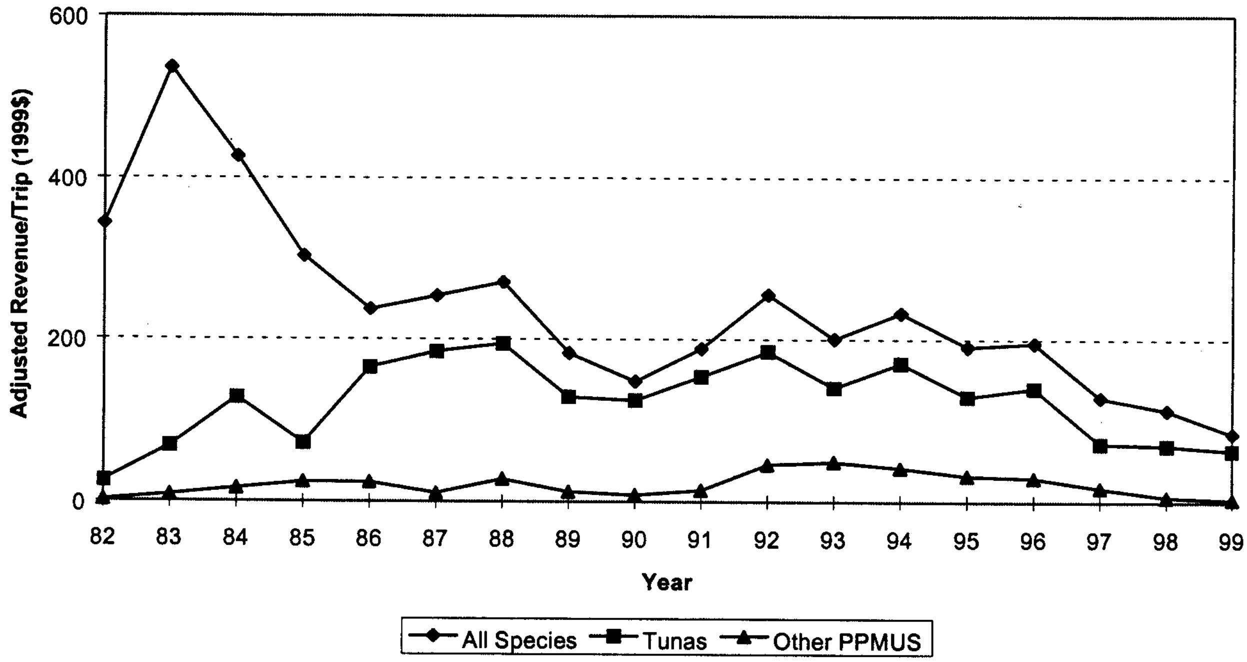


Interpretation: Prices for tuna increased 5% in 1998, but decreased by 8% this year. The overall decrease since 1993 may be due to the lower price that the canneries pay per pound of tuna than the local stores and restaurants may pay. Prices in general for pelagic species remain low, likely because of competition from frozen fish purchased from foreign longline vessels moored in Pago Harbor and from fishes imported from neighboring islands. Also, the influx of longline catches that make to the local markets probably contribute to the prices being low.

	Average Price/Pound ($)			
	Tunas		Other PPMUS	
Year	Unadjust.	Adjusted	Unadjust.	Adjusted
1982	$0.86	$1.38	$1.01	$1.62
1983	$0.69	$1.09	$1.31	$2.08
1984	$0.59	$0.91	$1.18	$1.84
1985	$0.95	$1.47	$1.53	$2.36
1986	$0.82	$1.22	$1.34	$2.00
1987	$0.83	$1.19	$1.22	$1.74
1988	$0.83	$1.15	$1.42	$1.97
1989	$0.97	$1.29	$1.24	$1.65
1990	$1.12	$1.39	$1.13	$1.39
1991	$1.46	$1.72	$1.48	$1.75
1992	$1.14	$1.29	$1.92	$2.18
1993	$1.53	$1.74	$2.07	$2.34
1994	$1.38	$1.53	$1.65	$1.83
1995	$1.07	$1.16	$1.41	$1.53
1996	$1.25	$1.31	$1.31	$1.37
1997	$1.05	$1.08	$1.29	$1.32
1998	$1.13	$1.14	$1.70	$1.72
1999	$1.05	$1.05	$1.30	$1.30
Average	**$1.04**	**$1.28**	**$1.42**	**$1.78**

Calculation: The average price per pound for each year is calculated by dividing the estimated revenue by the estimated weight sold. The adjustment for inflation is made by multiplying the annual average price for a given year by the 1996 consumer price index (CPI) for American Samoa, and dividing by the CPI for the given year.

Figure 20. American Samoa average inflation-adjusted revenue per trip landing Pelagic Fish for trolling method.

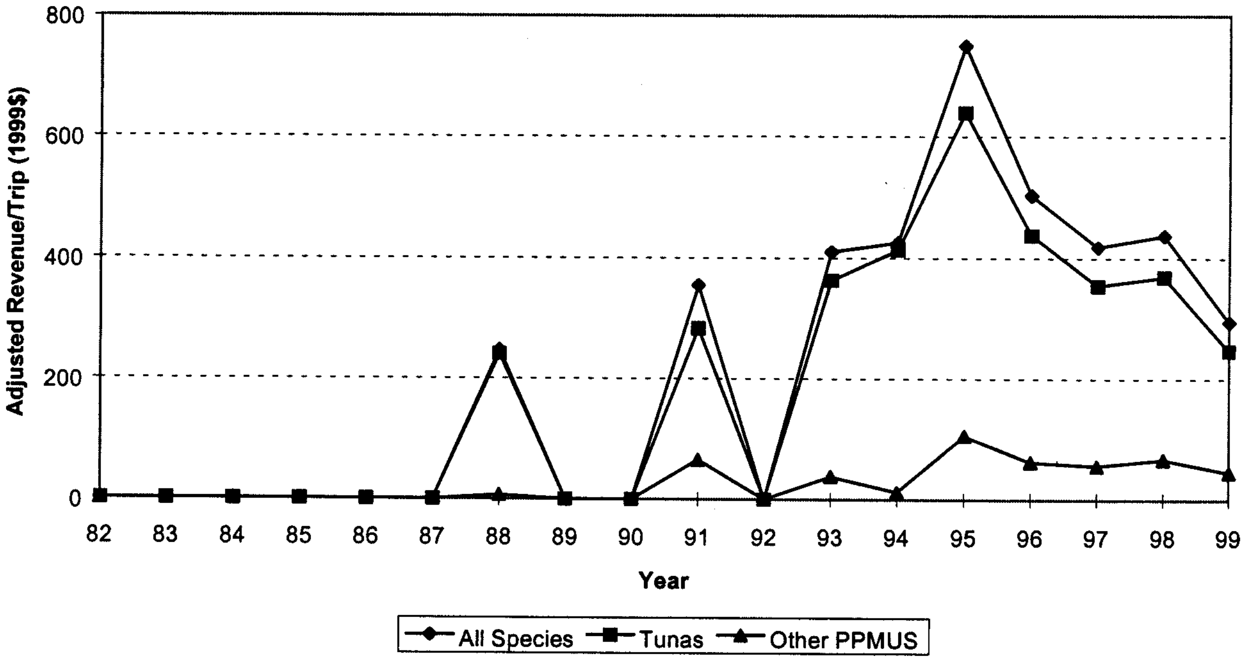


Interpretation: Revenue per trip (all species) decreased by 26% this year, setting a new record low. This may be due to the overall decrease in price per pound for all pelagic species sold at the canneries and the local markets.

Calculation: For commercial trips where pelagic species were landed, the average revenue per trip was calculated for each category. Revenue was adjusted for inflation by multiplying total landings by the CPI-adjusted for each respective year.

Year	All Species Adj.	All Species Unadj.	Tunas Adj.	Tunas Unadj.	Other PPMUS Adj.	Other PPMUS Unadj.
1982	$343	$214	$26	$16	$2.1	$1.3
1983	$536	$338	$68	$43	$8.3	$5.2
1984	$426	$274	$128	$82	$16.3	$10.5
1985	$303	$196	$72	$47	$24.4	$15.8
1986	$237	$159	$165	$111	$24.0	$16.1
1987	$253	$177	$184	$129	$10.7	$7.5
1988	$270	$195	$194	$140	$27.9	$20.1
1989	$183	$137	$129	$97	$12.2	$9.2
1990	$148	$120	$125	$101	$8.3	$6.7
1991	$189	$160	$154	$130	$14.3	$12.1
1992	$255	$225	$185	$163	$45.9	$40.4
1993	$200	$177	$141	$124	$49.2	$43.4
1994	$232	$209	$171	$154	$41.9	$37.7
1995	$191	$175	$129	$119	$32.2	$29.6
1996	$195	$186	$140	$133	$29.8	$28.4
1997	$129	$126	$72	$70	$17.6	$17.2
1998	$113	$112	$69	$69	$6.5	$6.4
1999	$84	$84	$63	$63	$3.2	$3.2
Average	**$238**	**$181**	**$123**	**$99**	**$20.8**	**$17.3**

Figure 21. American Samoa average inflation-adjusted revenue per trip landing PPMUS for longline method.

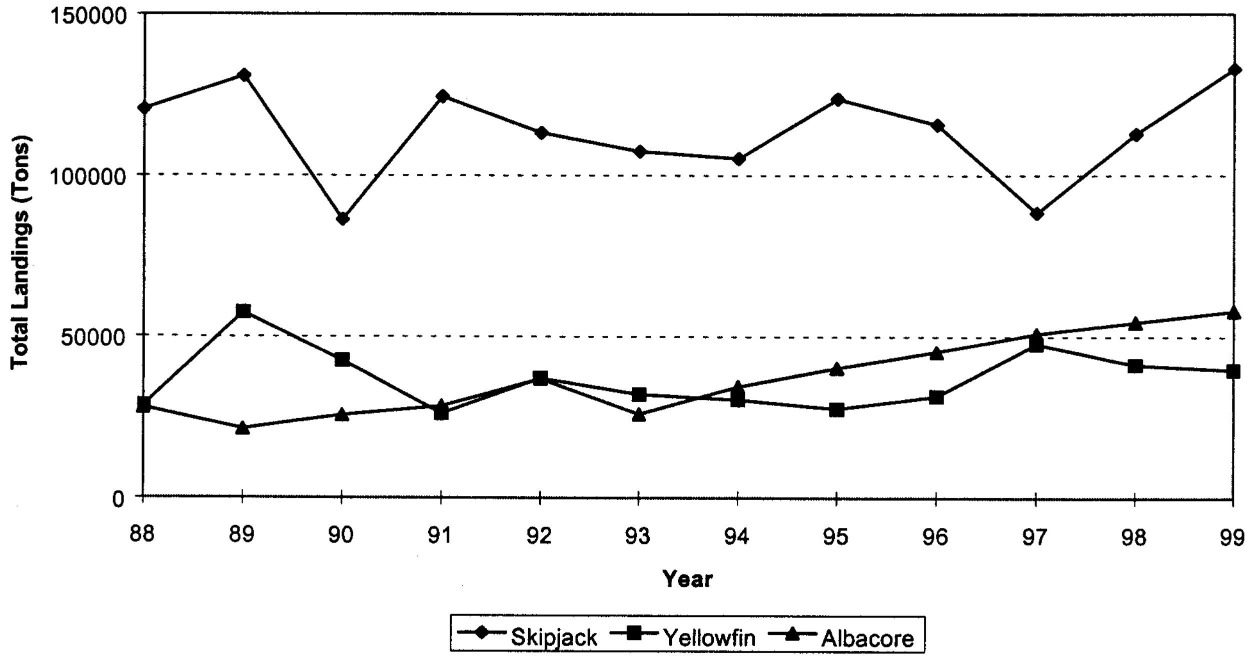


Interpretation: The longline revenue per trip increased by 5% in 1998, but dramatically decreased by 33% this year. This may be due to a decrease of 20% in commercial landings for all pelagic species. Also, a decrease in albacore landings, which bring in a higher price per pound than other PPMUS, may contribute to the decrease in revenues per trip for longline this year.

Calculation: For the creel survey monitored longline trips, average revenue per trip was calculated for each category. Revenue was adjusted by multiplying total landings of each category by the CPI-adjusted for each respective year.

Year	All Species		Tunas		Other PPMUS	
	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	$247	$178	$240	$173	$6.5	$4.7
1989	$0	$0	$0	$0	$0.0	$0.0
1990	$0	$0	$0	$0	$0.0	$0.0
1991	$355	$300	$283	$239	$64.9	$54.9
1992	$0	$0	$0	$0	$0.0	$0.0
1993	$410	$361	$363	$320	$38.0	$33.5
1994	$425	$383	$413	$372	$12.0	$10.8
1995	$750	$689	$639	$587	$105	$96.2
1996	$503	$480	$438	$417	$62.4	$59.5
1997	$418	$408	$354	$346	$56.0	$54.7
1998	$437	$433	$369	$365	$66.5	$65.8
1999	$294	$294	$247	$247	$45.5	$45.5
Average	**$213**	**$196**	**$186**	**$170**	**$25.4**	**$23.6**

Figure 22. Total cannery landings for skipjack, yellowfin, and albacore tuna.



Interpretation: The quantity of fish landed at American Samoa's canneries exceeds local landings by a factor of a thousand. Though some locally caught pelagics, especially albacore, are sold to the canneries, the vast majority of the fish landed have been taken in distant water fisheries. Cannery landings have remained essentially stable for the last several years, though albacore landings have increased across time.

Calculation: Cannery landings are from monthly landings summaries supplied by the canneries.

	Short Tons Landed		
Year	**Skipjack**	**Yellowfin**	**Albacore**
1988	120500	28800	28200
1989	130800	57500	21400
1990	86300	42600	25700
1991	124400	26200	28500
1992	113200	37200	36900
1993	107400	32200	26000
1994	105248	30496	34601
1995	123771	27640	40328
1996	115654	31611	45340
1997	88421	47710	50911
1998	112764	41306	54540
1999	133079	39765	57981
Average	**113461**	**36919**	**37533**

Appendix 2

Territory of Guam

Introduction and Summary

Pelagic fishing vessels based on Guam fall into two broad categories: 1) distant -water purse seiners and longliners that fish primarily outside Guam's EEZ and transship through Guam and 2) small primarily recreational trolling boats that are either towed to boat launch sites or berthed in marinas and fish only local waters, either within Guam's EEZ or occasionally in the adjacent EEZ of the Northern Mariana Islands. This report covers primarily the local small boat pelagic fishery.

The number of boats participating in Guam's pelagic fishery steadily increased from 193 in 1983 to 466 in 1996. The number of boats decreased slightly in 1997, increased slightly in 1998, and then decreased slightly in 1999 to 449. Most fishing boats are less than 10 meters (33 feet) in length and are typically owner-operated by persons who earn a living outside of fishing. Most fishermen sell a portion of their catch at one time or another, and it is impossible to make a distinction between recreational, subsistence, and commercial fishers. A small, but significant, segment of the pelagic fleet consists of marina-berthed charter vessels that are operated primarily by full-time captains and crews.

Estimated pelagic annual landings have varied widely, ranging between 147 and 422 tons. Total pelagic landings in 1999 were approximately 287 tons, a decrease of 23% compared with 1998. Landings in 1999 consist almost entirely of five major species: mahimahi (*Coryphaena hippurus*), wahoo (*Acanthocybium solandri*), skipjack tuna (*Katsuwonus pelamis*), yellowfin tuna (*Thunnus albacares*), and Pacific blue marlin (*Makaira mazara*). Minor components include rainbow runner (*Elagatis bipinnulatus*), great barracuda (*Sphyraena barracuda*), kawakawa (*Euthynnus affinis*), sailfish (*Istiophorus platypterus*), dogtooth tuna (*Gymnosarda unicolor*), and sharks. Approximately a dozen additional species are landed incidentally each year.

There are wide year to year fluctuations in the mahimahi, wahoo, marlin, and tuna landings. Yellowfin tuna landings increased from 1983 to 1985, declined from 1985 to 1987, then show a general increase. Blue marlin landings show a general increase from 1983 to 1990, decrease from 1990 to 1993, increased from 1993 to 1997, then fluctuates. Skipjack tuna landings declined until 1987, show a general increase until 1996, then show a general decline. Wahoo landings have fluctuated over the past 17 years.

Aggregate landings of all pelagics, tuna, non-tuna PPMUS fluctuate greatly, but appear to be increasing. Non-tuna PPMUS, primarily mahimahi, make up the bulk of the pelagic catch. The commercial landings of all pelagics also show a similar trend.

The average troll trip length, trolling hours, and trolling effort in terms of total hours fished per total trolling trips decreased compared with 1998. Charter boat activity decreased for the third year in a row, due to a drop in tourism as a result of the Asian economic crisis. Charter trolling trips decreased 18% in 1997, decreased 26% in 1998, then decreased 10% in 1999. Charter boats, which make up less than 10% of the pelagic fleet, account for 22% of all trolling trips, 12% of the pelagic catch, and 17% of hours spent trolling. Charter boats caught 15% of the mahimahi landings, 23% of the blue marlin landings, 12% of the skipjack landings, 4% of the yellowfin landings, and 13% of the wahoo landings

.

Trolling catch rates vary widely for all pelagic species. Trolling catch rate decreased for mahimahi, wahoo, and skipjack tuna, increased for blue marlin and remained the same for yellowfin. CPUE for non-charter boats and charters decreased 17% and 22% from 1998.

Commercial landings and commercial revenues of all pelagics, tuna, and non-tuna PPMUS decreased in 1999. This may have been due to less effective marketing of pelagic fish by vendors and competition between major vendors the past few years for pelagic fish. Inflation-adjusted revenues per trolling trip show a general decline, although all pelagics adjusted revenues per trolling trip show a general increase from 1996. Since the vast majority of boaters in the pelagic fishery do not rely on catching or selling fish for a living, effort continues to occur despite decreasing revenues. The average price of tuna and non-tuna PPMUS also show a general decline, although the price of non-tuna PPMUS has increased since 1995.

1998 Recommendations and Current Status

1. The Guam Offshore Expansion system is being completed with the assistance of NMFS. DAWR's historical offshore data should be incorporated into the new system to obtain a historical look at the growth and evolution of the local pelagic fishery.

DAWR is currently completing a new offshore expansion system with the assistance of NMFS. The expansion algorithms for catch and effort have been reviewed and revised for all strata covered by the offshore creel survey from 1985 to 1999.

2. Include a time-series of pelagic landings showing charter and non-charter categories.

The time series has been included in the 1999 report.

3. Compare time-series of CPUE between charter and non-charter categories for select species.

The time series has been included in the 1999 report.

4. Include the Guam CPI where time-series inflation adjustments are discussed.

The Guam CPI has been included in the 1999 report.

1999 Recommendations

1. Continue with the reprocessing and editing of data back to 1980.

2. Report bycatch, and obtain software to deal with summarization of bycatch data.

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Table 1. Guam 1999 creel survey - pelagic species composition

Species	1999 Pounds Landed	1999 Charter	1999 Non charter
Sharks	18,846	0	18,846
Mahimahi	160,150	23,921	136,229
Wahoo	76,958	9,788	67,170
Blue Marlin	81,888	19,164	62,724
Striped Marlin	0	0	0
Sailfish	1,700	0	1,700
Shortbill Spearfish	120	120	0
Dogtooth Tuna	7,105	585	6,520
Double-lined Mackerel	0	0	0
Subtotal PPMUS	**346,767**	**53,578**	**293,189**
Skipjack Tuna	120,137	13,938	106,199
Yellowfin Tuna	126,858	5,460	121,398
Bigeye Tuna	0	0	0
Kawakawa	11,020	3,667	7,353
Other Tuna	0	0	0
Subtotal Tunas	**258,015**	**23,065**	**234,950**
Rainbow Runner	15,745	575	15,170
Barracudas	10,024	382	9,642
Other	0	0	0
Subtotal Misc.	**25,769**	**957**	**24,812**
Assorted Troll Fish	12,403	0	12,403
Total Pelagics	**643,345**	**77,314**	**566,030**

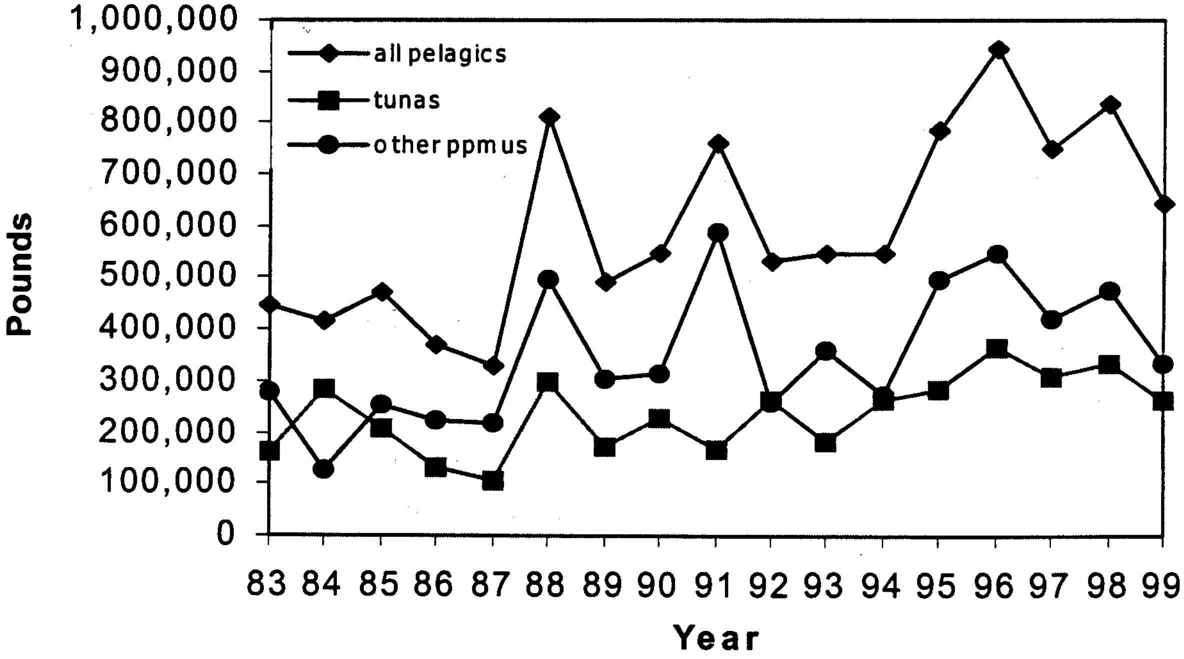
Table 2. Guam 1999 average commercial price of pelagic species

Species	1999 Average Price ($/lb.)
Mahimahi	2.08
Wahoo	2.23
Marlin	1.19
Spearfish	1.25
Sailfish	1.33
Dogtooth Tuna	1.43
Average Other PPMUS	1.94
Skipjack Tuna	1.32
Yellowfin Tuna	1.99
Kawakawa	1.34
Average Tuna	1.62
Rainbow Runner	2.14
Barracuda	2.08
Average All Pelagics	1.85

Table 3.
For Reference Only. Annual Consumer Price Indexes and CPI Adjustment Factors

Year	CPI	CPI_Adjustment Factor
1980	134	3.63
1981	161.4	3.01
1982	169.7	2.86
1983	175.6	2.77
1984	190.9	2.55
1985	198.3	2.45
1986	203.7	2.39
1987	212.7	2.29
1988	223.8	2.17
1989	248.2	1.96
1990	283.5	1.71
1991	312.5	1.56
1992	344.2	1.41
1993	372.9	1.30
1994	436	1.12
1995	459.2	1.06
1996	482	1.01
1997	482.5	1.01
1998	485.3	1
1999	**486**	**1**

Figure 1a. Guam annual estimated total landings: all pelagics, tunas, and other PPMUS



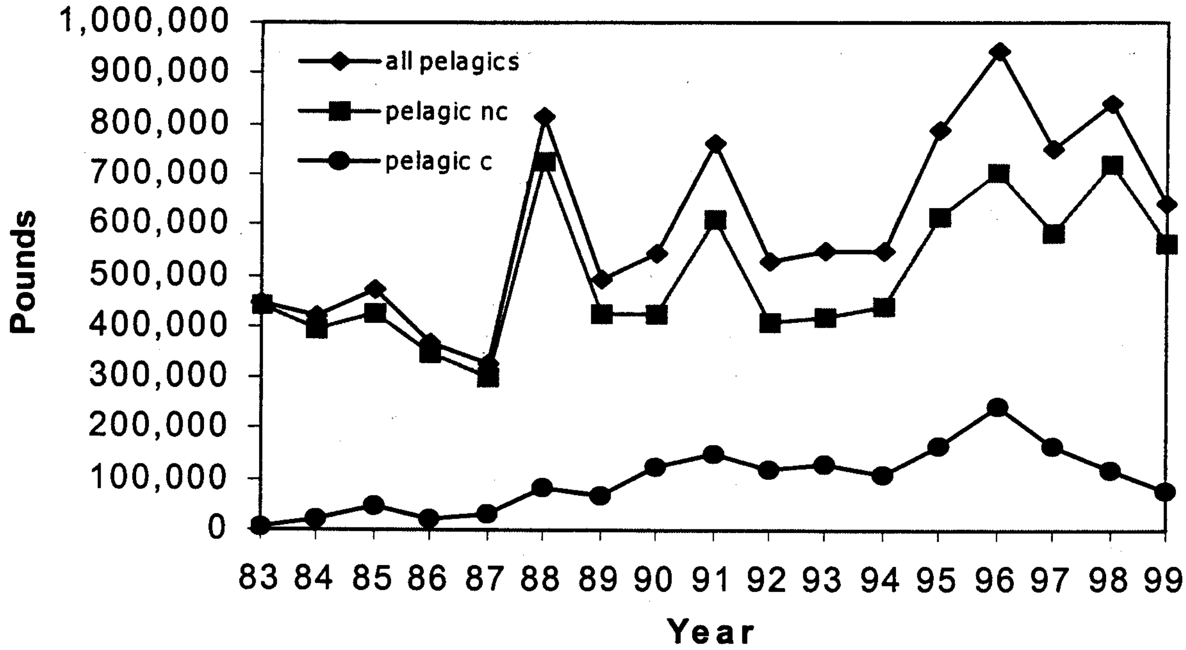
Interpretation: The general trend of the estimated total landings has increased over the past 14 years with an increase in trolling boat activity although a general decrease is observed from 1996. Because of an interest in targeting blue marlin, mahimahi, and a lack of interest in skipjack tuna, the bulk of the pelagic catch consist primarily of non-tuna PPMUS. Tunas and other PPMUS consist of 41% and 52% of the total pelagic landings in 1999. The total pelagic landings decreased 23%, tuna landings decreased 21%, and non-tuna PPMUS decreased 29% from 1998. This years decrease could be due to a decrease in trolling effort along with a decrease in the number of boats participating.

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

Calculation: A 362 day (363 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 PPMUS separately are summed across all methods to obtain the numbers plotted above except for 1992 which includes only the trolling method.

Year	Pounds Landed All Pelagics	Tunas	Other PPMUS
83	447,956	162,334	278,173
84	418,038	284,899	127,711
85	470,320	207,027	254,954
86	368,877	133,570	224,911
87	328,318	104,534	217,134
88	811,221	301,785	495,782
89	494,174	170,722	305,837
90	546,385	225,926	313,551
91	761,565	168,800	590,020
92	530,642	264,392	257,290
93	550,056	184,532	359,498
94	547,261	261,665	275,036
95	786,272	282,587	495,160
96	944,216	365,855	548,756
97	750,112	308,538	419,810
98	837,577	334,991	477,950
99	643,345	265,941	336,219
Average	**602,137**	**236,947**	**351,635**
Std deviation	**181,850**	**74,468**	**131,176**

Figure 1b. Guam annual estimated total landings: all pelagics, pelagic nc, and pelagic c



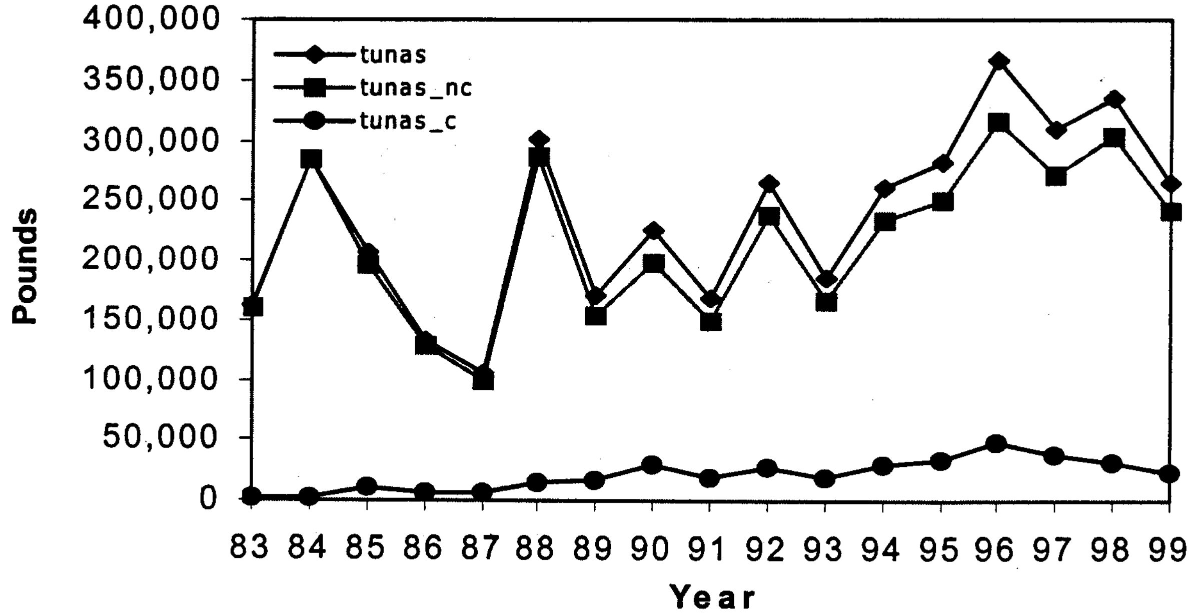
Interpretation: The general trend of the estimated total landings has increased over the past 14 years with an increase in trolling boat activity. Non-charter trolling trips account for the bulk of the pelagic catch. Prior to 1988, non-charters accounted for over 90% of the catch. Beginning in 1988, this percentage decreased due to an increase in charter boat activity. From 1996, a general decrease in charter landings is observed while no trend is apparent for non charters. For 1999, pelagic non-charters accounted for 88% of the total pelagic catch while pelagic charters accounted for 12%. Pelagic non-charter decreased 21% and pelagic charter decreased 35% from 1998. This years decrease in non-charter and charter landings could be due to a decrease in trolling effort along with a decrease in the number of boats participating.

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

Calculation: A 362 day (363 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 PPMUS separately are summed across all methods to obtain the numbers plotted above except for 1992 which includes only the trolling method.

	Pounds Landed		
Year	All pelagics	Pelagic nc	Pelagic c
83	447,956	442,301	5,655
84	418,038	395,678	22,361
85	470,320	425,791	44,528
86	368,877	347,138	21,740
87	328,318	298,385	29,933
88	811,221	727,154	84,067
89	494,174	426,524	67,651
90	546,385	423,725	122,660
91	761,565	611,025	150,540
92	530,642	411,292	119,350
93	550,056	418,248	131,809
94	547,261	440,074	107,187
95	786,272	618,925	167,347
96	944,216	702,879	241,337
97	750,112	583,500	166,612
98	837,577	719,243	118,335
99	643,345	566,030	77,314
Average	**602,137**	**503,407**	**98,731**
Std. Deviation	**181,849**	**134,982**	**63,550**

Figure 1c. Guam annual estimated total landings: all tunas, tunas nc, and tunas c



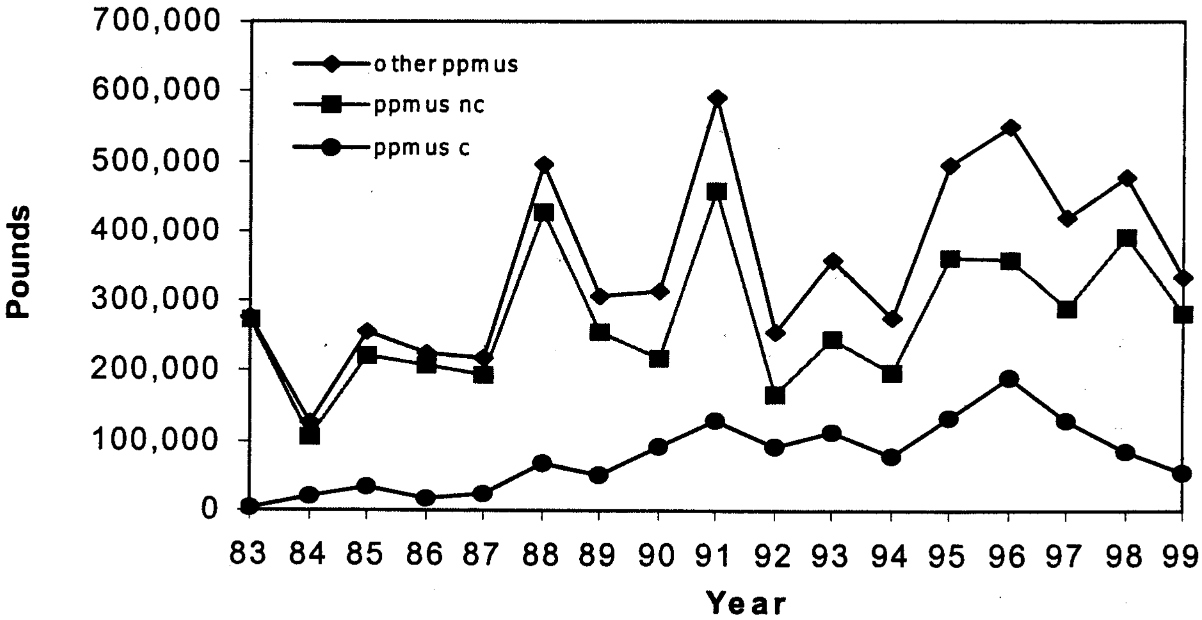
Interpretation: The general trend of the estimated total landings has increased over the past 14 years with an increase in trolling boat activity. Non-charter trolling trips account for the bulk of the tuna catch. In the 1980's, non-charters accounted for over 95% of the catch. This percentage decreased due to an increase in charter boat activity in the late 1980's. From 1996, a general decrease in non charter and charter landings is observed. For 1999, tuna non-charters account for 91% of the total tuna catch while tuna charters account for 9%. Tuna non-charter decreased 21% and tuna charter decreased 35% from 1998. This years decrease in non-charter and charter landings could be due to a decrease in trolling effort along with a decrease in the number of boats participating.

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

Calculation: A 362 day (363 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 PPMUS separately are summed across all methods to obtain the numbers plotted above except for 1992 which includes only the trolling method.

	Pounds Landed		
Year	Tunas	Tunas_nc	Tunas_c
83	162,334	160,613	1721
84	284,899	283,340	1559
85	207,027	196,020	11,007
86	133,570	128,201	5369
87	104,534	98,820	5714
88	301,785	286,974	14,811
89	170,722	154,355	16,366
90	225,926	197,255	28,672
91	168,800	149,735	19,065
92	264,392	237,257	27,135
93	184,532	165,705	18,827
94	261,665	232,747	28,918
95	282,587	249,901	32,686
96	365,855	316,394	49,462
97	308,538	271,288	37,250
98	334,991	302,903	32,089
99	265,941	242,440	23,501
Average	**236,947**	**216,115**	**20,832**
Std. Deviation	**74,468**	**65,584**	**13,450**

Figure 1d. Guam annual estimated total landings: other PPMUS, PPMUS nc, and PPMUS c



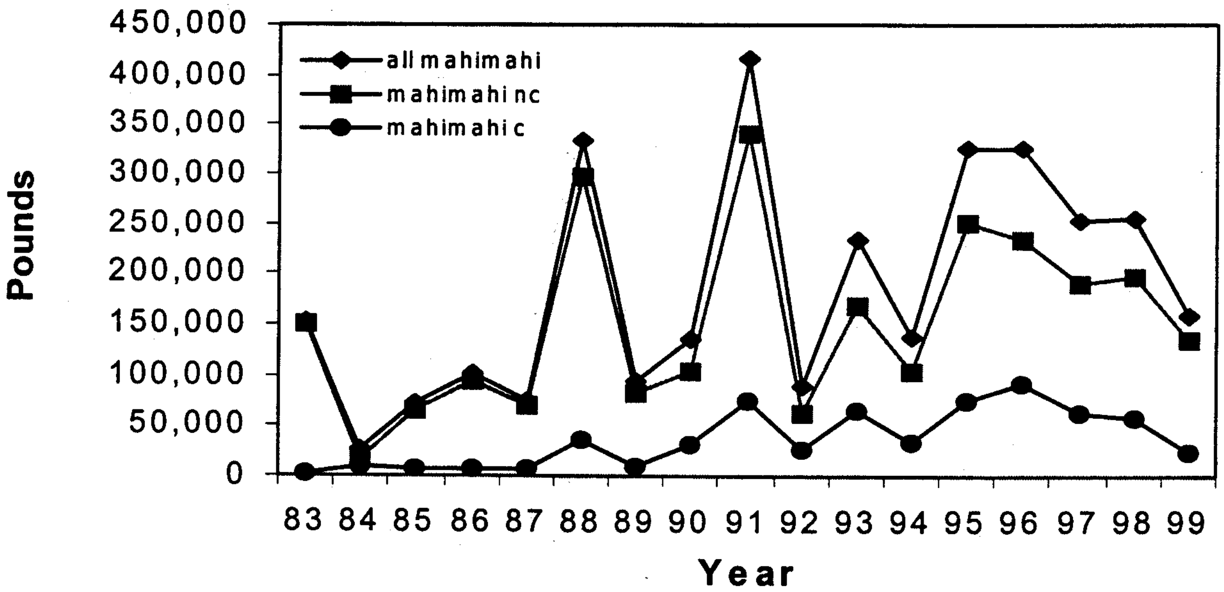
Interpretation: The general trend of the estimated total landings has increased over the past 14 years with an increase in trolling boat activity. Non-charter trolling trips account for the bulk of the other PPMUS catch. In the 1980's, non-charters accounted for over 87% of the catch. This percentage decreased due to an increase in charter boat activity in the late 1980's. From 1996, a general decrease in charter landings is observed while no trend is apparent for non charters. For 1999, other PPMUS non-charters accounted for 84% of the total other PPMUS catch while other PPMUS charters accounted for 16%. Other PPMUS non-charters decreased 27% and other PPMUS charters decreased 38% from 1998. The decrease in non-charter and charter landings could be due to a decrease in trolling effort along with a decrease in the number of boats participating.

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

Calculation: A 362 day (363 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 PPMUS separately are summed across all methods to obtain the numbers plotted above except for 1992 which includes only the trolling method.

	Pounds Landed		
Year	Other ppmus	Ppmus nc	Ppmus c
83	278,173	274,240	3934
84	127,711	106,910	20,802
85	254,954	221,446	33,508
86	224,911	208,633	16,279
87	217,134	193,177	23,957
88	495,782	426,729	69,053
89	305,837	254,876	50,961
90	313,551	220,083	93,468
91	590,020	458,773	131,247
92	257,290	166,207	91,083
93	359,498	247,031	112,467
94	275,036	197,014	78,022
95	495,160	361,077	134,082
96	548,756	357,485	191,271
97	419,810	291,351	128,459
98	477,950	392,220	85,730
99	336,219	283,240	52,979
Average	**351,635**	**274,147**	**77,488**
Std. Deviation	**131,176**	**96,635**	**51,182**

Figure 2a. Guam annual estimated total landings: all mahimahi, mahimahi nc, and mahimahi c



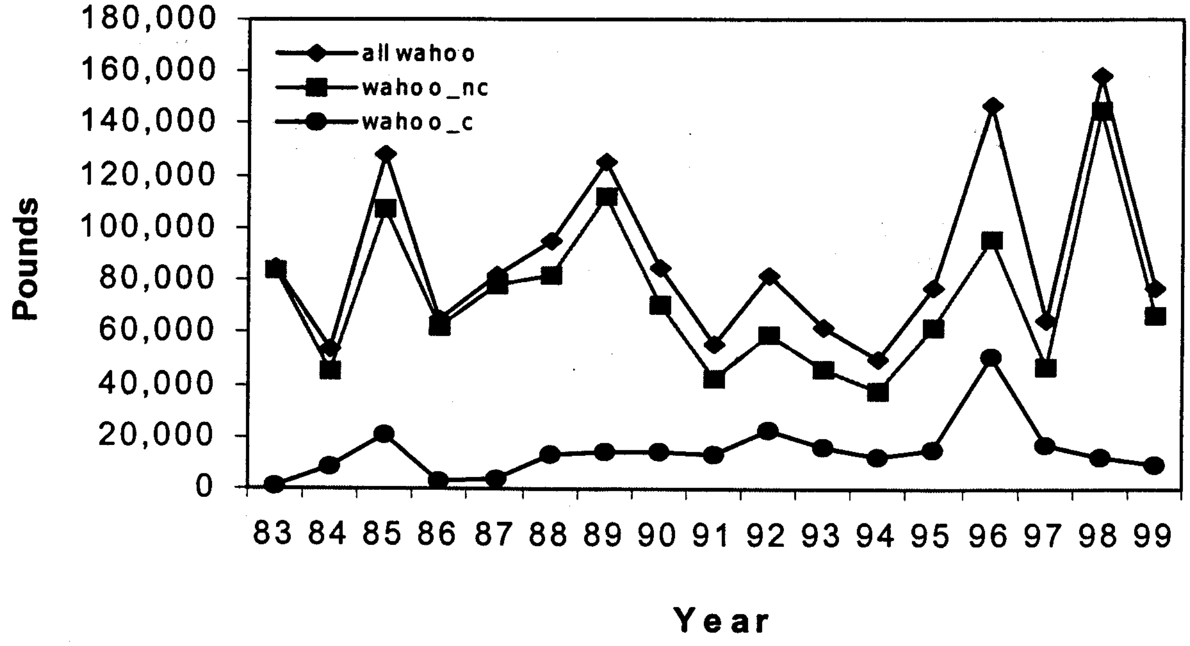
Interpretations: The general trend of the estimated landings has increased over the past 14 years with an increase in trolling boat activity. Non-charter trolling trips account for the bulk of the mahimahi catch. Prior to 1988, non-charters accounted for over 90% of the catch. Beginning in 1988, this percentage decreased due to an increase in charter boat activity. From 1995, a general decrease in non charter landings in observed. A similar decrease is observed from 1996 in non charter landings. For 1999, mahimahi non-charters accounted for 85% of the total mahimahi catch while mahimahi charters accounted for 15%. Mahimahi non-charters decreased 31% and mahimahi charters decreased 58% from 1998. This years decrease in non-charter and charter landings could be due to a decrease in trolling effort along with a decrease in the number of boats participating in 1999.

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.

	Pounds Landed		
Year	All mahimahi	Mahimahi nc	Mahimahi c
83	152,678	149,531	3147
84	25,420	16,739	8681
85	71,569	64,619	6951
86	101,487	94,646	6841
87	76,129	69,326	6803
88	333,393	296,937	36,456
89	93,709	83,069	10,640
90	134,747	102,838	31,910
91	416,053	341,358	74,695
92	89,115	63,259	25,856
93	234,522	169,200	65,322
94	137,768	103,448	34,320
95	326,868	251,367	75,501
96	327,635	234,575	93,060
97	254,806	191,864	62,942
98	255,814	198,425	57,389
99	160,150	136,229	23,921
Average	**187,757**	**151,025**	**36,731**
Std. Deviation	**114,344**	**90,585**	**29,188**

Figure 2b. Guam annual estimated total landings: all wahoo, wahoo nc, and wahoo c



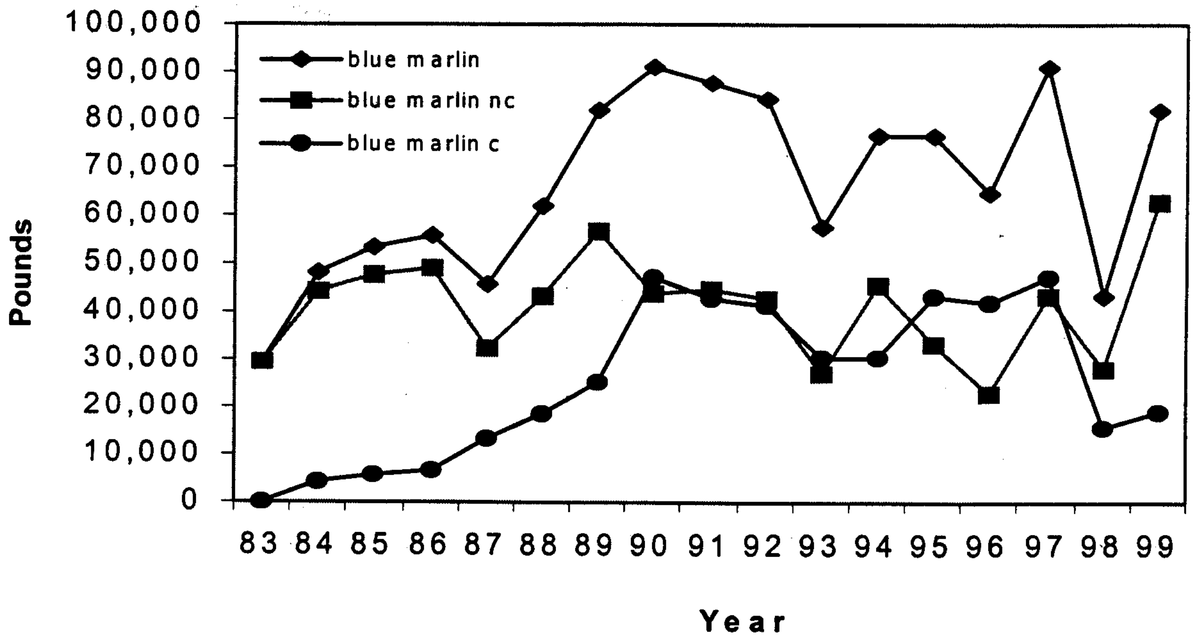
Interpretations: The general trend of wahoo non-charter landings have slightly decreased over the past 14 years. Up until 1987, most non-charter landings accounted for over 95% of the total catch. Beginning in 1988, this percentage decreased due to an increase in charter boat activity. From 1988 to 1998, non-charter landings have fluctuated accounting for 65% up to 92% of the total catch. The general trend of wahoo charter landings has slightly increased since 1985. In 1996, wahoo charter landings reached a high accounting for 35% of the total catch and has steadily decreased from then. For 1999, wahoo non-charters accounted for 87% of the total catch while charters accounted for 13%. Non-charter landings decreased 54% and charter landings decreased 21% from 1998. This years decrease in non-charter and charter landings could be due to a decrease in trolling effort along with a decrease in the number of boats participating.

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.

	Pounds Landed		
Year	All wahoo	Wahoo_nc	Wahoo_c
83	84,349	83,562	786
84	53,490	45,424	8066
85	128,209	107,275	20,934
86	64,756	61,985	2771
87	82,024	78,000	4024
88	95,180	82,107	13,073
89	125,720	112,006	13,714
90	84,873	70,698	14,176
91	55,952	42,681	13,270
92	82,238	59,675	22,563
93	62,373	46,318	16,055
94	50,390	37,712	12,677
95	77,325	62,224	15,102
96	147,181	95,884	51,297
97	64,956	47,538	17,418
98	157,947	145,524	12,424
99	76,958	67,170	9788
Average	**87,878**	**73,281**	**14,596**
Std. Deviation	**32,762**	**28,979**	**11,131**

Figure 3a. Guam annual estimated total landings:
blue marlin, blue marlin nc, and bluemarlin c



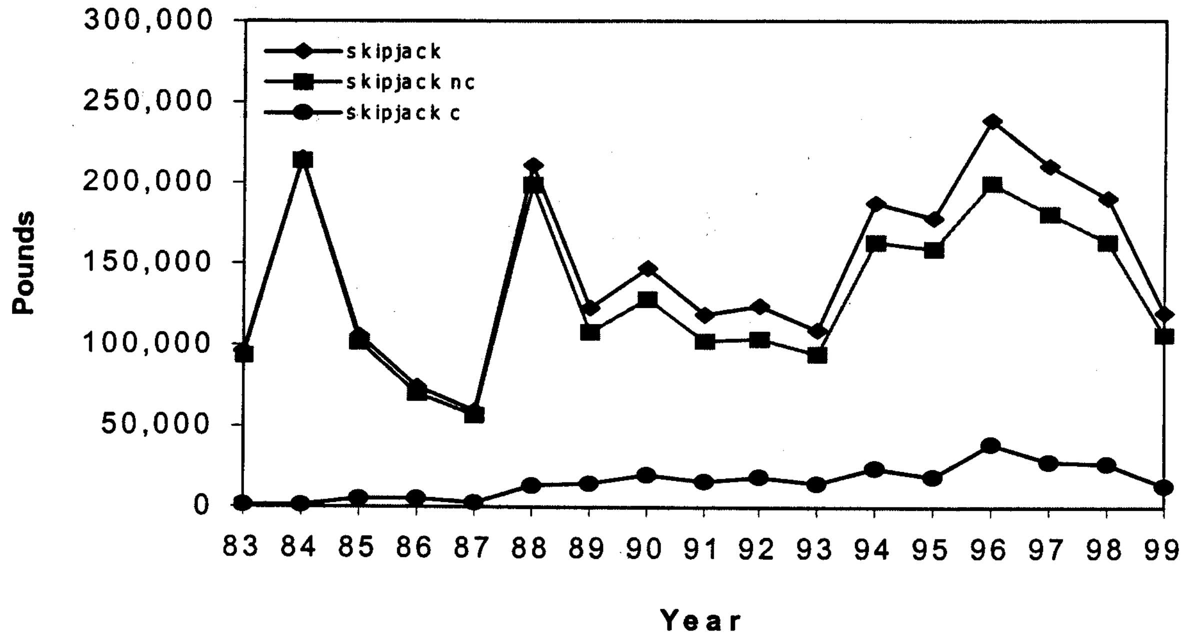
Interpretations: The general trend of blue marlin non-charter landings has decreased s over the past 14 years while blue marlin charter landings has increased with the increase in trolling boat activity. During the 1980's, non-charters accounted for the bulk of the marlin catch. In the early 1990's, charters began to account for about 50% of the total catch. In the middle 1990's, charters began to account for most of the catch. These increases are due to the increase in charter boat activity. The decrease in charter landings after 1997 is due to the decrease in charter trips. In 1999, non-charters accounted for 77% of the total marlin catch while charters accounted for 23%. Non-charter landings increased 111% and charter landings increased 18% from 1998. The increase in non-charter and charter landings in 1999 could be due to an increase in targeting this species during marlin season.

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.

	Pounds Landed		
Year	Blue marlin	Blue marlin nc	Blue marlin c
83	29,688	29,688	0
84	48,239	44,185	4,055
85	53,117	47,494	5,623
86	55,766	49,099	6,667
87	45,620	32,490	13,130
88	61,816	43,342	18,474
89	82,120	56,721	25,399
90	90,749	43,600	47,148
91	87,838	44,941	42,897
92	84,356	42,937	41,419
93	57,530	27,046	30,484
94	76,514	45,889	30,625
95	76,637	33,451	43,186
96	64,677	22,742	41,935
97	90,726	43,427	47,299
98	43,511	27,886	15,625
99	81,888	62,724	19,164
Average	**66,517**	**41,039**	**25,478**
Std. Deviation	**18,851**	**10,769**	**16,458**

Figure 4a. Guam annual estimated total landings: skipjack, skipjack nc, and skipjack c



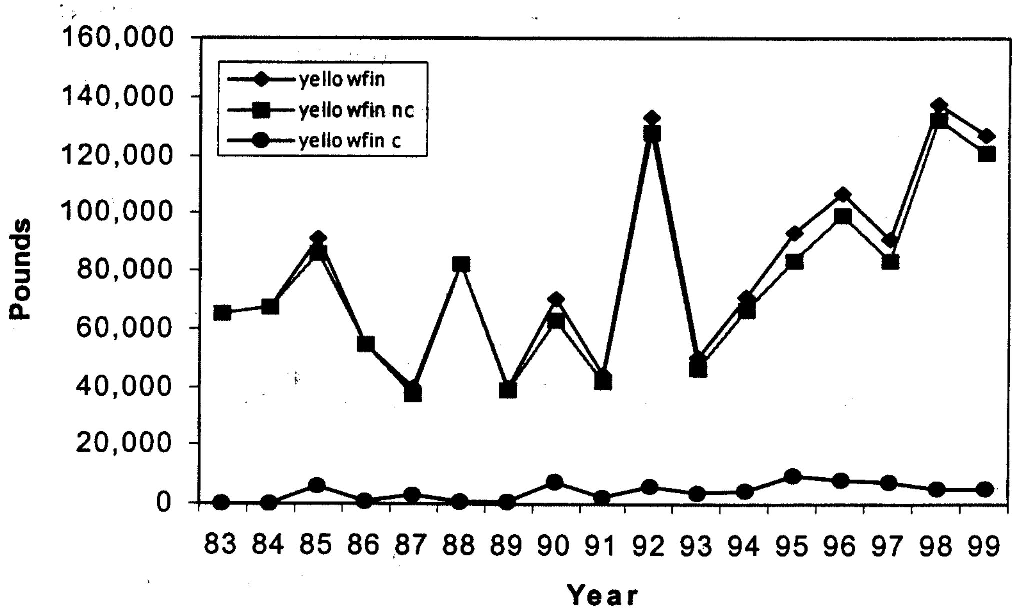
Interpretations: The estimated total landings has increased from 1987 to 1996 with an increase in trolling boat activity although a general decrease is observed from 1996. Prior to 1988, non-charter trolling trips accounted for over 90% of the pelagic catch. Because of an increase in charter activity in 1988, charters began to account for up to 16% of the skipjack tuna landings. In 1999, non-charters accounted for 88% of the total catch while charters accounted for 12%. Non-charter landings decreased 35% and charter landings decreased 48% from 1998. The decrease in non-charter and charter landings in 1999 could be due to a decrease in trolling effort along with a decrease in the number of boats participating.

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.

	Pounds Landed		
Year	Skipjack	Skipjack nc	Skipjack c
83	95,449	93,796	1,652
84	215,102	213,937	1,165
85	105,754	100,732	5,022
86	74,450	69,642	4,808
87	59,569	56,908	2,661
88	211,014	198,085	12,929
89	122,588	107,678	14,910
90	147,702	127,870	19,832
91	118,799	102,967	15,832
92	123,731	104,504	19,227
93	109,244	94,713	14,532
94	188,408	163,937	24,471
95	178,404	160,052	18,353
96	239,006	199,958	39,048
97	210,535	181,605	28,930
98	190,466	163,858	26,609
99	120,137	106,199	13,938
Average	**147,668**	**132,144**	**15,525**
Std. Deviation	**54,295**	**48,224**	**10,536**

Figure 4b. Guam annual estimated total landings: yellowfin, yellowfin nc, and yellowfin c



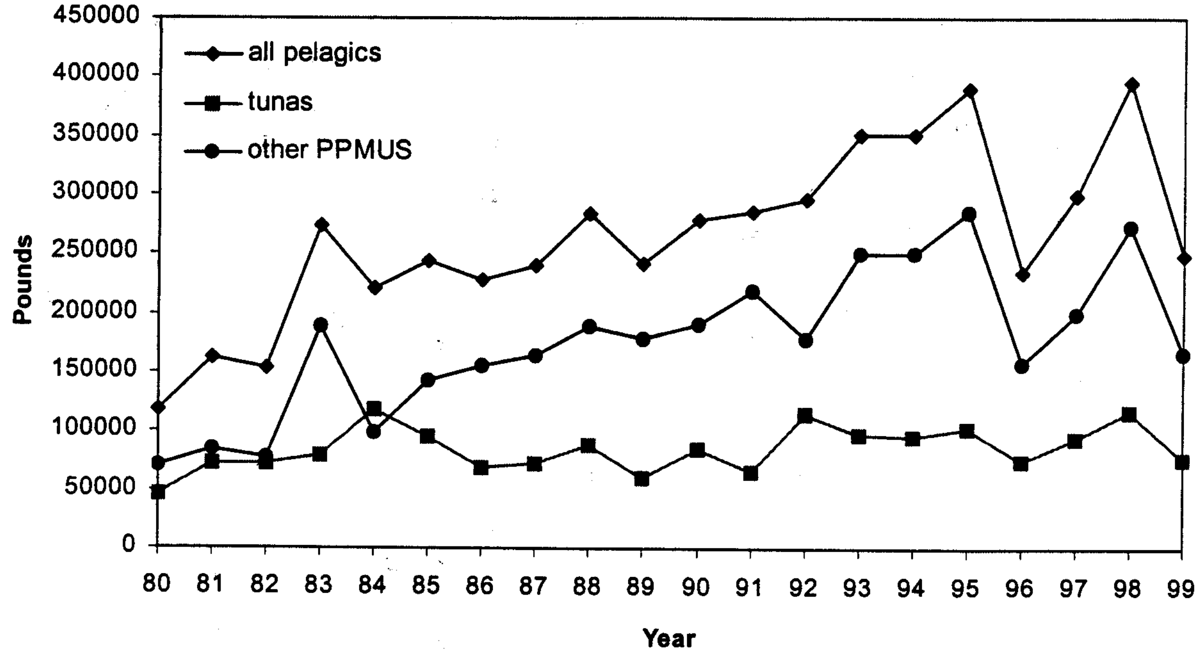
Interpretations: The estimated total landings of non-charters have increased from 1987 to 1999 while charters have only slightly increased with the increase in trolling boat activity. Non-charter trolling trips account for the bulk of the pelagic catch. In 1999, non-charters accounted for 96% of the total catch while charters accounted for 4%. Non-charter landings decreased 8% while charter landings increased 8% from 1998. The decrease in non-charter landings in 1999 could be due to a decrease in targeting the species while the increase in charter landings could be due to an increase in targeting the species.

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.

	Pounds Landed		
Year	Yellowfin	Yellowfin nc	Yellowfin c
83	64,684	64,684	0
84	67,463	67,207	256
85	91,560	85,813	5,748
86	54,781	54,297	485
87	39,766	37,061	2,705
88	82,549	81,985	565
89	39,967	39,048	920
90	69,952	62,519	7,433
91	44,073	41,865	2,208
92	133,397	127,508	5,889
93	49,973	46,053	3,920
94	71,081	66,899	4,183
95	93,329	83,703	9,626
96	107,244	99,343	7,901
97	91,455	83,982	7,474
98	137,395	132,388	5,008
99	126,858	121,398	5,460
Average	**80,325**	**76,221**	**4,105**
Std. Deviation	**31,773**	**30,184**	**3,051**

Figure 5. Guam annual estimated commercial landings: all pelagics, tunas, and other PPMUS



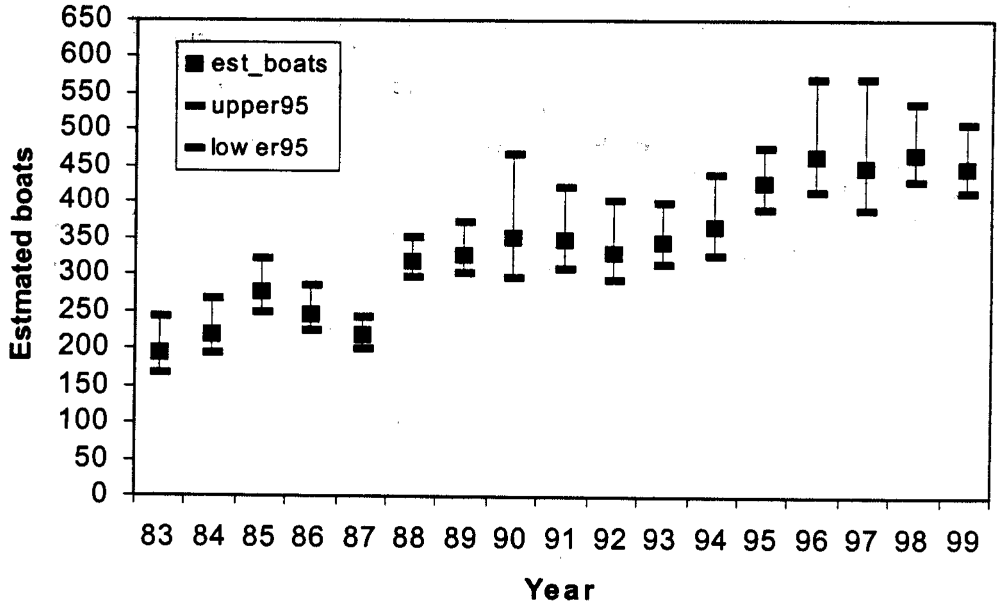
Interpretations: Commercial pelagic fishery landings appear to have increased steadily for the last 19 years, especially with the growth of the charter boat industry. A drop in landings between 1995 and 1996 may have been due primarily to a major fish vendor going out of business and fishermen marketing their fish to vendors that were not part of the commercial receipt book program. In 1999, tunas accounted for 30% of the total pelagic landings while other PPMUS accounted for 67%. Commercial landings decreased 37% for all pelagics, decreased 36% for tunas, and decreased 67% for other PPMUS. The decrease in commercial landings in 1999 could be due to a decrease in trolling effort. Because most vendors do not obtain the number of hours fished from fishermen, it is impossible to determine this.

Source: The WPacFIN-sponsored commercial landings system.

Calculation: The total estimated commercial landings for each year were calculated by summing the weight fields in the commercial landings data base 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.

	Pounds Landed		
Year	All pelagics	Tunas	Other PPMUS
80	118275	45043	70319
81	162186	72229	84371
82	153577	72347	77602
83	273120	79313	189241
84	220074	118167	98412
85	243060	94691	143509
86	227928	68510	154749
87	240790	71711	163449
88	283264	87962	188498
89	242554	59825	178424
90	279121	84176	190201
91	285696	64694	218588
92	296809	114765	178307
93	351201	96289	250211
94	351187	95321	250348
95	389849	102236	285481
96	235270	73394	157196
97	300457	93825	200121
98	395473	117330	273445
99	**248472**	**75346**	**165374**
Average	**264918**	**84359**	**175892**
Std. Deviation	**73054**	**19748**	**61923**

Figure 6. Guam estimated number of trolling boats



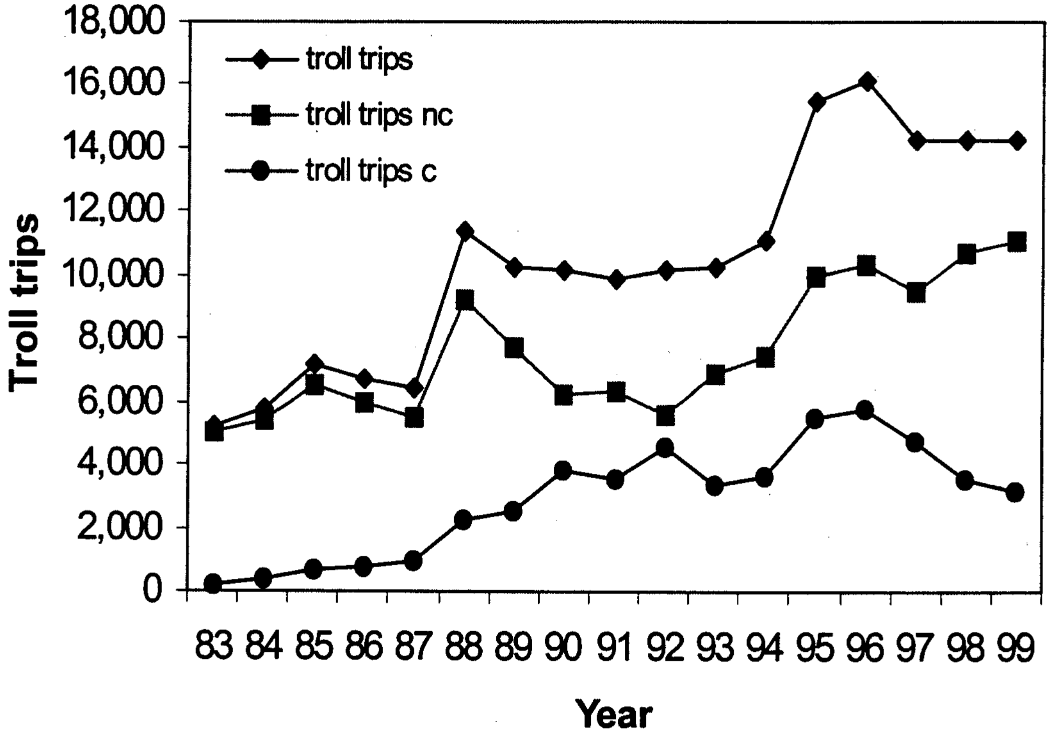
Interpretations: The number of trolling boats on Guam has been steadily increasing, especially since the addition of two marinas to the offshore sampling program. There appears to be a general increase in the number of small boats participating in Guam's pelagic fishery, while the number of charter vessels has remained fairly constant for several years. The number of trolling boats decreased slightly in 1999, approximately 5%. The estimated number of boats was 449 with an upper confidence limit of 510 and a lower of 415.

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 1998 trolling boat log was converted and processed through a boat estimator model 1,000 times. There were 1,315 logged trolling trips made by 383 different vessels, counted on 91 sample days.

	Estimated Number of Boats		
Year	Est_boats	Upper95	Lower95
83	193	242	168
84	219	267	193
85	276	323	249
86	246	284	226
87	219	244	201
88	320	353	297
89	329	374	303
90	352	467	299
91	349	422	309
92	332	405	294
93	346	401	316
94	369	439	329
95	427	476	393
96	466	572	415
97	449	572	393
98	469	537	430
99	449	510	415
Average	**342**	**405**	**308**
Std. Deviation	**90**	**109**	**82**

Figure 7a. Guam annual estimated number of total troll trips, troll trip nc, and troll trips c



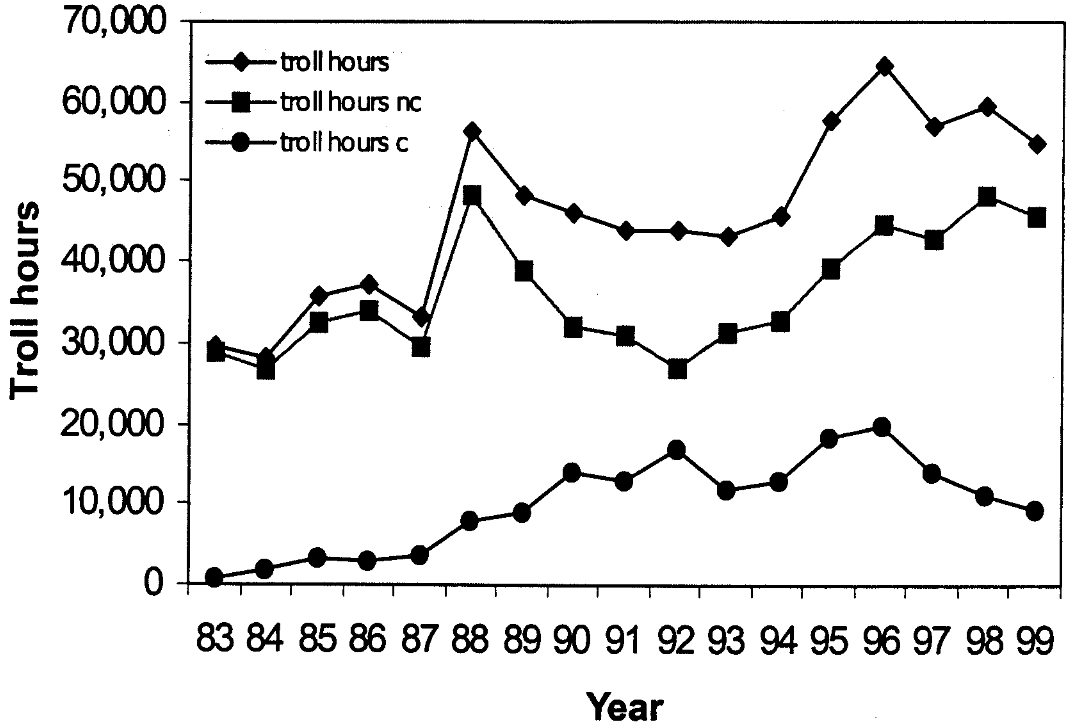
Interpretations: Non-charter and charter troll trips have increased over the past 17 years. Charter boat trips decreased over the past three years due to a decrease in charter activity resulting from a significant drop in tourism while non-charter trips have increased over the past two years. Compared with 1998, charter trolling trips decreased 10% while non-charter trips increased 3%. Charter trolling trips made up 78% of all trolling trips while charters made up 22%.

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.

Year	Troll trips	Troll trips nc	Troll trips c
83	5,187	5,039	148
84	5,763	5,411	353
85	7,209	6,544	665
86	6,677	5,932	744
87	6,458	5,513	945
88	11,412	9,221	2,192
89	10,230	7,714	2,515
90	10,130	6,264	3,865
91	9,870	6,325	3,545
92	10,165	5,614	4,551
93	10,247	6,931	3,316
94	11,103	7,497	3,606
95	15,528	10,000	5,528
96	16,098	10,317	5,781
97	14,279	9,528	4,751
98	14,295	10,758	3,537
99	14,233	11,053	3,180
Average	**10,523**	**7,627**	**2,895**
Std. Deviation	**3,479**	**2,074**	**1,803**

Figure 7b. Guam annual estimated number of troll hours, troll hours nc and troll hours c



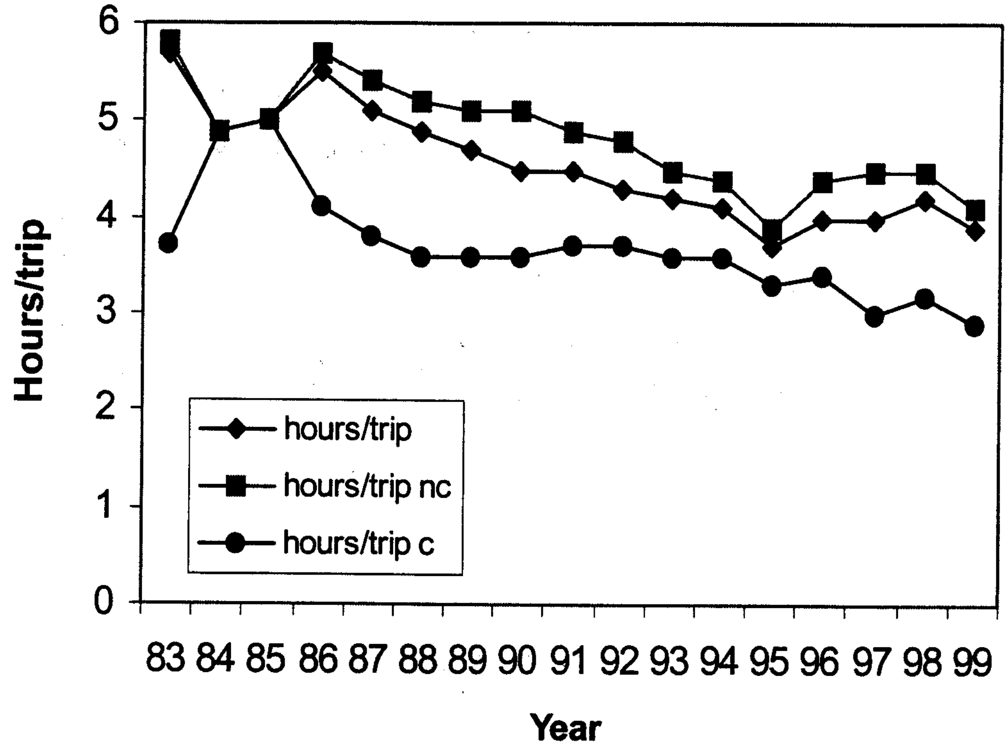
Interpretations: Trolling hours for non-charters and charters have increased over the past 17 years. From 1996, charter troll hours decreased due to a decrease in charter trolling activity, which also contributed to the decrease in total troll hours. Compared with 1998, charter trolling hours decreased 17% and non-charter trips decreased 6%. Non-charters accounted for 83% of the total trolling hours while charters accounted for 17%.

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.

Year	Troll hours	Troll hours nc	Troll hours c
83	29,555	29,009	546
84	28,256	26,528	1,727
85	35,895	32,593	3,302
86	36,997	33,940	3,057
87	33,187	29,605	3,582
88	56,224	48,398	7,826
89	48,226	39,063	9,163
90	46,021	32,096	13,925
91	44,151	31,016	13,135
92	43,855	27,070	16,785
93	43,131	31,274	11,857
94	45,931	32,829	13,102
95	57,626	39,284	18,342
96	64,603	44,916	19,687
97	56,994	42,856	14,137
98	59,645	48,453	11,192
99	54,991	45,685	9,305
Average	**46,193**	**36,154**	**10,039**
Std. Deviation	**10,974**	**7,485**	**5,939**

Figure 7c. Guam annual estimated hours/trip, hours/trip nc and hours/trip c



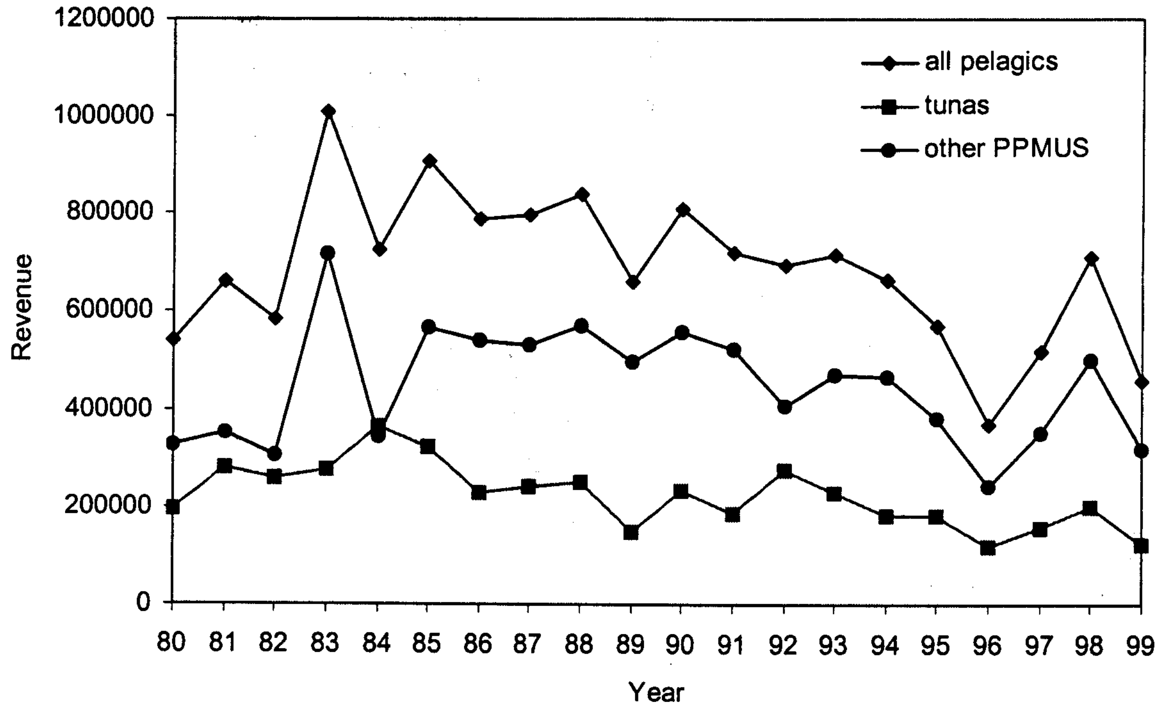
Interpretations: Trolling effort for non-charters and charters have decreased over the past 14 years. Compared with 1998, charter trolling effort decreased 9% and non-charter effort decreased 9%.

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.

Year	Hours/trip	Hours/trip nc	Hours/trip c
83	5.70	5.80	3.70
84	4.90	4.90	4.90
85	5.00	5.00	5.00
86	5.50	5.70	4.10
87	5.10	5.40	3.80
88	4.90	5.20	3.60
89	4.70	5.10	3.60
90	4.50	5.10	3.60
91	4.50	4.90	3.70
92	4.30	4.80	3.70
93	4.20	4.50	3.60
94	4.10	4.40	3.60
95	3.70	3.90	3.30
96	4.00	4.40	3.40
97	4.00	4.50	3.00
98	4.20	4.50	3.20
99	3.90	4.10	2.90
Average	**4.54**	**4.84**	**3.69**
Std. Deviation	**0.57**	**0.53**	**0.56**

Figure 8. Guam annual estimated commercial inflation-adjusted total revenues: all pelagics, tunas, and other PPMUS



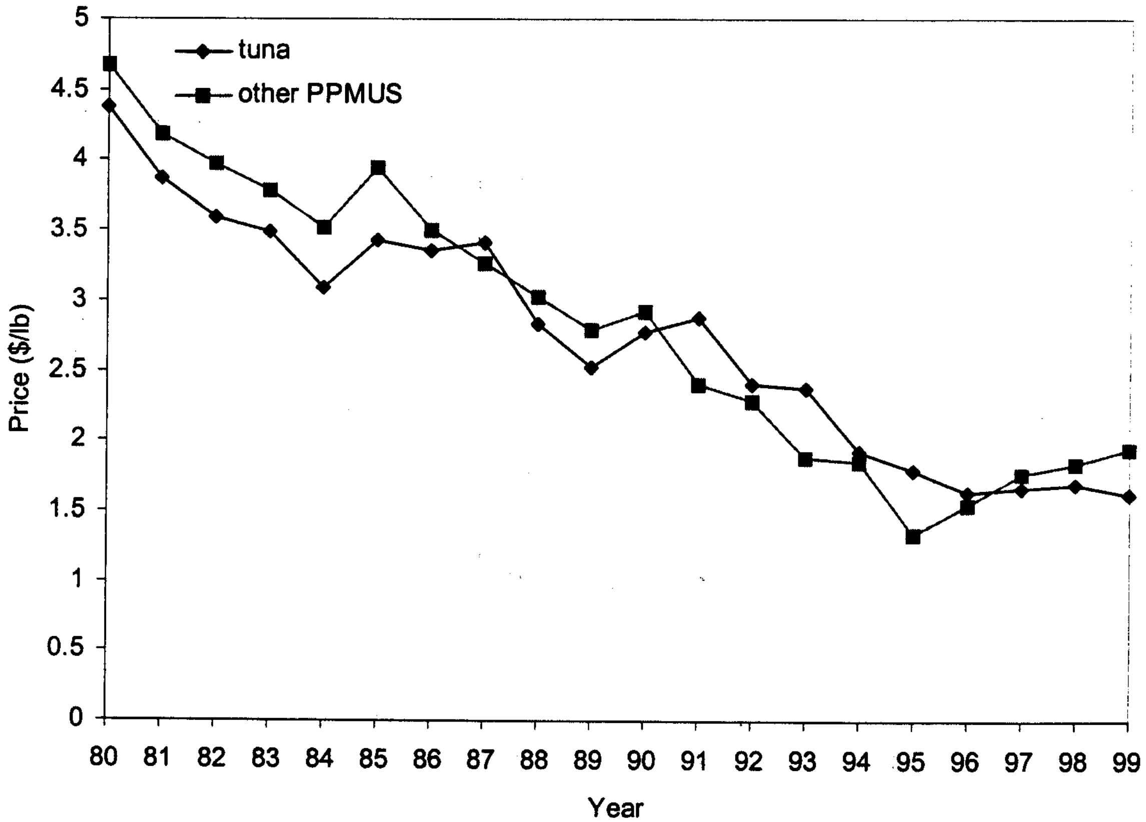
Interpretations: Adjusted revenues in 1999 decreased for all pelagics, tunas, and other PPMUS. Revenues decreased 36% for all pelagics, 38% for tunas, and 36% for other PPMUS. The decrease in revenues mirrors the decrease observed in commercial landings. The decrease in revenue may be due to less effective marketing by fish vendors, competition between vendors, and a decreased demand for pelagics .

Source: The WPACFIN-sponsored commercial landings system.

Calculation: The total estimated revenue for each year was calculated by summing the revenue fields in the commercial landings data base from the principle fish wholesalers on Guam, and then multiplying by the same percent coverage expansion factor as were the landings in figure 5. Inflation-adjusted total revenue per trip is derived from the Guam annual Consumer Price Index (CPI).

	Revenues($)					
	All pelagics		Tunas		Other PPMUS	
Year	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.
1980	149160	541003	54353	197137	90623	328689
1981	218384	657555	92914	279765	117052	352445
1982	203847	583819	90719	259819	107573	308089
1983	364527	1009011	100029	276881	258501	715530
1984	283724	722361	143598	365600	135498	344978
1985	369651	906014	131953	323418	230855	565827
1986	330302	788100	96395	229998	226935	541466
1987	347753	794617	107055	244620	233116	532670
1988	386468	839409	114981	249739	261901	568849
1989	337586	660993	76865	150502	253932	497198
1990	471241	807708	136321	233654	325372	557687
1991	462191	718706	119640	186040	337328	524545
1992	492707	695703	195547	276112	289129	408250
1993	547835	713829	175360	228495	362728	472634
1994	593838	662130	165296	184305	418612	466752
1995	537889	569087	173629	183700	361363	382322
1996	366280	369210	118883	119834	239901	241820
1997	515007	518612	154819	155903	351229	353688
1998	711066	711777	197677	197874	503600	504103
1999	**458638**	**458638**	**122023**	**122023**	**320462**	**320462**
Average		**686414**		**223271**		**449400**
Std. Deviation		**152943**		**64236**		**118646**

Figure 9. Guam average price of tunas and other PPMUS



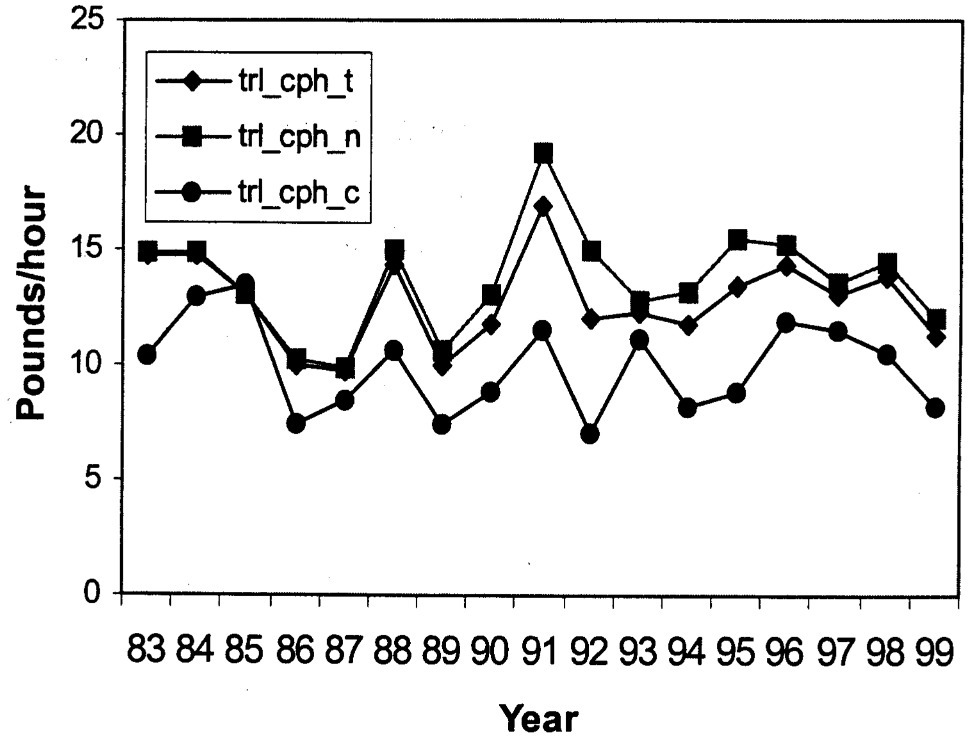
Interpretations: The inflation-adjusted price of tunas and other PPMUS shows a general decline during the past 19 years. Compared with 1998, the adjusted price for tuna has decreased by 4% while the adjusted price for other PPMUS increased 5%. The decrease in price for tuna may be due to a decrease in demand, less effective marketing by vendors, and competition between vendors while an increase in price of other PPMUS may be due to an increase in demand.

Source: The WPACFIN-sponsored commercial landings system.

Calculation: The average price of the Tunas and other PPMUS 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.

	Price ($/lb)			
	Tuna		Other PPMUS	
Year	Unadj.	Adj.	Unadj.	Adj.
1980	1.21	4.38	1.29	4.67
1981	1.29	3.87	1.39	4.18
1982	1.25	3.59	1.39	3.97
1983	1.26	3.49	1.37	3.78
1984	1.22	3.09	1.38	3.51
1985	1.39	3.42	1.61	3.94
1986	1.41	3.36	1.47	3.5
1987	1.49	3.41	1.43	3.26
1988	1.31	2.84	1.39	3.02
1989	1.28	2.52	1.42	2.79
1990	1.62	2.78	1.71	2.93
1991	1.85	2.88	1.54	2.4
1992	1.7	2.41	1.62	2.29
1993	1.82	2.37	1.45	1.89
1994	1.73	1.93	1.67	1.86
1995	1.7	1.8	1.27	1.34
1996	1.62	1.63	1.53	1.54
1997	1.65	1.66	1.76	1.77
1998	1.68	1.69	1.84	1.84
1999	**1.62**	**1.62**	**1.94**	**1.94**
Average		**2.74**		**2.82**
Std. deviation		**0.836**		**0.996**

Figure 10a. Guam trolling catch rates: cph total, cph nc, and cph c



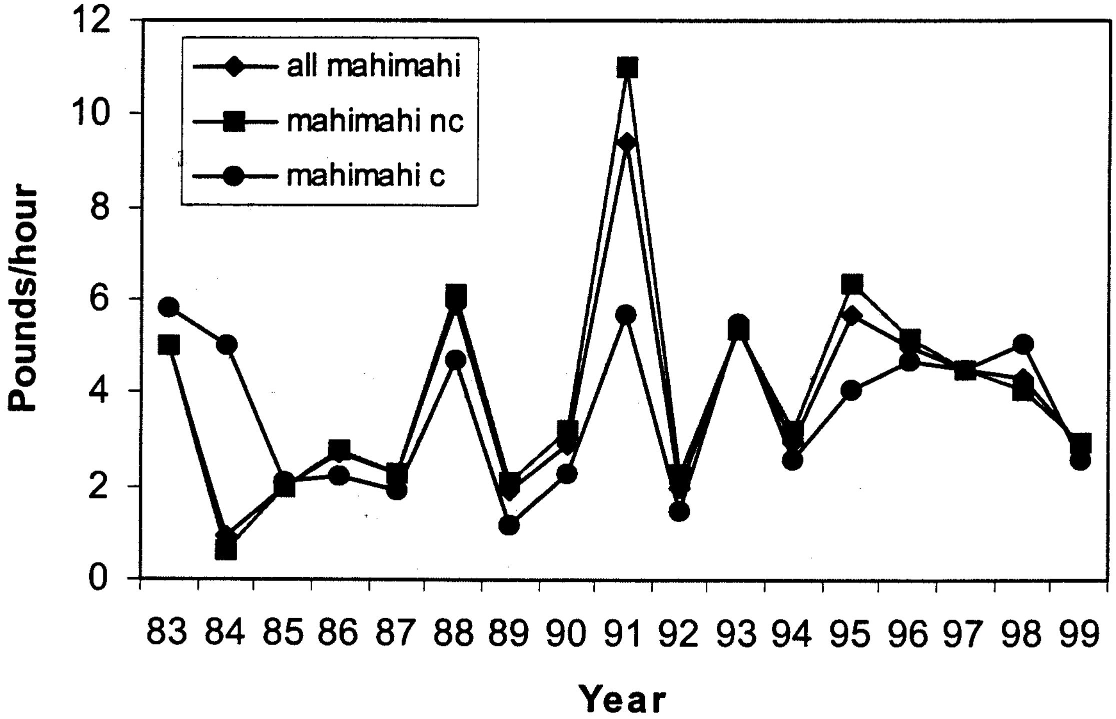
Interpretations: The wide fluctuations in CPUE are probably due to the high variability in the year to year abundance and availability of the stocks. However, since it is not possible to allocate species-specific effort, effort used to target other species can also result in artificially high or low catch rates for a given species. In 1999, total catch rate decreased 18 %, non-charter catch rate decreased 17%, and charter catch rate decreased 22%. No general trend in CPUE is apparent for charters. There has been a general increase in the total CPUE over the past 14 years, which can be contributed to non-charters.

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, wahoo, and blue marlin, each divided by the total number of hours spent fishing (gear in use).

Year	Trl_cph_t	Trl_cph_n	Trl_cph_c
83	14.8	14.9	10.4
84	14.8	14.9	12.9
85	13.1	13.1	13.5
86	10	10.2	7.5
87	9.7	9.9	8.4
88	14.4	15	10.7
89	10	10.6	7.4
90	11.8	13.1	8.8
91	16.9	19.2	11.5
92	12	15	7.1
93	12.3	12.8	11.1
94	11.8	13.2	8.2
95	13.4	15.5	8.9
96	14.3	15.3	11.9
97	13.1	13.6	11.6
98	13.8	14.5	10.5
99	11.3	12	8.2
Average	**13**	**14**	**10**
Std. Deviation	**1.96**	**2.29**	**2.00**

Figure 10b. Guam trolling catch rates: all mahimahi, mahimahi nc and mahimahi c



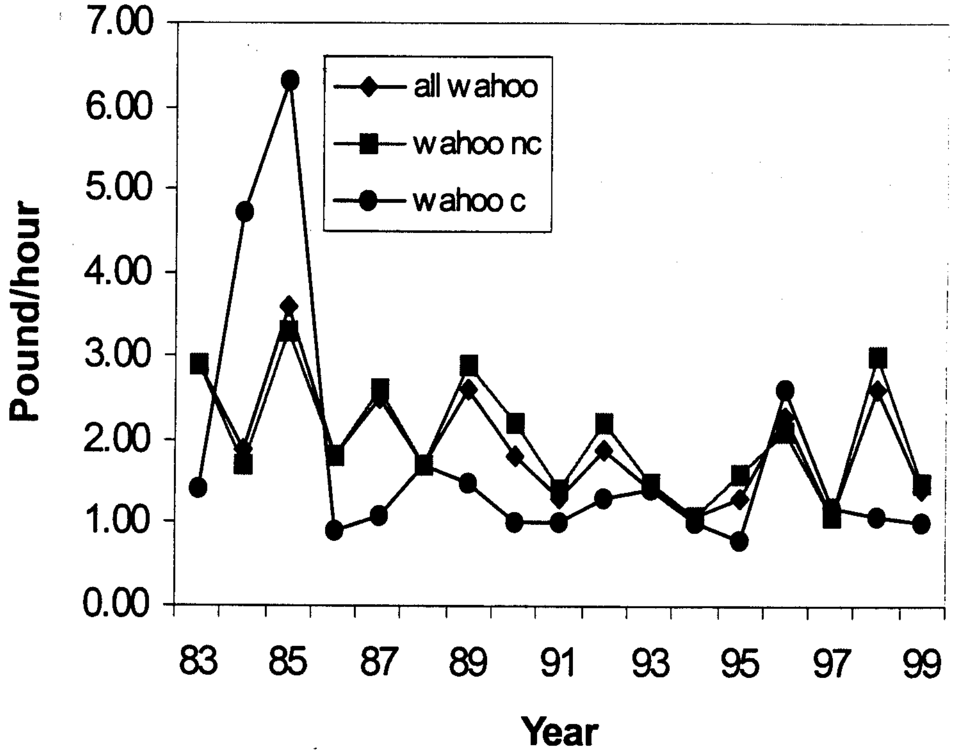
Interpretations: The wide fluctuations in CPUE are probably due to the high variability in the year to year abundance and availability of the stocks. However, since it is not possible to allocate species-specific effort, effort used to target other species can also result in artificially high or low catch rates for a given species. In 1999, the catch rate for mahimahi non-charters decreased 27% and decreased 49% for charters.

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, wahoo, and blue marlin, each divided by the total number of hours spent fishing (gear in use).

Year	All mahimahi	Mahimahi nc	Mahimahi c
83	5.00	5.00	5.80
84	0.90	0.60	5.00
85	2.00	2.00	2.10
86	2.70	2.80	2.20
87	2.30	2.30	1.90
88	5.90	6.10	4.70
89	1.90	2.10	1.20
90	2.90	3.20	2.30
91	9.40	11.00	5.70
92	2.00	2.30	1.50
93	5.40	5.40	5.50
94	3.00	3.20	2.60
95	5.70	6.40	4.10
96	5.00	5.20	4.70
97	4.50	4.50	4.50
98	4.30	4.10	5.10
99	2.90	3.00	2.60
Average	**3.87**	**4.07**	**3.62**
Std. Deviation	**2.09**	**2.40**	**1.61**

Figure 10c. Guam trolling catch rates: all wahoo, wahoo nc and wahoo c



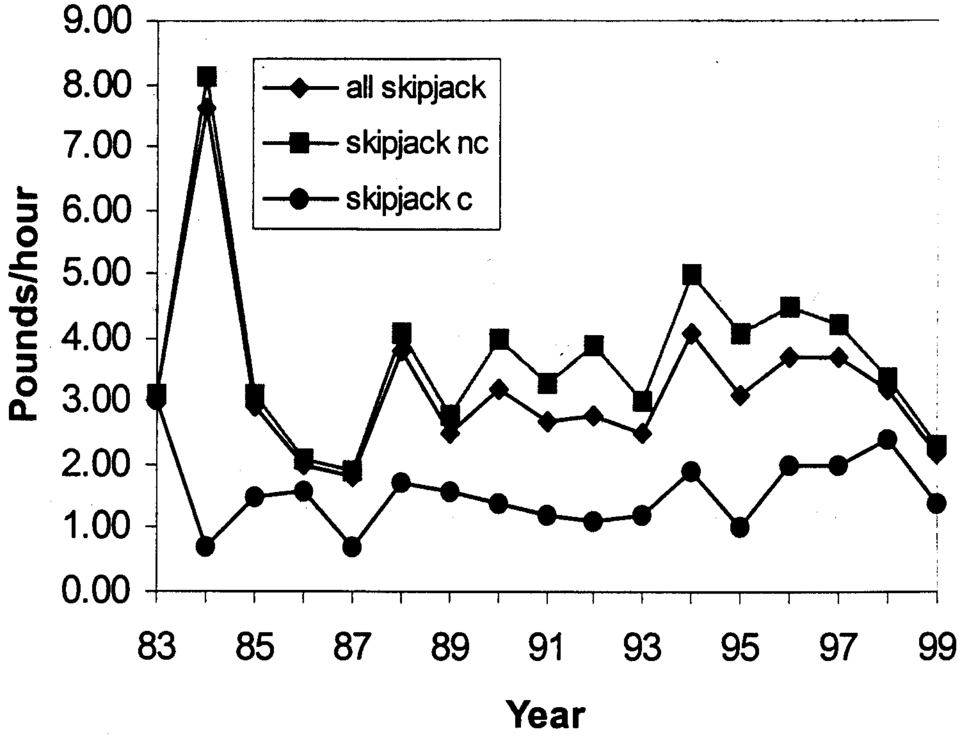
Interpretations: The wide fluctuations in CPUE are probably due to the high variability in the year to year abundance and availability of the stocks. However, since it is not possible to allocate species-specific effort, effort used to target other species can also result in artificially high or low catch rates for a given species. In 1999, the catch rate for wahoo non-charter decreased 50% and charters decreased 9%.

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, wahoo, and blue marlin, each divided by the total number of hours spent fishing (gear in use).

Year	All wahoo	Wahoo nc	Wahoo c
83	2.90	2.90	1.40
84	1.90	1.70	4.70
85	3.60	3.30	6.30
86	1.80	1.80	0.90
87	2.50	2.60	1.10
88	1.70	1.70	1.70
89	2.60	2.90	1.50
90	1.80	2.20	1.00
91	1.30	1.40	1.00
92	1.90	2.20	1.30
93	1.40	1.50	1.40
94	1.10	1.10	1.00
95	1.30	1.60	0.80
96	2.30	2.10	2.60
97	1.10	1.10	1.20
98	2.60	3.00	1.10
99	1.40	1.50	1.00
Average	**1.95**	**2.04**	**1.76**
Std. Deviation	**0.70**	**0.69**	**1.49**

Figure 11a. Guam trolling catch rates: all skipjack, skipjack nc and skipjack c



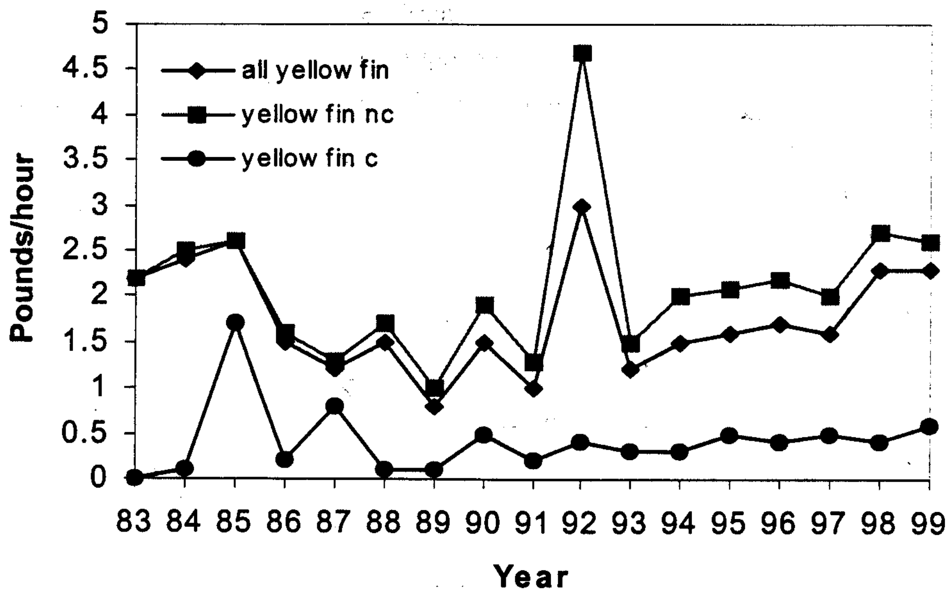
Interpretations: The wide fluctuations in CPUE for skipjack tunas are probably due to the high variability in the year to year abundance and availability of the stocks. Since it is not possible to allocate species-specific effort, effort used to target other species can also result in an artificially high or low catch rate for a given species. Compared with 1998, the catch rate for non-charter CPUE decreased 32% and charter CPUE decreased 42%.

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 were calculated the same way as Figure 10.

Year	All skipjack	Skipjack nc	Skipjack c
83	3.10	3.10	3.00
84	7.60	8.10	0.70
85	2.90	3.10	1.50
86	2.00	2.10	1.60
87	1.80	1.90	0.70
88	3.80	4.10	1.70
89	2.50	2.80	1.60
90	3.20	4.00	1.40
91	2.70	3.30	1.20
92	2.80	3.90	1.10
93	2.50	3.00	1.20
94	4.10	5.00	1.90
95	3.10	4.10	1.00
96	3.70	4.50	2.00
97	3.70	4.20	2.00
98	3.20	3.40	2.40
99	2.20	2.30	1.40
Average	**3.23**	**3.70**	**1.55**
Std. Deviation	**1.30**	**1.42**	**0.59**

Figure 11b. Guam trolling catch rates: all yellowfin, yellowfin nc, and yellowfin c



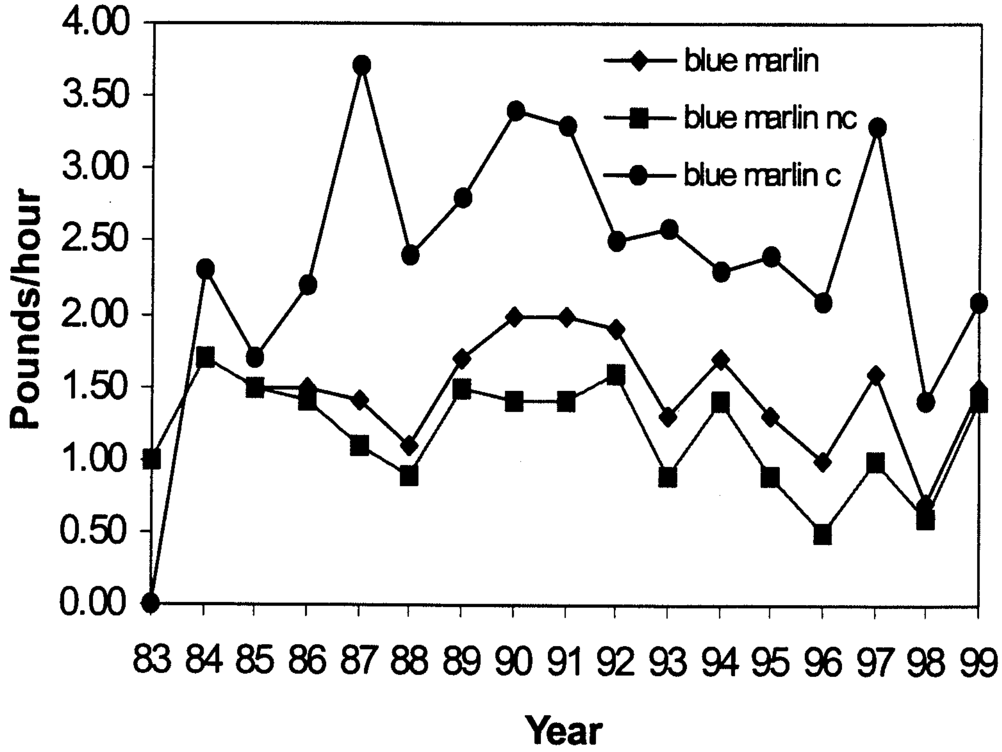
Interpretations: The wide fluctuations in CPUE for yellowfin tunas are probably due to the high variability in the year to year abundance and availability of the stocks. Since it is not possible to allocate species-specific effort, effort used to target other species can also result in an artificially high or low catch rate for a given species. Compared with 1998, the catch rate for non-charter yellowfin tuna decreased 4% while charter yellowfin tuna increased 33%.

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 were calculated the same way as Figure 10.

Year	All yellowfin	Yellowfin nc	Yellowfin c
83	2.20	2.20	0.00
84	2.40	2.50	0.10
85	2.60	2.60	1.70
86	1.50	1.60	0.20
87	1.20	1.30	0.80
88	1.50	1.70	0.10
89	0.80	1.00	0.10
90	1.50	1.90	0.50
91	1.00	1.30	0.20
92	3.00	4.70	0.40
93	1.20	1.50	0.30
94	1.50	2.00	0.30
95	1.60	2.10	0.50
96	1.70	2.20	0.40
97	1.60	2.00	0.50
98	2.30	2.70	0.40
99	2.30	2.60	0.60
Average	**1.76**	**2.11**	**0.42**
Std. Deviation	**0.61**	**0.83**	**0.39**

Figure 11c. Guam trolling catch rates: blue marlin, blue marlin nc, and blue marlin c



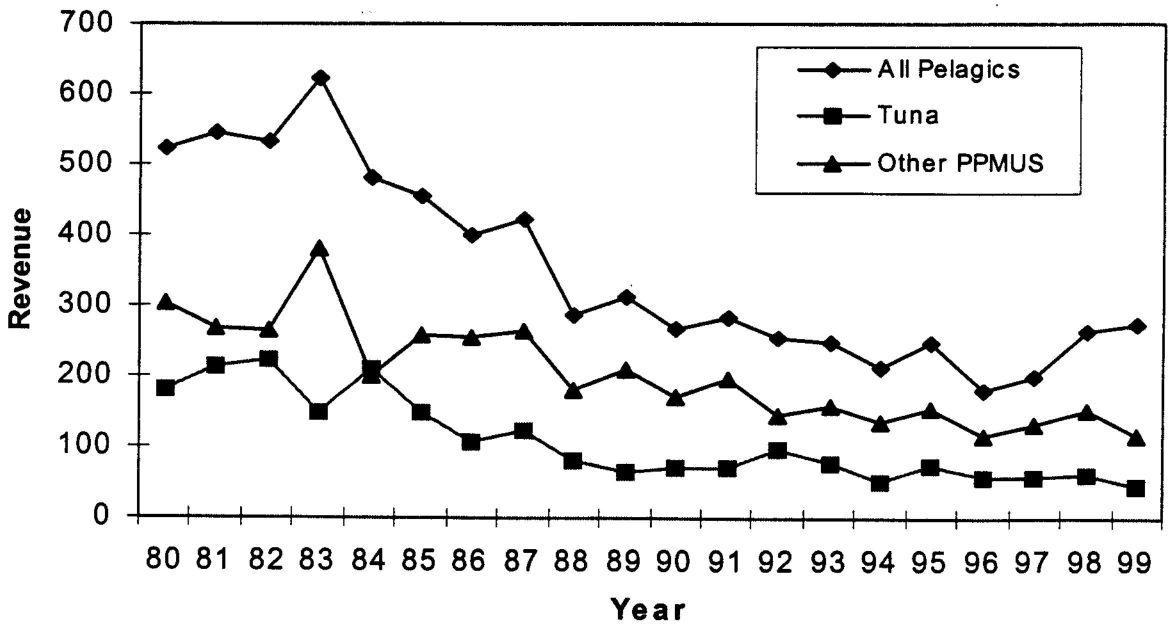
Interpretations: The wide fluctuations in CPUE are probably due to the high variability in the year to year abundance and availability of the stocks. Since it is not possible to allocate species-specific effort, effort used to target other species can also result in an artificially high or low catch rate for a given species. Compared with 1998, the total catch rate, non-charter catch rate, and charter catch rate increased 107%, 114% and 33%, 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 were calculated the same way as Figure 10.

Year	Blue marlin	Blue marlin nc	Blue marlin c
83	1.00	1.00	0.00
84	1.70	1.70	2.30
85	1.50	1.50	1.70
86	1.50	1.40	2.20
87	1.40	1.10	3.70
88	1.10	0.90	2.40
89	1.70	1.50	2.80
90	2.00	1.40	3.40
91	2.00	1.40	3.30
92	1.90	1.60	2.50
93	1.30	0.90	2.60
94	1.70	1.40	2.30
95	1.30	0.90	2.40
96	1.00	0.50	2.10
97	1.60	1.00	3.30
98	0.70	0.60	1.40
99	1.50	1.40	2.10
Average	**1.46**	**1.19**	**2.38**
Std. Deviation	**0.37**	**0.35**	**0.87**

Figure 12: Guam inflation-adjusted revenues per trolling trip: all pelagics, tunas, and other PPMUS



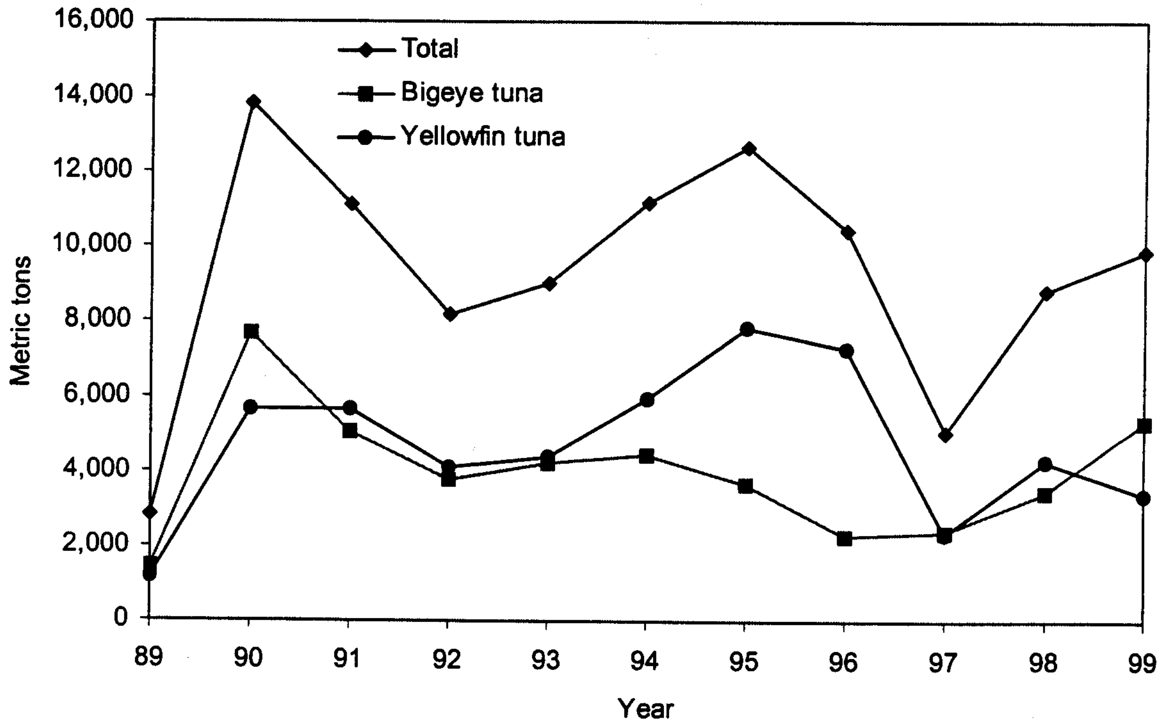
Interpretation: There has been a general decrease in the adjusted revenue per trip for all pelagics, tunas and other PPMUS over the past 19 years. In 1999, adjusted revenue per trip increased 3% for all pelagics while decreasing 25% for tunas and 23% for other PPMUS. Care must be taken in interpreting this data, since the Guam fishery is subject to biases created by marketing problems and the market structure upon which the data collecting system is based. During 1988, 1991, and 1993, record highs in the abundance and landings of mahimahi did not result in high revenues per trolling trip for those years. A glut in the market and other marketing problems during those years resulted in low revenues per trolling trip. Beginning in 1997, though, several major fish vendors began competing for pelagic fish, with one placing no limit on fish sold to it by its members. Despite revenues increasing or decreasing, effort still occurs since most charter and non-charter trolling boats do not rely on selling their fish for a living.

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 PPMUS sold, and then dividing each by the number of trips, respectively, for any trip which landed PPMUS. Adjusted revenue per trip was derived from the Guam Annual Consumer Price Index (CPI).

	Revenues per trip ($)					
	All Pelagics		Tuna		Other PPMUS	
Year	Unadj.	Adj.	Unadj.	Adj.	Unadj.	Adj.
1980	144	524	50	182	84	303
1981	181	544	71	214	89	269
1982	186	532	78	224	93	266
1983	224	621	53	147	137	380
1984	189	481	83	211	78	199
1985	185	454	60	147	105	257
1986	168	400	45	108	107	254
1987	185	424	53	122	116	265
1988	132	286	37	80	83	181
1989	159	312	32	63	107	209
1990	157	269	42	71	99	170
1991	183	285	45	70	127	197
1992	181	255	69	97	102	144
1993	192	250	59	77	122	159
1994	192	214	48	53	121	135
1995	234	247	70	74	146	154
1996	179	180	57	57	115	116
1997	199	200	58	58	131	131
1998	264	265	60	60	152	152
1999	**273**	**273**	**45**	**45**	**117**	**117**
Average		**350.8**		**108**		**202.9**
Std. Deviation		**134**		**59**		**71**

Figure 13. Annual Guam longline landings from foreign longliners fishing outside the Guam EEZ



Interpretation: Annual landings from a primarily foreign longline fishing fleet have ranged up to 13,851 tons since the fishery began in the late 1980's. These vessels fish primarily outside Guam's EEZ, yet tranship their catch from Guam. In 1999, the majority of longline vessel port calls were made by Taiwanese (45%) and Japanese (46%) longline vessels. A total of 165 vessels made 908 port calls, a 7.5% increase in the number of port calls compared with 1998. The landings were 34% yellowfin tuna, 54% bigeye tuna, 6% of various marlin species, and 6% of all other species combined. Compared with 1998, total longline landings increased 12%, bigeye landings increased 56%, and yellowfin tuna landings decreased 21%. The increase in 1999 longline landings could reflect a reversal of climatic changes that occurred during 1997 which negatively affected migrating pelagic fish stocks to the region.

Source: The Guam Department of Commerce.

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

	Foreign Longline Landings		
Year	Total (tons)	Bigeye tuna (tons)	Yellowfin tuna (tons)
89	2,829	1,455	1,145
90	13,851	7,657	5,681
91	11,114	5,033	5,686
92	8,181	3,760	4,122
93	9,003	4,200	4,379
94	11,175	4,454	5,965
95	12,687	3,643	7,846
96	10,449	2,300	7,281
97	5,031	2,399	2,334
98	8,817	3,430	4,290
99	**9902**	**5360**	**3404**
Average	**9,367**	**3,972**	**4,739**
Standard Deviation	**3,198**	**1,702**	**2,015**

Appendix 3

Hawaii

Introduction and Summary

Hawaii's commercial pelagic catch[1] has remained at essentially the same level since 1993 following a seven year continual increase starting in 1987. Overall, longline catch decreased marginally in 1999 (3 %) but has been generally stable since 1991. Handline catch of tunas increased 67% from 1998 levels boosted mainly by the continued increase in albacore catches. Troll catch of tunas increased 18%, although this variation is typical for this gear type and has not varied much from the long-term average.

Effort in the longline fishery in 1999 was directed toward tunas rather than swordfish (with resultant changes in catch composition). The number of active longliners declined from 1991 to 1996 as a number of vessels left Hawaii for U.S. mainland fisheries. In the latter part of 1997, 15 longline vessels migrated to California and fished mainly swordfish for the remainder of the year. However, in 1998 and 1999, the number of longline vessels off-loading in Hawaii increased as vessels from California and the East coast again based themselves out of Honolulu. The number of longline vessels active in the fishery was at its highest point in 1999 since 1994. Total number of trips has nevertheless not varied over the past five years. Bigeye tuna price was up 15% in 1999, as were swordfish prices (+13%), but yellowfin and albacore prices were down (7% and 8%, respectively), reflecting rather different market conditions.

Probably the most significant change over the past several years has been the shift of longline effort out of swordfish into tuna. The number of swordfish-directed trips has declined from 319 in 1993 to just 65 trips in 1999. Meanwhile tuna-directed trips have increased from 542 to 776 trips over the same period.

Finally, albacore catch by longline, handline, and other gear types increased by 460% from 1992 to 1997. 1998 saw a 25 % reduction of catch (all gears combined) compared to 1997, but 1999 catch rebounded 25% to almost 1997 levels.

A number of fishery management issues were significant in 1999. Shark finning by longline and other vessels led to State of Hawaii legislative hearings and the passage of a law, prohibiting landing shark fins in the state without the associated carcass. This law was signed by the Governor of Hawaii and made law on June 22 2000. The legality of the state law to preempt federal management remains in question but has not been tested. During this time, the Council wrote an amendment setting quotas for the shark species caught by the longline fleet. NMFS has

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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).

not yet taken action on this amendment. Protected species interactions (marine turtles and sea birds) in the longline fishery continue to be of concern. Considerable research effort is being directed toward the interactions problem by National Marine Fisheries Service (NMFS) and the Council. Another amendment written by the Council outlines mandatory and optional mitigation measures to reduce seabird interactions with the longline fleet. Final action has not been taken on this amendment either. The Center for Marine Conservation and Turtle Island Restoration Network filed a lawsuit in the district court against NMFS on February 24, 1999, charging that the longline industry was a threat to the survival of the leatherback and loggerhead Pacific populations. On December 27, 1999 an injunction was placed on the longline fishery, requiring line clippers and dip nets on board to release hooked turtles in a manner that offer the greatest chance of survival. An area in international waters above 29 N was also closed to Hawaiian-based fishermen. The details of the closure were modified in mid-2000, and an Environmental Impact Statement for the Pelagic Fisheries is required for completion by April 2001.

Information & Sources

This report contains the most recently available information on Hawaii's commercial pelagic fishery. Commercial fisheries data are compiled from two sources: The State of Hawaii's Division of Aquatic Resources (HDAR) commercial catch reports, and the U.S. National Marine Fisheries Service (NMFS) Honolulu Laboratory longline logbooks and marketing monitoring samples.[2] Explicit data on the recreational fishery are not available since recreational fishers 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. A recent JIMAR research report gives some idea 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 is planned to begin again in Hawaii in 2001, however, in the interim, a summary of what is known about recreational fisheries, including preliminary estimates of recreational catch are included in Module 6 of this report.

The Hawaii report was prepared using preliminary 1999 NMFS and HDAR data. NMFS longline data for 1991-98 were updated and can be considered "final", and the 1999 longline data are essentially complete. HDAR commercial catch reports for 1999, which comprise the troll, handline, pole-and-line, and other gears data, were made available in unedited format so changes can be expected. "Final" NMFS and HDAR figures for 1999 will appear in the annual report for 2000.

Total landings in the troll, handline and other CPUE analyses do not necessarily equal overall

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2 Ito, Russell Y. and Machado, Walter A. 1997. Annual report of the Hawaii-based longline fishery for 1996. Southwest Fisheries Science Center administrative report H-97-12.

3 Hamilton, Marcia S and Huffman, Stephen W. 1997. Cost-earnings study of Hawaii's small boat fishery, 1995-96. University of Hawaii SOEST 97-06/JIMAR 97-314. 102 p.

landings tables by gear type due to separate compilations based on separate versions of the HDAR data sets.

This module was prepared by Sam Pooley, NMFS and Walter Ikehara, HDAR. Information on longline catch and logbooks was provided by Russell Ito and Frederick Dowdell, NMFS. Information on HDAR Commercial Marine Licenses was provided by Reginald Kokubun, HDAR. HDAR commercial catch data was compiled by Frank Cabacungan, NMFS.

Hawaii commercial marine license information[4]

Every fisherman, including crew members on commercial fishing vessels, who takes any marine species for commercial purposes is required by the State to have a Commercial Marine License (CML) and, unless specifically exempted[5], is required to submit a catch report monthly to HDAR.

A total of 3,876 fishermen were licensed by the State of Hawaii in calendar year 1999, of which 2,786 were required to file monthly catch reports. As of April 2000, HDAR had received 31,987 monthly reports (91.5% of the 34,964 monthly reports expected based on the number of license holders and the number of months in 1999 in which they held their licenses).

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, but it indicates what they consider to be their primary fishing method.

Primary fishing method	**Number of licenses required to report**	
	1998	**1999**
Trolling	1,574	1,572
Longline	446	546
Ika shibi & palu ahi	180	199
Baitboat (akuboat)	75	62
Total pelagic	2,275	2,379
Total all methods	3,657	3,876

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

5 Only one person per vessel or fishing trip is required to submit a catch report. This person is usually, but not always, the captain. (The captain may or may not be the vessel owner.) Crew members are generally not required to submit catch reports.

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Table 1. Hawaii domestic commercial catch, revenue and prices[6], 1998-99.

	1998			1999		
Species	**Pounds Caught (x 1,000)**	**Ex-vessel Revenue (x $1,000)**	**Average Price ($/lb)**	**Pounds Caught (x 1,000)**	**Ex-vessel Revenue (x $1,000)**	**Average Price ($/lb)**
Swordfish	7,200	12,000	1.67	6,900	13,000	1.88
Blue marlin	1,400	1,500	1.07	1,400	1,400	1.00
Striped marlin	900	1,100	1.22	900	1,200	1.33
Other billfish	400	300	0.75	600	500	0.83
Mahimahi	900	1,800	2.00	1,300	2,700	2.08
Ono (wahoo)	800	1,500	1.88	1,000	1,700	1.70
Opah (moonfish)	900	1,000	1.11	1,200	1,400	1.17
Sharks[7]	6,200	1,500	0.24	6,300	1,400	0.22
Other pelagics	300	300	1.00	300	500	1.67
Non-Tuna PMUS Subtotal	**19,000**	**21,000**	**1.11**	**19,900**	**23,800**	**1.20**
Albacore	3,100	3,600	1.16	4,100	4,400	1.07
Bigeye tuna	7,600	21,700	2.86	6,200	20,400	3.29
Bluefin tuna	40	250	6.25	20	150	7.50
Skipjack tuna	1,400	1,600	1.14	1,900	2,200	1.16
Yellowfin tuna	3,800	8,300	2.18	3,900	7,900	2.03
Tuna PMUS Subtotal	**15,940**	**35,450**	**2.22**	**16,120**	**35,050**	**2.17**
TOTAL	**34,940**	**56,450**	**1.62**	**36,020**	**58,850**	**1.62**

Interpretation: Total pelagic catch increased 2% by while revenue increased by 4%. Ex-vessel prices split for the major species; bigeye and swordfish were higher (15% and 13%, respectively) and yellowfin and albacore were lower (7% and 8%, respectively). Swordfish and bigeye tuna continue to dominate pelagic catch in Hawaii. Swordfish and bigeye catch both declined in 1999 (4% and 18%, respectively). The number of swordfish-directed longline trips was the lowest in a decade, with only 65 swordfish-directed trips in 1999, one-third the ten year average. Tuna-directed trips increased slightly, up 2% from 1998. Bigeye prices rebounded from the 1998 decline.

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[6] Average price is calculated as *(Ex vessel revenue / Pounds Sold)* and was recompiled to this format consistently for this year's module.

[7] Shark "catch" represent estimated whole weight, often of sharks whose dried fins were the portion actually landed.

Albacore catch rebounded substantially in 1999 (+32%) following the trend of several years of substantial increases. Shark catch remained high in 1999, with a higher percentage landed (as a finned product) than in previous years.

Blue marlin catch remained lower for the second straight year, with the decline caused by a decline in the troll-handline gear catch. These show a substantial inter-annual variation, as discussed later. Other catches were within the usual ranges, except for shark (estimated whole weight) which has increased continuously since 1993 due to the market for shark fins, leveled off in 1999.

<u>Data</u>: Data are combined from NMFS longline estimates and HDAR commercial catch reports for other pelagic gears. (See subsequent tables for details.) Due to rounding, totals between tables may differ.

Data Source: Imported from P8799N.xls (11/14/00) as compiled by NMFS.

Table 2. Hawaii domestic commercial pelagic catch and revenue by gear, 1998-99

Gear	Pounds Caught (x 1,000)	Pounds Sold (x 1,000)	Ex-vessel Revenue (x $1,000)	Average Price ($/lb)
1998				
Longline	28,562	28,562	46,594	1.63
Aku Baitboat	845	842	1,106	1.31
MHI Trolling[8]	2,526	2,106	4,114	1.95
MHI Handline[9]	1,382	1,351	2,774	2.05
Other[10]	1,616	1,510	1,960	1.30
TOTAL	**34,931**	**34,371**	**56,548**	**1.65**
1999				
Longline	28,317	28,317	47,432	1.68
Aku Baitboat	1,309	1,307	1,669	1.28
MHI Trolling	2,972	2,469	4,628	1.87
MHI Handline	2,312	2,268	4,125	1.82
Other	1,055	889	1,303	1.47
TOTAL	**35,965**	**35,250**	**59,157**	**1.68**

Interpretation: Longline catch remained the same in 1999 from 1998 as did the total number of trips. As the number of tuna-directed trips increased, the total number of hooks set increased 10%. Catch rates of the major target species for longline gear increased (swordfish and bigeye tuna). In addition, there was a higher retention of sharks (for finned product).

Pelagic handline catch in the Main Hawaiian Islands (MHI) increased substantially in 1999, while MHI trolling increased marginally. Fishing effort and catch rates require closer examination for proper interpretation.

Aku baitboat (pole-and-line skipjack tuna) increased marginally from the 1998 fifty year low, but was still below almost every recent year's annual landings.

Data: Data are from HDAR commercial catch reports for the non-longline pelagic gears and NMFS estimates for longline. HDAR commercial catch reports are categorized into Aku baitboat (pole-and-line targeting skipjack tuna); MHI handline (*ika shibi, palu ahi*, and miscellaneous handline techniques) targeting tunas; MHI trolling (targeting tunas, billfish, mahimahi, and ono); and Other -- other troll and handline locations and various other pelagic gears. Due to rounding, totals between tables may differ. Time-series data is included later in the module.

Data Source: Imported from GAS98b.dbf (3/30/99) and P8799n.xls (11/14/00).

8 Main Hawaiian Islands (MHI) trolling only, excluding distant water trolling

9 MHI pelagic handline only, excluding seamount and NWHI handline.

10 Other includes all other pelagic gears as well as troll and handline outside the main Hawaiian Islands.

Table 3a. Hawaii longline catch and revenue, 1998-99.

Species	1998 Catch (x 1,000 lb)	1998 Revenue (x $1,000)	1999 Catch (x 1,000 lb)	1999 Revenue (x $1,000)
Blue marlin	851	1,071	786	923
Striped marlin	833	990	802	1,101
Swordfish (round weight)	7,188	11,928	6,831	12,492
Other billfish	380	252	533	466
Mahimahi	331	570	679	1,275
Ono (wahoo)	262	494	343	617
Opah (moonfish)	922	956	1,210	1,387
Sharks (round weight)	6,207	1,506	6,300	1,480
Other	251	379	342	481
Non-Tuna PMUS Subtotal	**17,225**	**18,146**	**17,826**	**20,222**
Albacore	2,448	3,032	3,248	3,816
Bigeye	7,097	21,044	5,897	20,013
Bluefin	36	254	23	151
Skipjack	168	143	219	166
Yellowfin	1,588	3,977	1,042	2,591
Tuna PMUS Subtotal	**11,337**	**28,450**	**10,429**	**26,737**
TOTAL	**28,562**	**46,596**	**28,255**	**46,493**

Interpretation: *Changes in aggregate species composition should be qualified by reference to changes in longline trip type (see following table).*

Overall longline catch has grown substantially in the past five years, with 1998 being the largest longline catch ever in Hawaii and 1999 not much below catches from 1998. Catch of bigeye tuna decreased in 1999, but remains the largest percentage of the total tuna catch. Yellowfin catch declined for the second straight year after a high in 1997. The trend of increasing albacore catches continued in 1999. Total tuna catch was up slightly from 1998 and well above the long-term average. Swordfish catch decreased slightly with a smaller number of targeted trips, swordfish landings remain substantially below their mid-1990s peak. The total of other pelagic species (e.g., mahimahi, ono, moonfish, and shark (fins)) was at its highest levels, but shark catch represents almost the entire increase. Shark catch stabilized in 1999 as shark finning continues to be a major source of income, particularly for some sectors of the fishery (with crews frequently receiving most if not all of a vessel's dried shark fin revenue).

More detailed information on longline catch and effort statistics is included in the NMFS annual report on the fishery compiled by Russell Ito, Honolulu Laboratory.

Data: Data are from NMFS Honolulu Laboratory compilations based on Federal logbooks filed by domestic longliners operating out of Hawaii.

Catch is estimated by number of fish recorded as caught in the Federal longline logbooks, multiplied by the average weight per species from NMFS market monitoring in Honolulu. Data for 1998 are from preliminary average weights.

Revenue is based on whole weight prices. Swordfish and shark are adjusted to whole-weight estimates.
Data Source: Imported from LL99b.xls (3/19/00)

Table 3b. Hawaii longline catch per unit effort by trip type[11], 1998-99.

Species	1998				1999			
	All Trips	Swordfish Trips	Mixed Trips	Tuna Trips	All Trips	Swordfish Trips	Mixed Trips	Tuna Trips
Blue marlin	0.31	0.29	0.58	0.25	0.26	0.23	0.51	0.21
Striped marlin	0.83	0.42	0.87	0.85	0.75	0.61	0.99	0.71
Swordfish	2.52	14.50	9.22	0.20	1.99	14.62	8.60	0.16
Mahimahi	1.28	1.53	3.25	0.84	2.32	4.72	6.04	1.49
Moonfish	0.53	0.01	0.04	0.67	0.65	0.01	0.24	0.76
Ono (wahoo)	0.48	0.12	0.27	0.55	0.54	0.24	0.35	0.59
Sharks	5.75	23.01	12.16	3.09	4.58	19.10	10.52	2.93
Albacore	2.81	2.45	1.95	3.02	3.52	4.40	3.26	3.53
Bigeye tuna	5.69	2.33	4.81	6.13	4.20	1.85	3.82	4.38
Yellowfin tuna	1.25	0.75	1.29	1.28	0.89	0.72	0.89	0.90
Number of trips	**1,140**	**84**	**296**	**760**	**1,137**	**65**	**296**	**776**
Number of hooks set	**17,365,852**	**1,019,960**	**2,859,857**	**13,486,035**	**19,115,654**	**669,509**	**3,033,494**	**15,412,651**
Number of lightsticks	**1,223,780**	**519,595**	**654,367**	**49,818**	**813,849**	**263,868**	**532,363**	**27,618**

[Data source and Interpretation on following page]

11 Trip type refers to the primary species target for each trip. (See *Data* description below).

Interpretation: This table shows the substantial difference in interpretation that categorization of CPUE by trip type can make. Swordfish trips have twice the swordfish CPUE as Mixed trips, while swordfish is a small incidental catch in Tuna trips. The aggregate (All Trips) CPUE figures are not good indicators of catchability or abundance, although they do indicate the relative importance of particular species within the fishery as a whole.

Swordfish trip CPUE for swordfish increased in 1999, although swordfish-directed hooks were much lower in 1999 than in previous years. Mixed trip CPUE for swordfish decreased 7%, while Mixed trip hooks set remained stable. One-third fewer lightsticks were used per set in both Swordfish and Mixed trips. CPUEs for albacore (all trip types) increased, while CPUEs for yellowfin and bigeye declined for all trip types. Overall, yellowfin and bigeye CPUE decline approximately 25% while albacore CPUE increased by 25%.

Catch of shark remains relatively high in Swordfish and Mixed trips (compared to target species), but relatively low in Tuna trips. Shark CPUEs were lower in 1999 than in past years. Approximately 67% of all sharks were retained (most as fins).

Mahimahi was much more available in 1999 compared to 1998 (a typical pattern of biannual variation in apparent abundance catchability), while most other pelagic species were about the same.

Tuna trip CPUEs for albacore were higher in 1998, but lower for bigeye and yellowfin . The number of hooks set by Tuna trips continues to increase. Mixed trips appear to have targeted swordfish more in 1999.

More detailed information on longline CPUE statistics will be included in the NMFS annual report on the fishery being compiled by Russell Ito, Honolulu Laboratory.

Data: Data are from NMFS Honolulu Laboratory compilations based on Federal logbooks filed by domestic longliners operating out of Hawaii. ***CPUE*** is the number of fish caught per 1,000 longline hooks. *Trip Type* refers to the identification of the primary target species for a particular trip, either as indicated by the vessel captain to NMFS logbook collection staff or designated by NMFS in the absence of a captain's designation.

Data Source: NMFS longline logbook summaries (11/14/00).

Table 3c. Hawaii longline catch (number of fish caught) by area fished[12], 1998-99.

Species	1998 All Locations	1998 MHI EEZ	1998 NWHI EEZ	1998 Outside of U.S. EEZs	1999 All Locations	1999 MHI EEZ	1999 NWHI EEZ	1999 Outside of U.S. EEZs
Blue marlin	5,350	1,698	1,217	2,125	4,936	1,709	1,059	1,857
Striped marlin	14,347	4,856	5,757	3,408	14,417	5,607	3,515	4,857
Swordfish	43,776	4,721	10,611	28,269	37,474	2,357	6,182	29,323
Mahimahi	22,183	7,664	3,527	10,157	44,399	11,654	4,316	27,743
Moonfish	9,184	3,585	1,862	3,462	12,399	5,161	1,431	5,629
Ono (wahoo)	8,281	2,305	761	4,068	10,278	2,579	763	5,435
Sharks	99,919	14,685	20,152	59,180	87,579	17,449	15,150	51,475
Albacore	48,833	12,482	6,802	25,621	67,303	23,805	6,261	35,659
Bigeye tuna	98,795	26,723	16,629	37,762	80,332	29,203	9,672	36,883
Yellowfin tuna	21,721	4,678	2,713	8,004	16,970	4,835	1,581	4,817
Trips[13]	**1,181**	**581**	**305**	**734**	**1,161**	**674**	**246**	**775**
Hooks (1,000s)	**17,366**	**4,970**	**3,095**	**7,362**	**19,116**	**6,552**	**2,881**	**9,106**
Lightsticks (1,000s)	**1,224**	**99**	**310**	**814**	**814**	**54**	**173**	**585**

MHI: Main Hawaiian Islands
NWHI: Northwestern Hawaiian Islands
EEZ: Exclusive Economic (200-mile) Zone

[Data source and Interpretation on following page]

12 Only the three areas with the largest catch are tabled here. The balance reflects catch in U.S. possessions or catch where locations were not verified.

13 Total trips are not additive across areas because trips may intersect more than one area. Totals may also differ between tables because of different data compilation dates.

Interpretation: Longline fishing effort (as measured by number of hooks set) increased by about 10% in 1999. However the locations of that effort changed again. Fishing effort continued to shift away from NWHI (outside the 50 mile protected species zone) with 7 % fewer hooks in 1999 and increased substantially at the Pacific remote island territories (particularly Palmyra Atoll/Kingman Reef) which constituted 11% of longline fishing effort in 1998. Fishing outside the U.S. EEZs increased about 24% and effort in the MHI increased 32%.

Bigeye tuna catch fell back to 1997 levels after a 25% increase in 1998. Yellowfin catch was also down, 21% lower than 1998. Albacore catch was up 38% from 1998, close to 1997 record high. Half of the bigeye tuna was caught outside the U.S. EEZ this year, whereas it was primarily caught within the MHI or NWHI EEZs in earlier years. Slightly more than half the albacore is caught outside the EEZs. About 30 % of the yellowfin caught was at the Pacific remote island territories while another 28 % was caught outside the U.S. EEZs.

As would be expected, most swordfish was caught outside the EEZs. The drop in total catch of swordfish was due to the drop in catch in the Hawaiian EEZ. Marlin catch remained constant within and outside the Hawaiian EEZ.

The number of shark caught decreased by 13 % in 1999. Sixty percent of the sharks were caught outside the Hawaii EEZs, confirming the relatively pelagic and migratory nature of the blue sharks which predominate in the catch (93% of all sharks caught).

More detailed information on longline catch and effort statistics will be included in the NMFS annual report on the fishery being compiled by Russell Ito, Honolulu Laboratory.

Data: Catch is *Number Caught* based on Federal logbooks filed by domestic longliners operating out of Hawaii. The Main Hawaiian Islands (MHI) EEZ (Exclusive Economic Zone) represents all longline catch within 200 miles of the eight main islands of Hawaii, except for the overlap with the Northwestern Hawaiian Islands (NWHI). Catch in other U.S. EEZ areas includes the EEZs for U.S. possessions in the central and western Pacific (e.g., Wake Island).

Data Source: NMFS longline logbook summaries (LLCS 11/14/00)

Table 4a. Average estimated round weight (in pounds) of fish by longline, 1987-99.

Year	Non-Tuna PMUS					Tunas			
	Swordfish	Blue marlin	Striped marlin	Mahimahi	Wahoo (ono)	Albacore	Bigeye	Skipjack (aku)	Yellowfin
1987	129	161	66	21	33	62	76	18	82
1988	119	157	57	20	32	60	83	19	103
1989	131	165	62	23	35	62	77	19	104
1990	148	198	62	19	36	61	80	21	122
1991	155	175	59	15	32	52	85	20	118
1992	178	175	66	11	35	45	77	17	99
1993	172	157	64	13	33	44	88	17	92
1994	163	171	64	12	34	41	81	18	97
1995	171	157	58	10	31	50	79	18	95
1996	157	154	58	17	31	53	64	17	80
1997	163	134	66	13	30	54	71	20	89
1998	176	164	60	16	32	55	74	20	76
1999	**188**	**164**	**55**	**16**	**34**	**52**	**75**	**20**	**62**
Average	158	164	61	16	33	53	78	19	94
Standard Deviation	20.9	14.7	3.8	4.0	1.8	7.0	6.2	1.4	16.6

[Data source and Interpretation on following page]

Interpretation: Analysis of any changes in size composition for species which are caught in multiple locations (e.g., MHI vs. out of the EEZ) is difficult without identification of the catch location. What is significant about the average sizes is the relatively slight change in average weight over time and the relatively small standard deviations for most species. Average swordfish weights were at their highest in 1999, while blue marlin were at the long-term average. Yellowfin average weight was the lowest since the modern longline fishery began.

More detailed analysis of weight composition is found in NMFS annual longline monitoring reports.

Data: Longline data are from NMFS Honolulu Laboratory market monitoring. Where fish are presented in less than whole form, conversion factors are applied to convert to whole weight. This is not frequent for longline catch (except for swordfish). Sharks are not included in this average weight table because of inadequate samples (most shark is "landed" only as a finned product.)

Data source: Imported from LL99b.xls (03/16/00)

Table 4b. Average estimated round weight (in pounds) of fish for troll-handline-other gears, 1987-99.

	Non-Tuna PMUS					Tunas			
Year	Swordfish	Blue marlin	Striped marlin	Mahimahi	Ono (wahoo)	Albacore	Bigeye	Skipjack (aku)	Yellowfin
1987	126	215	66	21	24	33	14	7	32
1987	124	181	64	18	25	64	34	7	32
1988	107	188	68	21	25	55	24	11	44
1989	97	248	76	20	25	58	25	7	41
1990	122	197	63	15	23	53	29	9	34
1992	75	215	70	14	26	53	28	6	27
1993	139	182	67	14	24	55	22	7	44
1994	95	233	67	14	27	53	30	9	37
1995	110	204	61	16	24	22	18	7	30
1996	86	195	65	16	23	42	24	12	42
1997	96	175	68	16	21	40	19	11	34
1998	85	201	58	18	25	21	21	5	28
1999	**88**	**211**	**55**	**18**	**27**	**48**	**24**	**7**	**31**
Average	104	203	65	17	25	46	24	8	35
Standard Deviation	19.2	21.0	5.3	2.5	1.6	13.6	5.4	2.1	5.9

[Data source and Interpretation on following page]

Interpretation:

Most species are within their 13-year ranges although swordfish, striped marlin, and yellowfin tuna were somewhat below their averages and there does appear to be a trend towards smaller swordfish in the troll-handline-other gear category. Blue marlin was substantially larger in 1999 than in recent years, but was still only slightly above its longer term average.

Data: Troll-handline-other gear data are from HDAR commercial catch reports (*pounds caught* divided by *number caught* where *number caught* > *0*). Correction cannot be made for weights of processed fish (e.g., headed and gutted) which might have been recorded in processed form. Average weight is calculated as Pounds Caught *divided by* Number Caught. *Other* gear represents all other gears except troll, handline, longline, and baitboat.

Data source: annual GASyr.dbf (11/14/00)

Table 5a. Hawaii longline vessel activity (trips), 1991-1999.

Year	# vessels	Total Trips	Tuna Trips	Mixed Trips	Swordfish Trips
1991	141	1,671	556	823	292
1992	123	1,266	458	531	277
1993	122	1,192	542	331	319
1994	125	1,106	568	228	310
1995	110	1,125	682	307	136
1996	103	1,100	657	351	92
1997	105	1,125	745	302	78
1998	114	1,140	760	296	84
1999	**119**	**1,137**	**776**	**296**	**65**
Average	118	1,207	638	385	184
Standard Deviation	12	181	112	184	112

Interpretation: This table shows the decline in the number of longline trips in Hawaii from the moratorium on new entry in 1991 through 1994, at which point trip effort stabilized. The table also shows the dramatic shift from swordfish-targeted trips toward tuna (primarily bigeye tuna) and mixed trips in 1995, and the decline of swordfish-directed fishing effort. As a result of this shift, interpretation of longline catch statistics should reflect the changing nature of longline targeting practices.

Data: Data compiled by the NMFS Honolulu Laboratory's Fishery Monitoring & Economics Program from NMFS Federal logbooks. Type of trip is usually determined by interview with the vessel captain or occasionally by FMEP staff interpretation of salient characters from fishing vessel gear design, fishing locations, and catch composition. Detailed longline effort data is only available beginning in the 1991 calendar year when Federal logbooks went into effect.

Data Source: NMFS longline logbook summaries (LLCS 11/14/00)

Table 5b. Hawaii longline vessel activity (miles to first set and days fishing), 1991-1999[14]

	All Trips			
	Average		Maximum	
Year	Miles to first set	Days fishing	Miles to first set	Days fishing
1991	318	7.6	1,792	22
1992	424	9.5	1,871	26
1993	465	10.3	2,122	29
1994	430	10.0	2,814	26
1995	441	10.2	2,097	27
1996	367	10.5	2,037	30
1997	332	10.5	1,973	36
1998	422	10.9	1,611	24
1999	**388**	**11.3**	**1,791**	**26**
Average	399	10.1	2,012	27
Standard Deviation	51	1.1	343	4

[14]Data not corrected for vessels starting trips in California and ending in Hawaii.

	Average					
	Tuna Trips		Mixed Trips		Swordfish Trips	
Year	Miles to first set	Days fishing	Miles to first set	Days fishing	Miles to first set	Days fishing
1991	240	7.7	276	6.3	585	10.7
1992	260	8.4	404	7.8	733	12.7
1993	222	8.8	522	9.6	820	13.7
1994	252	8.9	323	8.0	833	13.4
1995	273	10.0	397	9.3	884	13.2
1996	284	10.3	410	10.3	790	12.7
1997	288	10.1	365	10.6	623	14.1
1998	384	10.3	439	11.9	708	14.5
1999	**313**	**11.1**	**490**	**11.7**	**821**	**12.5**
Average	280	9.5	403	9.5	755	13.1
Standard Deviation	48	1.1	77	1.9	101	1.1

	Maximum					
	Tuna Trips		Mixed Trips		Swordfish Trips	
Year	Miles to first set	Days fishing	Miles to first set	Days fishing	Miles to first set	Days fishing
1991	1,508	18	1,408	22	1,792	26
1992	1,156	14	1,543	21	1,871	26
1993	1,432	14	1,616	23	2,122	29
1994	945	16	1,298	19	2,814	26
1995	945	20	1,609	26	2,097	27
1996	1,866	28	1,547	30	2,037	28
1997	1,002	19	1,323	36	1,973	27
1998	1,154	17	1,611	24	1,522	24
1999	**1,160**	**19**	**1,723**	**26**	**1,791**	**22**
Average	1,251	18.3	1,494	25.1	2,029	26.6
Standard Deviation	326	4.5	132	5.5	372	1.5

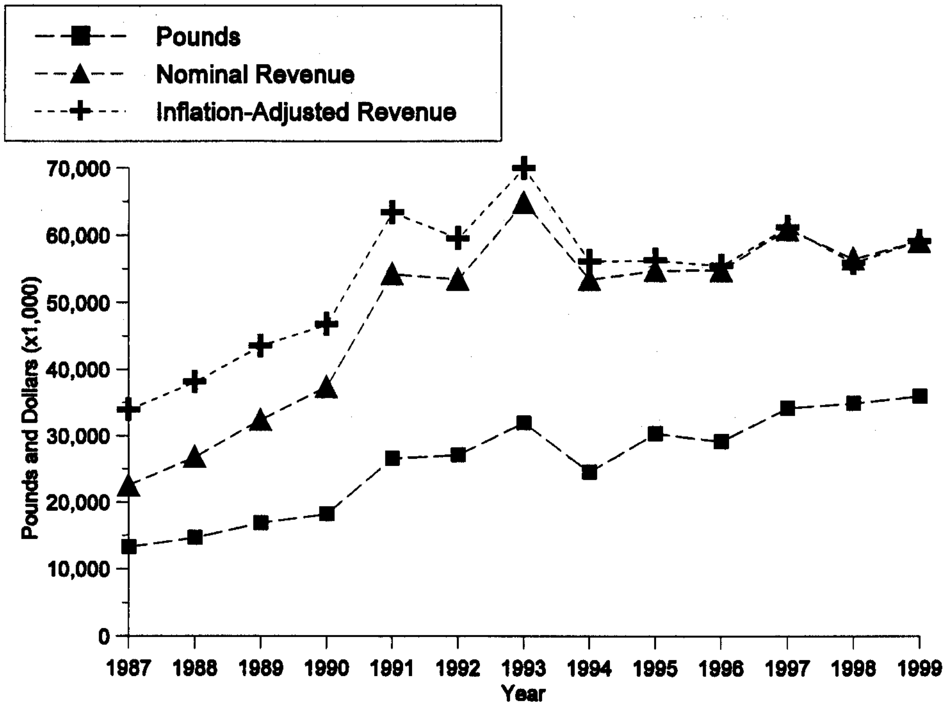
Interpretation: These tables show an increase in the average miles to first set for mixed and swordfish trips and a decrease of 18% from the 1998 high for tuna trips. The number of days fishing is above the average for tuna and mixed trips and slightly below for swordfish trips. An increase in the maximum distance to first set occurred for each trip type, although this was near 10% below the average for tuna and swordfish trips. Swordfish boats may have lower miles to first set since more vessels fishing further to the east may be offloading in California (and thus not included in this data base).

Data: Data compiled by the NMFS Honolulu Laboratory's Fishery Monitoring & Economics Program from NMFS Federal logbooks. Type of trip is determined by FMEP staff through interviews with vessel captains or categorization of fishing operations.

Miles to first set is determined as the distance from Honolulu to the first set as recorded on the logbook. Average days fishing is determined by the number of days on which sets and hauls occurred on an individual trip.

Source: NMFS Honolulu Laboratory FMEP programming (11/14/90)

Figure 1. Hawaii commercial pelagic landings and revenue (all gears and pelagic species), 1987 - present.



Interpretation: Total pelagic landings (bottom line) and revenue (top lines) data show the effect of the dramatic increase in longline landings from the mid-1980s through 1993 and the general stabilization of landings and revenue since then. Gear-specific changes are considered in later figures.

Data source on following page.

Hawaii commercial pelagic landings and revenue (all gears and species).

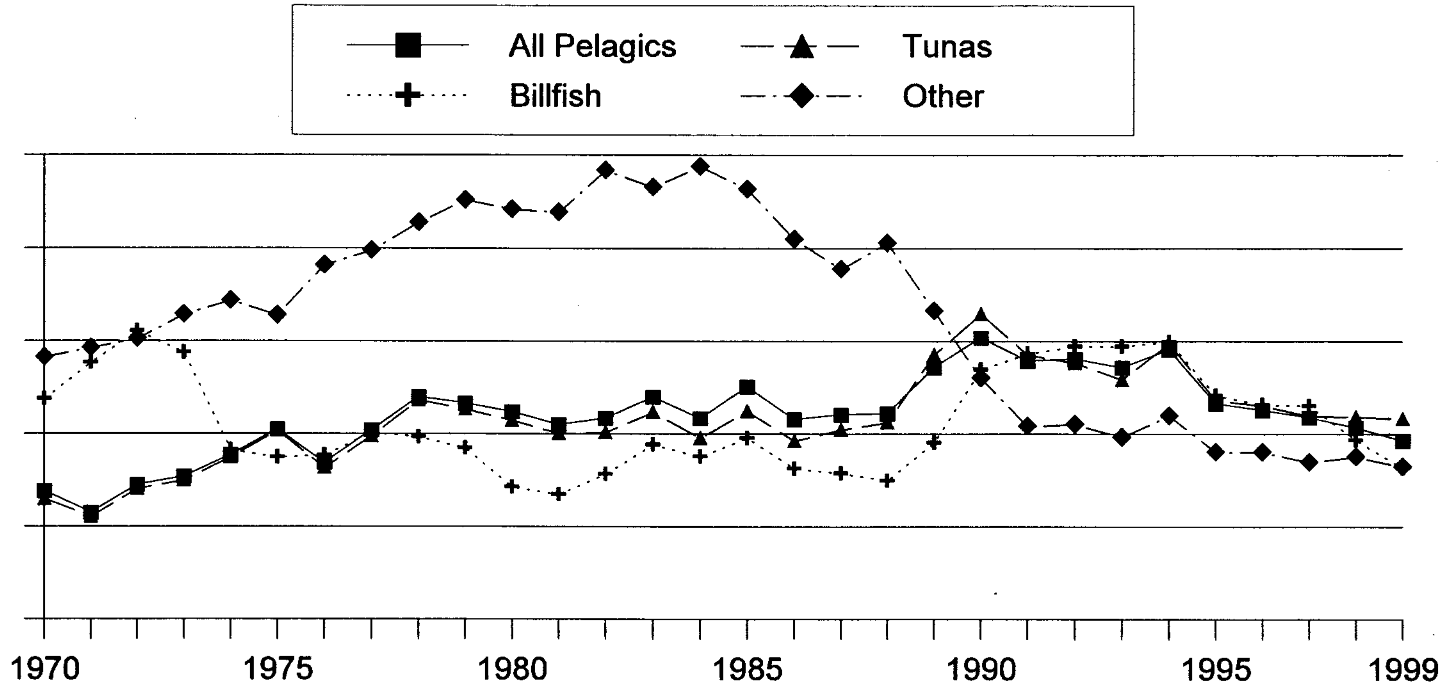
Year	Pounds (x 1,000)	Nominal Revenue (x$1,000)	Adjusted Revenue (x $1,000)	Honolulu Consumer Price Index (U)
1987	13,337	$22,597	$33,964	114.90
1988	14,733	$26,873	$38,134	121.70
1989	16,960	$32,442	$43,533	128.70
1990	18,291	$37,399	$46,769	138.10
1991	26,648	$54,306	$63,369	148.00
1992	27,156	$53,478	$59,546	155.10
1993	31,970	$64,863	$69,968	160.10
1994	24,584	$53,422	$56,085	164.50
1995	30,359	$54,773	$56,272	168.10
1996	29,157	$54,807	$55,449	170.70
1997	34,196	$60,879	$61,162	171.90
1998	34,930	$55,549	$55,938	171.50
1999	**35,965**	**$59,157**	**$59,157**	**172.70**
Average	26,000	$48,500	$53,800	
Standard Deviation	7,600	$13,200	$9,900	

Data: Data are compiled from Hawaii Division of Aquatic Resources (HDAR) commercial catch reports for non-longline landings and from NMFS estimates of longline landings. Inflation-adjusted revenue (Revenue*) is computed from the Honolulu consumer price index (HCPI) as: (Current year HCPI / data year HCPI) X (data year nominal ex-vessel revenue)[15]

Data Source: P8799n.xls (12/20/00)

15 The same adjustment can be done on price data.

Figure 2. **Hawaii commercial ex-vessel pelagic prices, inflation-adjusted, 1970 - present.**



<u>Interpretation</u>

Inflation-adjusted pelagic prices have declined for all major species groups over the past five years from peaks in the early 1990s. The market for tuna has weakened due to the decline in tourists arriving from Japan and due to a weak export demand. Swordfish prices also fell substantially on the U.S. East coast in 1998 due to a widespread boycott of swordfish by restaurants initiated by the Ocean Wildlife Campaign. An addendum to the Hawaii Fishing Industry and Vessel Economics project under the JIMAR Pelagic Fisheries Research Program is investigating price movements over the past few years now available (K.E McConnell et al. 1998. An analysis of auction prices of tuna in Hawaii: hedonic prices, grading and aggregation. Univ. Hawaii. Pelagic Fisheries Research Program, SOEST 98-03, 27pp).

Hawaii commercial pelagic prices, inflation-adjusted [16].

Year	All Pelagics	Tuna	Billfish	Other	HCPI
1970	$1.38	$1.30	$2.38	$2.83	114.20
1971	$1.15	$1.11	$2.77	$2.93	118.90
1972	$1.45	$1.41	$3.11	$3.03	122.80
1973	$1.54	$1.50	$2.88	$3.29	128.30
1974	$1.77	$1.75	$1.83	$3.44	141.90
1975	$2.05	$2.04	$1.75	$3.28	155.00
1976	$1.69	$1.64	$1.77	$3.82	162.80
1977	$2.04	$1.98	$2.02	$3.98	171.80
1978	$2.40	$2.37	$1.97	$4.28	184.10
1979	$2.33	$2.27	$1.85	$4.52	204.50
1980	$2.24	$2.15	$1.43	$4.42	228.70
1981	$2.10	$2.01	$1.35	$4.39	252.80
1982	$2.17	$2.02	$1.57	$4.84	268.10
1983	$2.40	$2.24	$1.89	$4.66	275.90
1984	$2.17	$1.96	$1.76	$4.88	284.80
1985	$2.51	$2.25	$1.96	$4.64	301.40
1986	$2.16	$1.93	$1.63	$4.10	308.20
1987	$2.21	$2.05	$1.58	$3.78	323.80
1988	$2.22	$2.13	$1.50	$4.06	343.05
1989	$2.72	$2.86	$1.91	$3.33	355.90
1990	$3.04	$3.30	$2.70	$2.61	380.35
1991	$2.79	$2.86	$2.87	$2.09	412.50
1992	$2.81	$2.77	$2.95	$2.11	432.00
1993	$2.72	$2.59	$2.95	$1.97	445.30
1994	$2.91	$2.98	$3.00	$2.20	456.30
1995	$2.33	$2.37	$2.42	$1.81	467.60
1996	$2.26	$2.31	$2.32	$1.81	476.90
1997	$2.18	$2.20	$2.31	$1.70	487.40
1998	$2.07	$2.19	$1.94	$1.76	499.59
1999	**$1.93**	**$2.17**	**$1.64**	**$1.65**	**517.00**
Average	2.19	2.16	2.13	3.27	
Std Deviation	0.45	0.49	0.53	1.07	

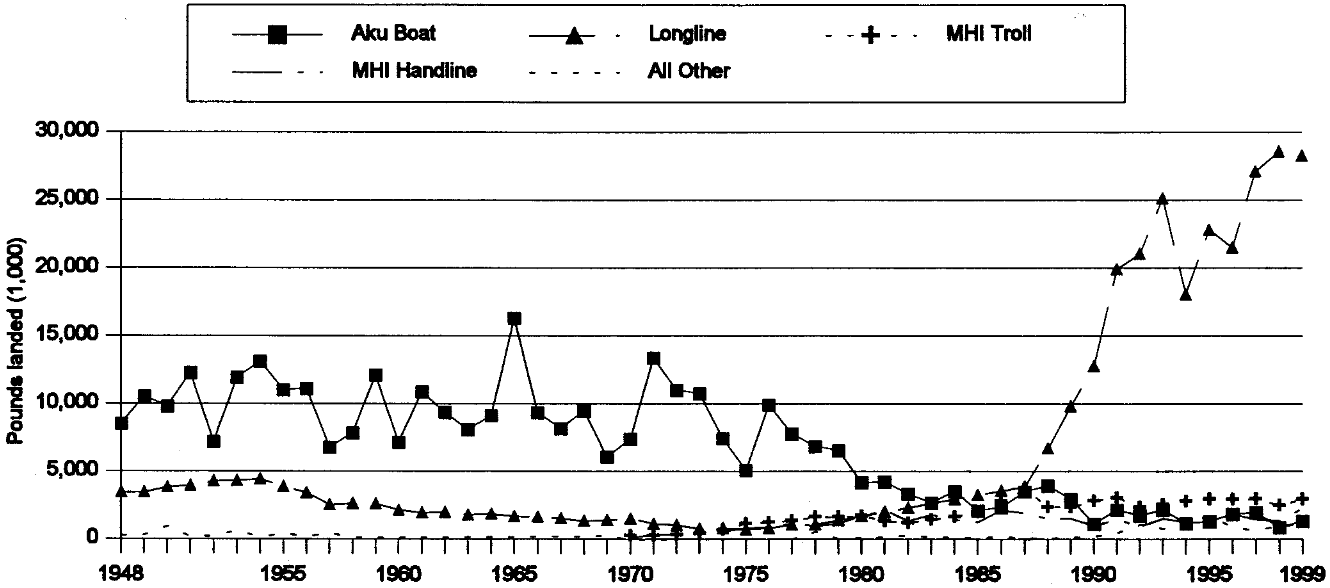
Data

Data are compiled from Hawaii Division of Aquatic Resources (HDAR) commercial catch reports. Nominal price is calculated as (ex vessel) revenue / pounds sold. Inflation-adjusted price is calculated from the Honolulu consumer price index (CPI) as: (Current year CPI / data year CPI) * data year nominal price. No adjustments are made in this table for product form (e.g., most swordfish prices in HDAR are reported as headed, gilled, and gutted, not raised to whole weights. This increases the reported average billfish price.) or for under-reporting by some gear types (e.g., longline in the early 1980s.)

Data source: PPRICE.xls (12/20/00)

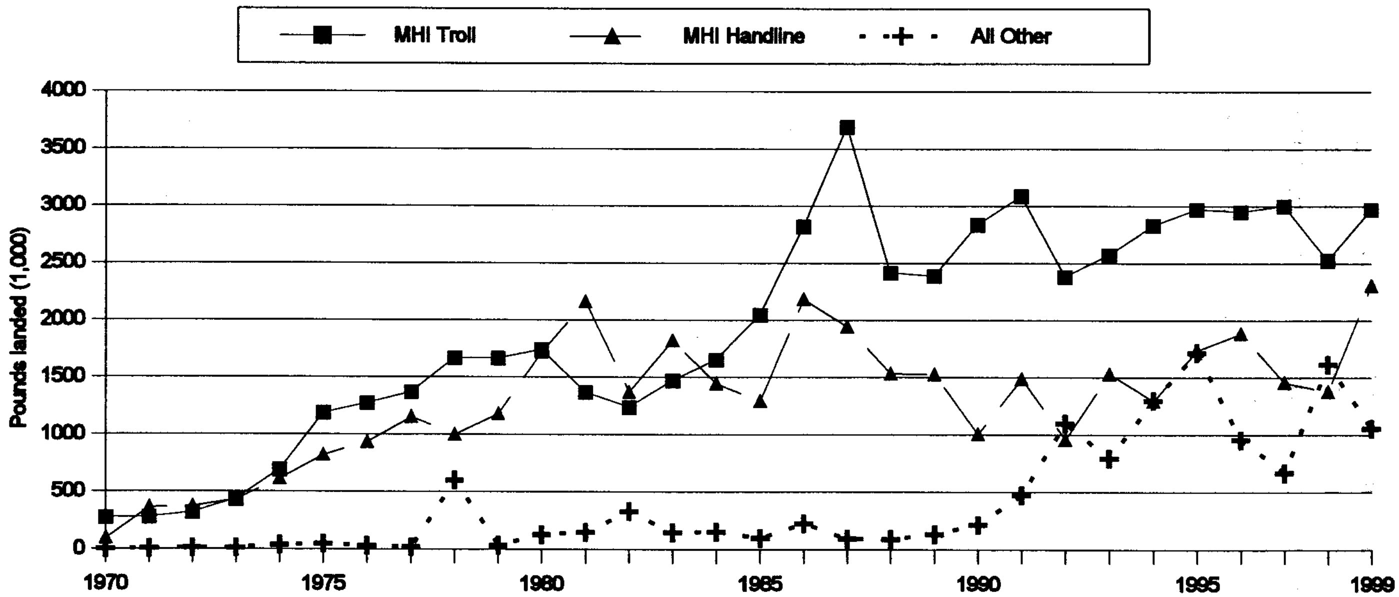
16 Each years' inflation-adjusted price data must be updated annually.

Figure 3a. Hawaii commercial pelagic landings by major gear types.



Interpretation: This figure shows the long-term decline of the aku boat (pole-and-line skipjack tuna) fishery from its peak in the mid-1960s through the closure of the Hawaiian Tuna Packers (Bumble Bee Tuna) cannery in 1984. The aku boat fishery declined for a variety of issues, primarily economic. The figure also shows the rise of the troll-handline fishery in the mid-1970s (see following figure) and the rapid rise of the longline fishery in the late 1980s. The longline fishery now dominates pelagic landings and all other fisheries in the state.

Figure 3b. Troll-Handline-Other Gears Pelagic Landings, 1970 - present.



Interpretation:

This figure attempts to "interpret" the troll, handline and other categories of pelagic landings in Hawaii. Trolling in the main Hawaiian Islands for pelagics recovered in 1999 from a sudden dip in 1998 to levels which have remained steady since 1994. Landings of main Hawaiian Islands handline tuna (ika shibi and palu ahi in the near-shore areas) increased dramatically (up 67% from 1998) to a 30 year high. Other pelagic landings (by other gears and by troll and handline from a variety of areas[17]) have fluctuated substantially. The result is that total troll-handline-other pelagic landings in 1999 were not substantially different from the early 1990s.

In 1995, Other pelagic gear landings were almost 50% non-MHI pelagic handline and a similar amount identified as Other Gears - Other Areas (distant-water albacore trollers). The non-MHI pelagic handline landings were predominately yellowfin tuna (587,000 pounds) and bigeye tuna (102,000 pounds). The Other Gears - Other Areas landings were almost entirely albacore (815,000 pounds). Almost all of the Trolling landings were recorded in the MHI.

In 1997, the non-MHI handline pelagic landings were simply lower. Whereas in the 1997 annual report there were questions about the Other landings, it appears that the apparent decline in 1997 was half reporting delinquency, half decline in catch.

[17] Includes NWHI landings by these gear types, distant-water albacore trollers, and Cross Seamount handline when reported separately.

Table 6. Hawaii commercial fishing landings, pelagics by gear type, 1948 - present. HDAR figures and NMFS estimates (all species).

Pounds Caught			
Year	**Aku boat**	**Longline**	**Total Troll-Handline-Other**
1948	8,496	3,476	297
1949	10,541	3,491	332
1950	9,788	3,859	976
1951	12,264	3,970	183
1952	7,181	4,290	247
1953	11,914	4,332	646
1954	13,104	4,448	161
1955	11,020	3,898	449
1956	11,120	3,443	217
1957	6,765	2,571	453
1958	7,856	2,645	156
1959	12,122	2,636	132
1960	7,138	2,173	150
1961	10,878	1,972	148
1962	9,349	2,022	154
1963	8,096	1,811	171
1964	9,134	1,883	167
1965	16,295	1,707	170
1966	9,339	1,655	198
1967	8,164	1,563	226
1968	9,463	1,353	195
1969	6,072	1,416	273

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(continued)

Year	Aku Boat	Longline	MHI Troll	MHI Handline	Other	Total Troll-Handline-Other
	Pounds Caught					
1970	7,386	1,541	275	102	2	379
1971	13,393	1,151	279	368	7	654
1972	11,001	1,055	321	378	11	710
1973	10,766	778	436	437	12	885
1974	7,427	830	692	619	36	1,347
1975	5,088	746	1,188	825	47	2,060
1976	9,896	838	1,273	938	30	2,241
1977	7,780	1,101	1,372	1,156	20	2,548
1978	6,849	1,125	1,669	1,002	600	3,272
1979	6,549	1,432	1,667	1,186	35	2,889
1980	4,194	1,740	1,743	1,723	126	3,592
1981	4,229	2,047	1,368	2,164	145	3,947
1982	3,342	2,355	1,238	1,374	328	2,941
1983	2,683	2,663	1,473	1,823	145	3,442
1984	3,527	2,970	1,655	1,449	153	3,257
1985	2,114	3,278	2,046	1,294	99	3,439
1986	2,351	3,585	2,820	2,186	226	5,232
1987	3,503	3,893	3,693	1,947	94	5,737
1988	3,943	6,733	2,414	1,537	91	4,038
1989	2,962	9,844	2,386	1,531	132	4,046

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Year	Aku Boat	Longline	MHI Troll	MHI Handline	Other	Total Troll-Handline-Other
1990	1,116	12,790	2,838	1,009	214	4,128
1991	2,146	19,970	3,087	1,490	474	5,054
1992	1,735	21,090	2,381	961	1,098	4,439
1993	2,137	25,160	2,572	1,533	793	4,896
1994	1,159	18,110	2,833	1,297	1,298	5,428
1995	1,291	22,850	2,973	1,742	1,716	6,433
1996	1,844	21,540	2,951	1,888	953	5,792
1997	1,947	27,120	3,003	1,460	668	5,133
1998	845	28,600	2,526	1,382	1,616	5,524
1999	**1,309**	**28,300**	**2,972**	**2,312**	**1,055**	**6,339**
Average 1948-present	6,743	6,234	1,235	1,304	407	3,661
Standard Deviation	4,012	7,802	1,110	565	508	1,747

Data: Data are compiled from HDAR commercial catch reports using a data summarization program (HEPS.prg) maintained by the Fishery Monitoring and Economics Program of the NMFS Honolulu Laboratory.

Gears are categorized in this report as follows:

Trolling: Gear 6 in HDAR codes

Handline: Gears 3 (Deepsea handline), 8 (Ika Shibi), 9 (Palu Ahi), and 35 (Drifting/Pelagic handline)

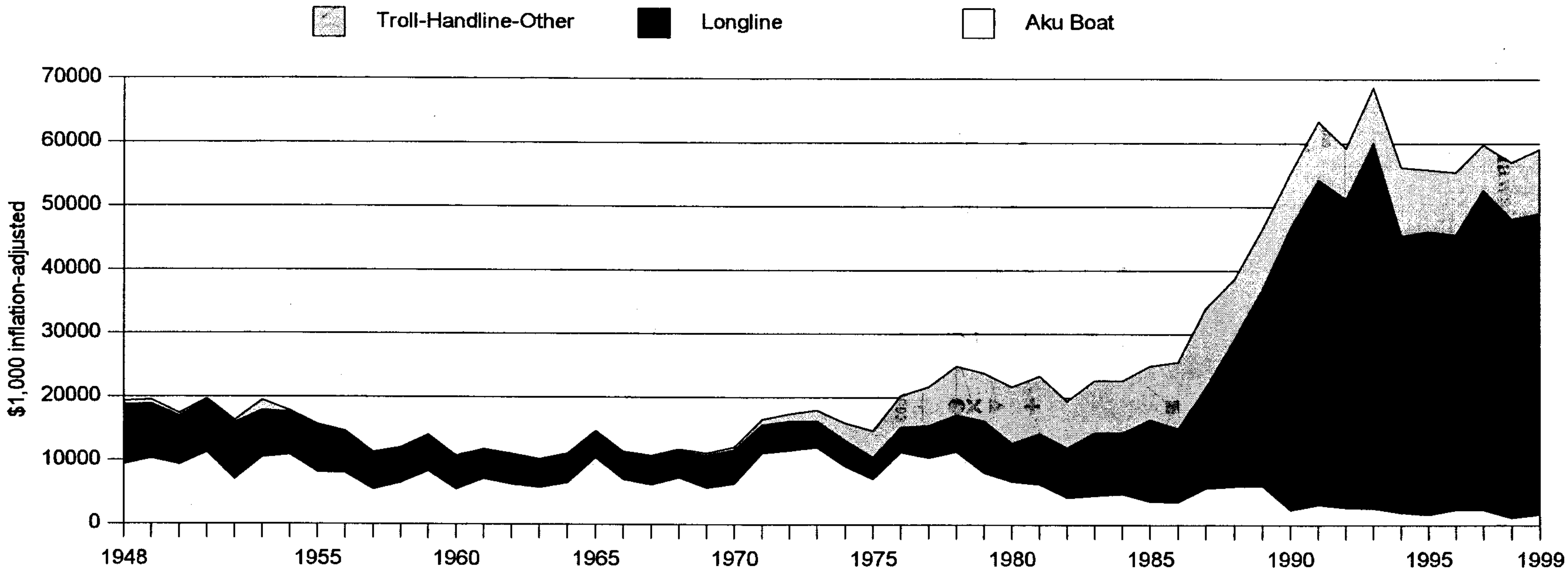
Other: All remaining gears (except Longline and Aku Boat)

Areas are categorized as follows:

MHI: HDAR Areas 100-699
Other: Includes NWHI, the periphery of the MHI (usually outside of one-degree square of the MHI), and all other fishing locations.

Data Source: \HTof 99a.XLS (12/20/00) and P8799C.XLS (11/14/00)

Figure 4. Hawaii commercial fishing revenue, adjusted for inflation, 1948 - present.



Interpretation: On an inflation-adjusted ex-vessel revenue basis, the dominance of the longline fleet beginning in the late 1980s is clearly shown. Approximately 80% of all commercial pelagics revenue comes from the longline fishery, compared to less than 30% in 1980. Longline revenue dipped significantly in 1994 as a number of vessels returned to the mainland U.S., but some of this decline has been subsequently recovered through tuna landings. Troll-handline-other pelagic landings were near their long-term average but still significantly below their 1994-1996 highs. These fisheries have shown substantial variation over the past twenty years.

Data source on following pages.

Hawaii commercial fishing revenue*, adjusted for inflation, 1948 - present.
($ x 1000)

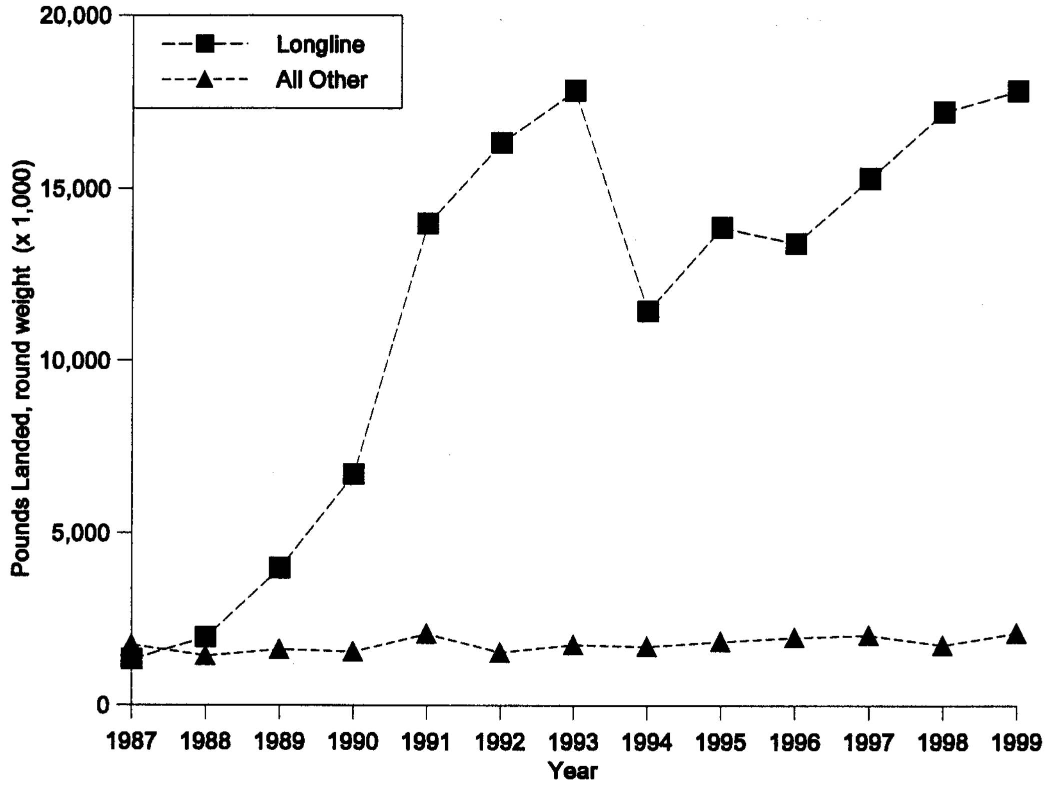
Year	Aku Boat	Longline	Troll-Handline-Other
1948	9,348	9,349	564
1949	10246	8600	610
1950	9302	7608	425
1951	11216	8105	320
1952	6946	8914	395
1953	10397	7402	1,635
1954	10821	6710	221
1955	8098	7234	313
1956	7973	6322	321
1957	5396	5593	293
1958	6445	5341	216
1959	8306	5543	172
1960	5449	5056	224
1961	7074	4523	202
1962	6224	4651	219
1963	5736	4267	209
1964	6446	4446	213
1965	10401	4116	209
1966	6975	4188	268
1967	6203	4268	285
1968	7308	4181	297
1969	5678	5069	423
1970	6321	5323	486
1971	11161	4435	928
1972	11575	4602	1166
1973	12051	4208	1,686
1974	9,097	4114	2,706

Year	Aku Boat	Longline	Troll-Handline-Other
1975	7,101	3443	4,195
1976	11,337	3964	4,968
1977	10461	5104	6,076
1978	11421	5807	7,655
1979	8111	8222	7,531
1980	6746	6094	8,814
1981	6313	7974	9,062
1982	4,193	7856	7,381
1983	4,527	9904	8,258
1984	4,784	9673	8,195
1985	3,683	12861	8,443
1986	3556	11586	10461
1987	5734	15795	12512
1988	6,001	23205	9508
1989	6,086	31025	9518
1990	2,342	44394	8596
1991	3,158	51157	9080
1992	2,689	48548	8002
1993	2605	57446	8689
1994	1,926	43611	10724
1995	1,592	44588	9675
1996	2,417	43276	9777
1997	2,393	50283	7152
1998	1,114	47027	8910
1999	1,669	47,400	10,056
Average	6,439	15,097	4,378
Std. Deviation	3,189	17,025	4,318

Data: Combination of HDAR commercial catch reports for non-longline gears and NMFS estimates for longline.

Data Source: HTOT98a.xls (4/22/99)

Figure 5. Hawaii commercial billfish and other non-tuna PMUS catch by gear type, 1987 - present



Interpretation: The chart shows the rapid rise in the longline fishery for swordfish in 1991-93, the decline in 1994 as swordfish longliners returned to the mainland U.S., and stabilization since then as more vessels targeted swordfish again. Swordfish rose from 4 % of longline landings of non-tunas in 1987 to 40 % in 1999. In addition, the non-tuna PMUS includes the estimated round weight of pelagic sharks (e.g., blue sharks) which are caught incidentally and processed at-sea only for their fins. This amounted to approximately 36% of non-tuna longline landings in 1999. More information is obtainable from the species tables and from the NMFS annual report on the fishery (Ito, 1999).

The chart also shows the relative stability of non-tuna PMUS catch by all the other gears. However landings by troll-handline-other pelagic gears in 1999 was the highest since 1987, 18% above the long-term average.

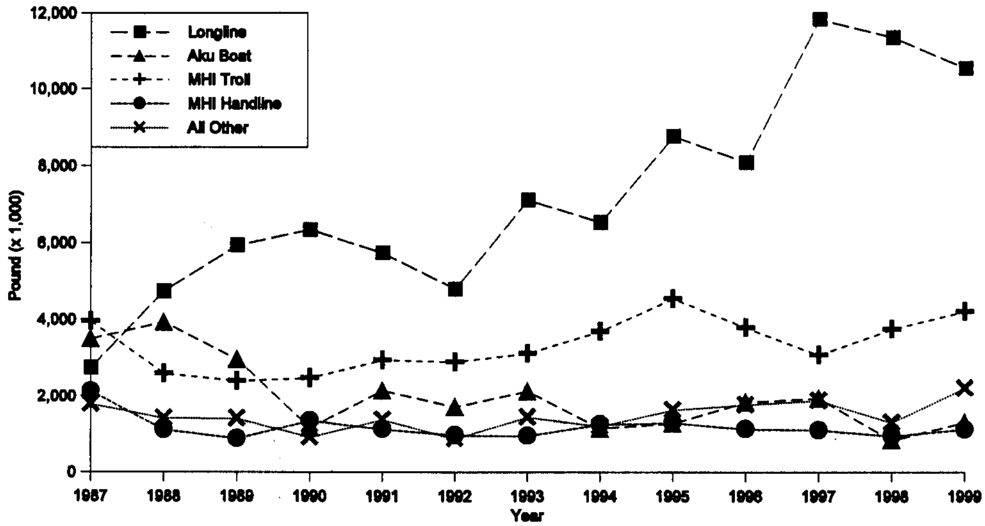
Hawaii commercial billfish and other non-tuna PMUS catch by gear type.

Year	Pounds Landed (x 1,000)	
	Longline	All Other
1987	1,350	1,776
1988	2,000	1,459
1989	4,000	1,648
1990	6,700	1,586
1991	14,000	2,105
1992	16,300	1,558
1993	17,800	1,784
1994	11,500	1,734
1995	13,900	1,882
1996	13,400	2,001
1997	15,300	2,063
1998	17,200	1,775
1999	17,800	2,127
Average	11,635	1,808
Standard Deviation	6,037	217

Data: Longline data are compiled from NMFS estimates. Troll-handline-other pelagics data are compiled from HDAR commercial catch reports.

Data Source: P8799N.cal (11/19/00)

Figure 6. Hawaii commercial tuna catch by gear type, 1987 - present.



<u>Interpretation</u>: Since 1993, longline fishing effort increasingly has focused on tuna as a target species (as described in Ito, 1996). Aku boat landings recovered somewhat from its dramatic drop in 1998, but remained 34% below the average. MHI troll landings continued to increase from the 1997 low and was 26% above their long-term average and MHI handline recovered to landings near the long-term average.

The time-series now illustrates the fluctuating importance (or reporting) of all other gears, including NWHI trolling and handline, off-shore handline, and distant-water troll.

In 1999, most of the All Other tuna landings were primarily off-shore handline from the seamounts and NOAA weather buoys: 110,000 pounds of albacore, 310,000 pounds of bigeye and 435,000 pounds of yellowfin. Albacore landings by Other gears-Other areas were 303,000 pounds from distant-water trollers.

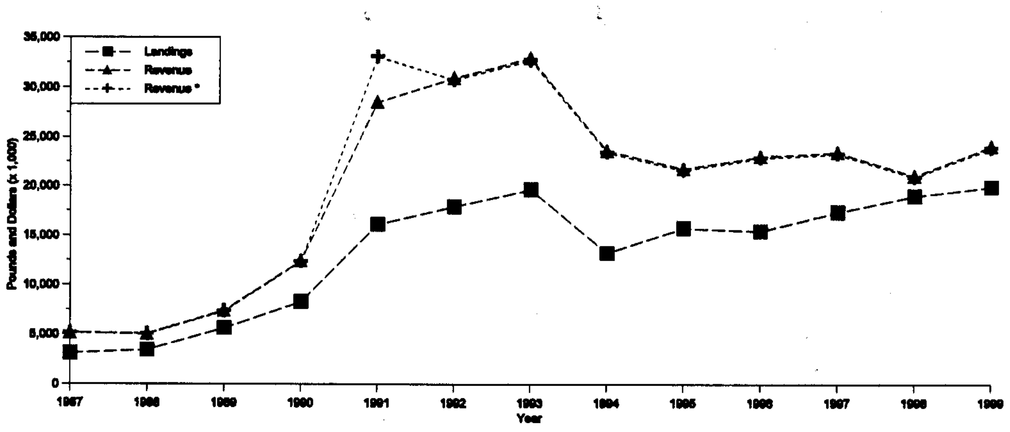
Hawaii commercial tuna catch by gear type.

Year	Pounds Caught (x 1,000)				
	Longline	Aku boat (Pole-and-line baitboat)	MHI Troll	MHI Handline	All Other
1987	2,750	3,501	3,960	2,127	1,799
1988	4,750	3,936	2,588	1,124	1,428
1989	5,950	2,961	2,401	891	1,423
1990	6,350	1,180	2,475	1,361	926
1991	5,750	2,147	2,946	1,139	1,383
1992	4,800	1,722	2,896	976	889
1993	7,100	2,134	3,117	962	1,455
1994	6,500	1,158	3,694	1,263	1,208
1995	8,750	1,290	4,549	1,301	1,642
1996	8,100	1,843	3,791	1,138	1,768
1997	11,800	1,942	3,073	1,110	1,883
1998	11,350	845	3,749	950	1,304
1999	10,500	1,309	4,212	1,124	2,200
Average	7,265	1,998	3,342	1,190	1,485
Standard Deviation	2,722	947	693	315	373

Data: Longline data are compiled from NMFS estimates. Troll-handline-other pelagics data are compiled from HDAR commercial catch reports.

Data Source: P/8799N.cal (11/21/08)

Figure 7. Hawaii billfish & other non-tuna PMUS catch and revenue, 1987 - present.



Interpretation: Longline landings of swordfish increased in 1999 but remained lower than most annual landings in the 1990's. Ex-vessel (nominal) revenue increased in 1999 in part due to the increase in prices for swordfish (+13%) from 1998 prices.

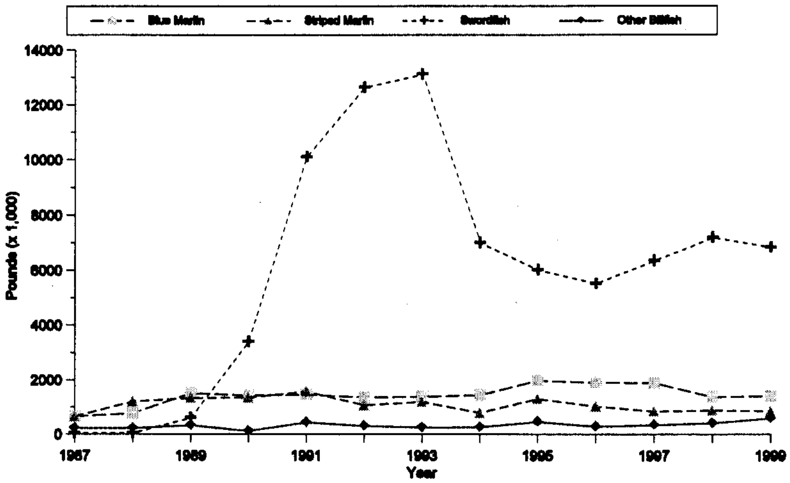
Hawaii billfish & other non-tuna PMUS catch and revenue, 1987 - present.

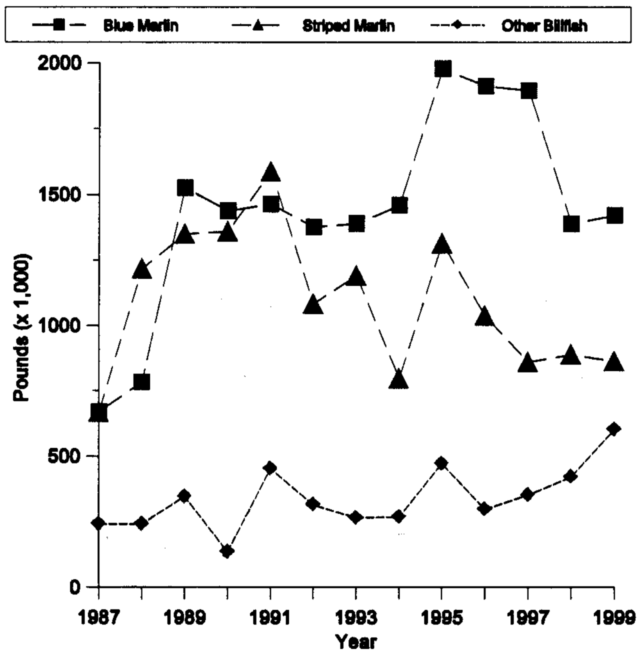
Year	Pounds (x1,000)	Nominal Revenue ($,1000)	Inflation-adjusted Revenue ($1,000)	HCPI
1987	3,126	5,207	5,171	115
1988	3,459	5,093	5,058	122
1989	5,648	7,410	7,359	129
1990	8,286	12,415	12,329	138
1991	16,105	28,530	33,060	148
1992	17,878	30,955	30,740	155
1993	19,594	32,929	32,700	160
1994	13,194	23,565	23,401	165
1995	15,772	21,780	21,629	168
1996	15,431	22,999	22,839	171
1997	17,360	23,420	23,257	172
1998	19,000	21,043	20,897	172
1999	**19,900**	**24,033**	**23,866**	**173**
Average	13,443	19,952	20,177	
Standard Deviation	6,160	9,447	9,820	

Data: Longline data are compiled from NMFS estimates. Troll-handline-other pelagics data are compiled from HDAR commercial catch reports.

Data Source: P8799N.cal (11/14/00)

Figure 8. Species composition of Hawaii commercial billfish catch, 1987 - present.





Species composition of Hawaii commercial billfish catch, 1987 - present

Year	Blue Marlin	Striped Marlin	Swordfish	Other Billfish
	Pounds Landed (x 1,000)			
1987	671	669	59	244
1988	784	1,220	65	244
1989	1,527	1,353	616	349
1990	1,439	1,361	3,411	138
1991	1,465	1,590	10,113	454
1992	1,378	1,085	12,644	318
1993	1,391	1,193	13,126	267
1994	1,461	798	7,008	271
1995	1,979	1,316	6,023	474
1996	1,914	1,039	5,532	300
1997	1,897	861	6,367	354
1998	1,390	890	7,204	423
1999	1,423	865	6,852	604
Average	1,440	1,095	6,078	342
Standard Deviation	383	271	4,296	122

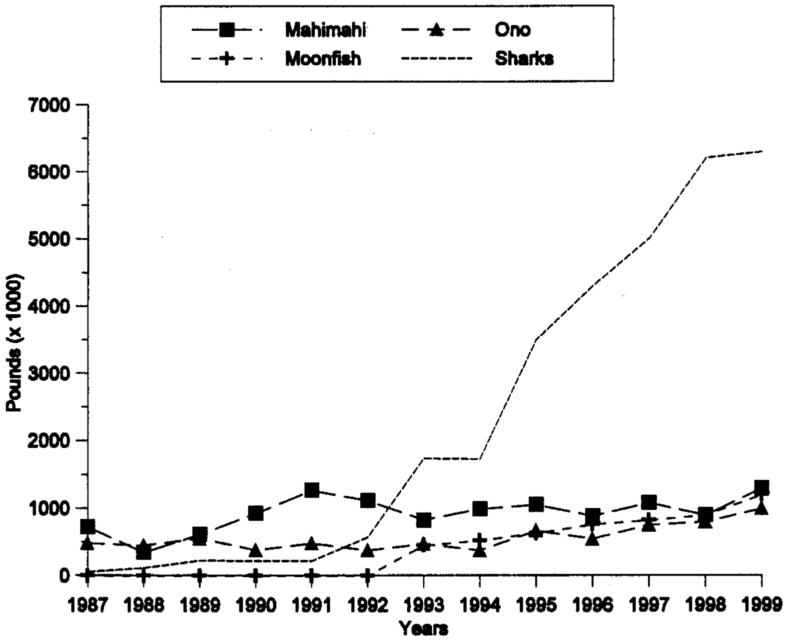
Interpretation: The swordfish component of the longline fishery rose rapidly in the early 1990s, with a significant decline subsequently as longline fishing effort shifted towards tuna. 1999 blue marlin landings were slightly below the long-term average. Striped marlin was also somewhat below the long-term average.

Longline landings of blue marlin have increased from 15% of the total in 1987 to 66% in 1998, but dropped to 55% in 1999. Troll-handline-other landings have remained relatively constant over the time period.

Data: Species summaries for all gears combined are compiled from HDAR and NMFS landings figures. Longline data are compiled from NMFS estimates. Troll-handline-other pelagics data are compiled from HDAR commercial catch reports. Data are rounded to the nearest 100,000 pounds.

Data Source: P8799N.xls (11/14/00)

Figure 9. Hawaii commercial catch -- mahimahi, ono (wahoo), moonfish (opah), and sharks (whole weight), 1987 - present



Interpretation: Landings for mahimahi, ono and moonfish were the highest since the longline fishery began in 1987. In 1999 99,700 sharks were caught (-12%) by the Hawaii-based domestic longline fishery, of which 58,268 were kept (67%): only 982 sharks were kept as *whole* shark product and the remainder were processed as a finned product (shark landings are reported as biomass (whole or round weight) figures).

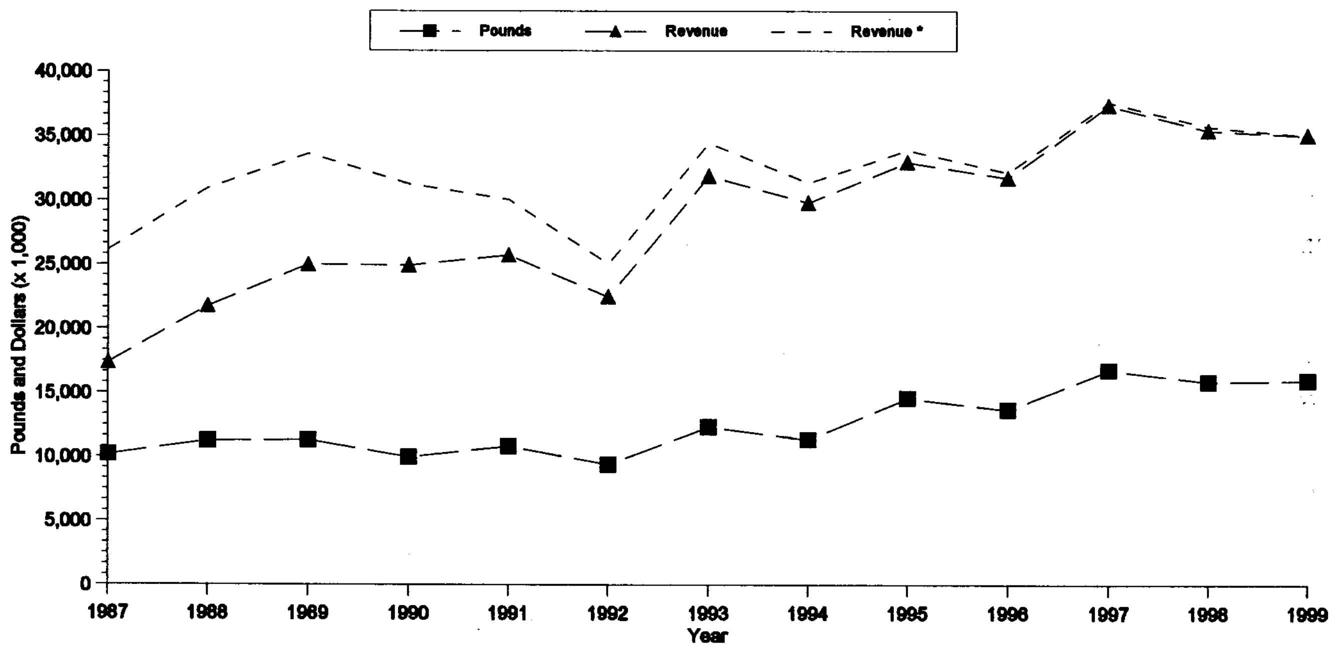
Hawaii commercial catch -- mahimahi, ono(wahoo), and sharks.

Year	Pounds (x 1,000)			
	Mahimahi	Ono	Moonfish	Sharks (Whole Wgt)
1987	722	484	0	57
1988	345	452	0	118
1989	612	553	0	224
1990	927	381	0	221
1991	1,271	482	0	222
1992	1,120	380	0	573
1993	830	473	450	1,748
1994	993	377	520	1,738
1995	1,055	669	630	3,518
1996	888	548	760	4,311
1997	1,085	757	823	5,019
1988	900	800	900	6,207
1999	1,300	1,000	1,200	6,300
Average	927	566	406	2,327
Standard Deviation	263	189	431	1,738

Data: Species summaries for all gears combined are compiled from HDAR and NMFS landings figures. Longline data are compiled from NMFS estimates. Troll-handline-other pelagics data are compiled from HDAR commercial catch reports. Data are rounded to the nearest 100,000 pounds. Shark landings represent reported weights for troll-handline-other gears and NMFS estimates of round or whole weights for longline-caught shark, including sharks "finned" (where only the fins are retained and the carcasses are discarded at sea).

Data Source: P8799N.cal (11/14/00)

Figure 10. Hawaii tuna catch and revenue, 1987 - present.



Interpretation: Tuna landings in the Hawaii commercial fishery have been near record levels (1965 being the highest year of the aku boat fishery) and the highest since the tuna cannery closed (1984).[18] Nominal and inflation-adjusted ex vessel revenue are also at record levels, although somewhat lower in 1999 than 1998. Troll-handline-other landings of tuna are below average for the recent period. Aku boat (pole-and-line skipjack tuna) landings have shown some increase in 1999 but remain depressed despite new investment in that sector.

18 Total tuna landings were 14,700,000 pounds (sold) in 1970, of which over half was from the pole-and-line aku boat fleet. The record landings were in 1965 (16.3 million pounds).

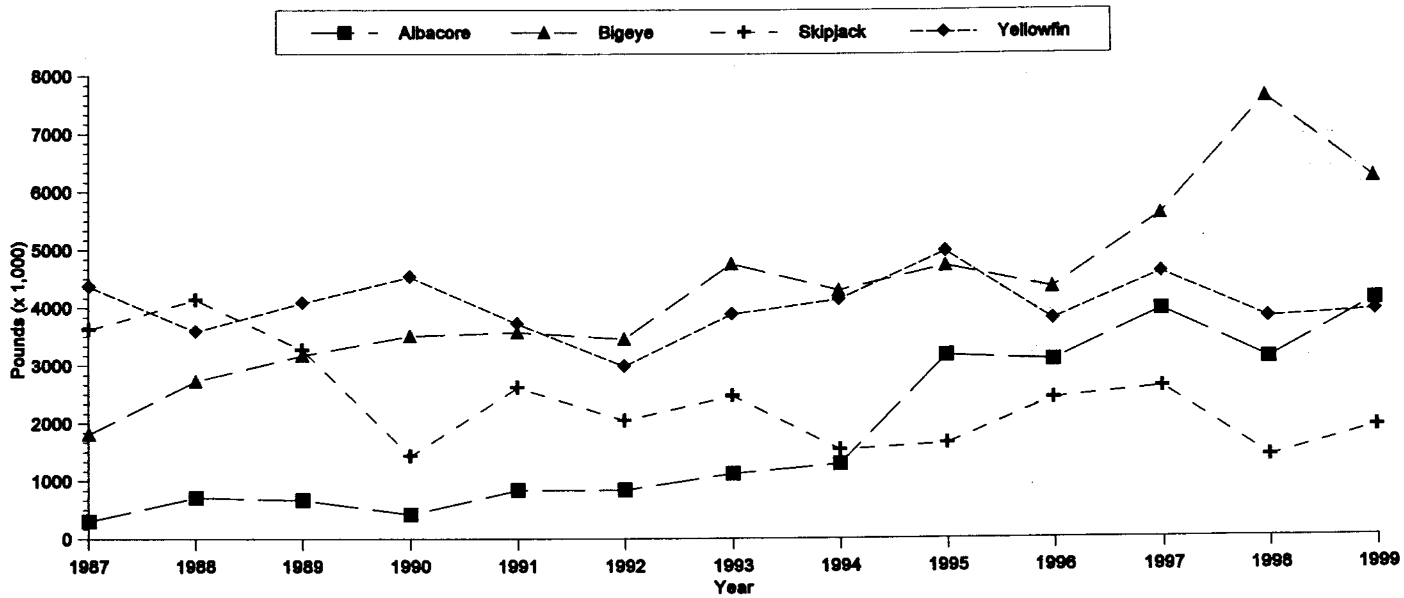
Hawaii tuna catch and revenue, 1987 - present

Year	Pounds Landed (x 1,000)	Nominal Revenue x $1,000	Inflation-adjusted Revenue x $1,000	HCPI
1987	10,211	17,390	26,183	114.9
1988	11,274	21,780	30,961	121.7
1989	11,312	25,032	33,648	128.7
1990	10,005	24,984	31,298	138.1
1991	10,843	25,776	30,130	148.0
1992	9,428	22,528	25,128	155.1
1993	12,371	31,924	34,496	160.1
1994	11,382	29,857	31,400	164.5
1995	14,609	33,001	33,963	168.1
1996	13,724	31,804	32,233	170.7
1997	16,834	37,460	37,699	171.9
1998	15,931	35,506	35,817	171.5
1999	**16,040**	**35,124**	**35,124**	**173.0**
Average	12,613	28,628	32,160	152.8
Standard Deviation	2,528	6,150	3,603	20.6

Data: Commercial landings and ex vessel revenue for all gears combined are compiled from HDAR and NMFS figures. Longline data are compiled from NMFS estimates. Troll-handline-other pelagics data are compiled from HDAR commercial catch reports. Data are rounded to the nearest 100,000 pounds. Inflation-adjusted revenue bases previous year's revenues on the current year (1997) Honolulu consumer price index (HCPI).

Data Source: P8798n.xls (4/22/99)

Figure 11. Species composition of Hawaii commercial tuna catch, 1987 - present.



Interpretation: Bigeye landings decreased from their record landings in 1998 while landings of all other tuna increasing slightly in 1999. Albacore landings remain high since the dramatic increase in 1995. Yellowfin landings were slightly below the recent average. Skipjack tuna (aku) landings recovered slightly from the lowest year (1998) on record.

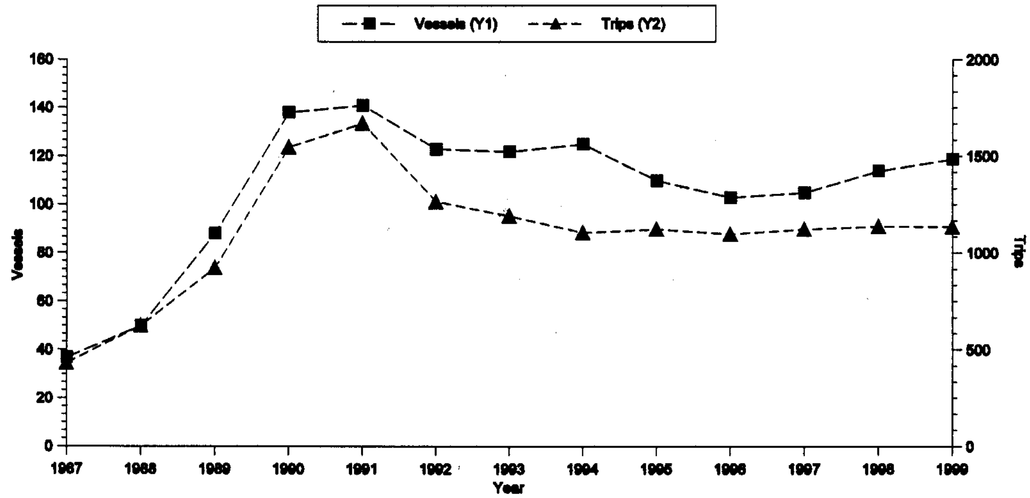
Species composition of Hawaii commercial tuna catch, 1987 - present.

	Pounds Landed (x 1,000)			
Year	**Albacore**	**Bigeye**	**Skipjack (aku)**	**Yellowfin**
1987	313	1,819	3,628	4,376
1988	720	2,737	4,147	3,594
1989	679	3,186	3,276	4,094
1990	429	3,519	1,438	4,540
1991	849	3,579	2,625	3,729
1992	851	3,464	2,051	2,994
1993	1,128	4,758	2,473	3,892
1994	1,297	4,301	1,540	4,144
1995	3,174	4,729	1,651	4,975
1996	3,092	4,348	2,423	3,798
1997	3,956	5,602	2,609	4,598
1998	3,100	7,600	1,400	3,800
1999	4,100	6,200	1,900	3,900
Average	1,822	4,296	2,397	4,033
Standard Deviation	1,420	1,535	867	509

Data: Species summaries for all gears combined are compiled from HDAR and NMFS landings figures. Longline data are compiled from NMFS estimates. Troll-handline-other pelagics data are compiled from HDAR commercial catch reports. Data are rounded to the nearest 100,000 pounds.

Data Source: P8799N.xls (11/14/00)

Figure 12. Hawaii longline vessel activity, 1987 - present.



Interpretation: Longline vessel activity in Hawaii has remained stable in 1999 although five more vessels fished in 1999 than in 1998. Activity remains substantially below the 1990-91 peak when limited entry into the fishery was introduced.

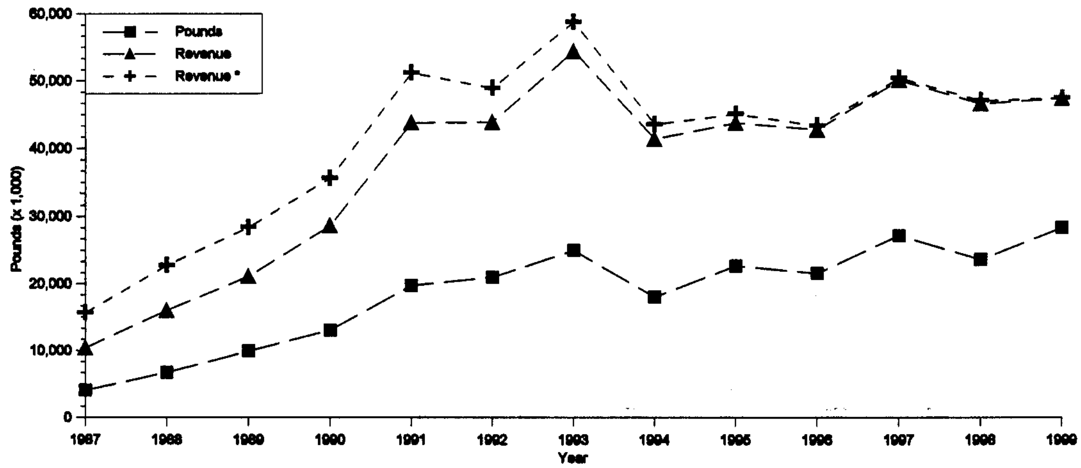
Hawaii longline vessel activity, 1987 - present.

Year	Active Vessels	Trips
1987	37	435
1988	50	627
1989	88	923
1990	138	1,546
1991	141	1,671
1992	123	1,266
1993	122	1,192
1994	125	1,106
1995	110	1,125
1996	103	1,100
1997	105	1,125
1998	114	1,139
1999	**119**	**1,137**
Average	106	1,107
Standard Deviation	30	312

Data: Longline fishing effort data are compiled from Federal logbooks collected by the Fishery Monitoring & Economics Program of the NMFS Honolulu Laboratory for the year 1991-present, and by shoreside monitoring by FMEP in earlier years (Ito, 1997).

Data source: (LL98.xls RYI, 4/2/99)

Figure 13a. Hawaii longline catch and revenue, 1987 - present.



Interpretation: Hawaii longline landings have remained fairly stable since 1995, with the exceptional peak in 1997. Most of the effort in the past several years has been directed at tunas, with bigeye and albacore providing the largest volume. Swordfish remains the largest single component, but only marginally more than bigeye tuna. However bigeye, because ex-vessel prices for bigeye are 75% higher than for swordfish, total revenue is much greater for bigeye. Albacore tuna landings increased substantially in 1999 even though prices were especially weak.

Hawaii longline catch and revenue, 1987 - present.

Year	Pounds (x 1,000)	Nominal Revenue ($1,000)	Adjusted Revenue ($1,000)	Honolulu Consumer Price Index
1987	4,100	10,450	15,734	115
1988	6,750	16,050	22,816	122
1989	9,950	21,150	28,430	129
1990	13,050	28,650	35,684	139
1991	19,750	43,820	51,222	148
1992	20,980	43,875	48,939	155
1993	24,935	54,390	58,772	160
1994	17,998	41,373	43,511	165
1995	22,638	43,772	45,048	168
1996	21,522	42,754	43,330	171
1997	27,118	50,043	50,363	172
1998	23,562	46,594	47,002	172
1999	**28,317**	**47,432**	**47,432**	**173**
Average	18,513	37,719	41,406	
Standard Deviation	7,747	13,914	12,348	

Data: Longline landings and ex vessel revenue estimates are compiled by the NMFS Honolulu Laboratory. They represent weight estimates using Federal logbooks (since 1991) and market monitoring average weight per fish and average price per pound. From 1987-1990, estimates rely on NMFS shoreside and market monitoring.

Data Source: P8799N.xls (11/14/00)

Figure 13b. Hawaii longline landings -- billfish (including swordfish), 1987 -present.

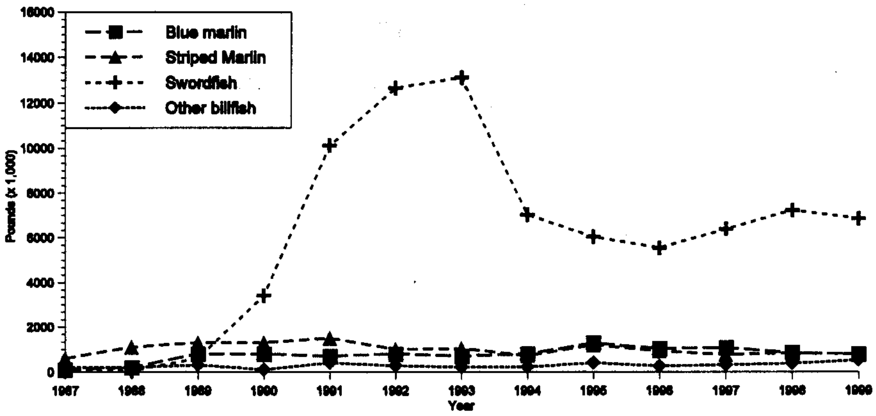
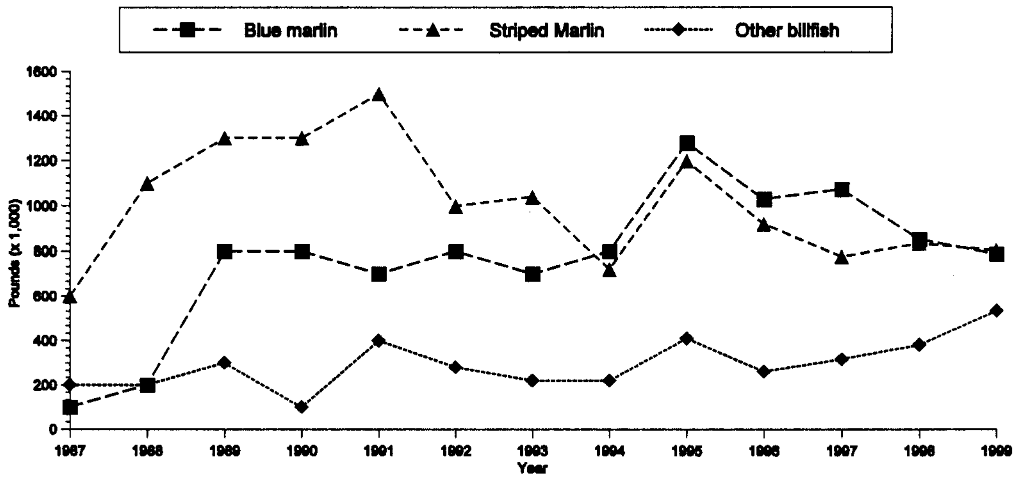


Figure 13c. Hawaii longline catch – marlins & other billfish, 1987 - present.



Hawaii longline catch -- billfish (including swordfish), 1987 - present.

	Pounds Caught (x 1,000)			
	Blue marlin	**Striped marlin**	**Swordfish**	**Other billfish**
1987	100	600	50	200
1988	200	1,100	50	200
1989	800	1,300	600	300
1990	800	1,300	3,400	100
1991	700	1,500	10,100	400
1992	800	1,000	12,640	280
1993	700	1,040	13,100	220
1994	800	720	7,000	220
1995	1,280	1,200	6,010	410
1996	1,030	920	5,520	260
1997	1,074	775	6,351	316
1998	851	833	7,189	380
1999	**786**	**802**	**6,831**	**533**
Average	763	1,007	6,065	294
Std Deviation	318	265	4,296	115

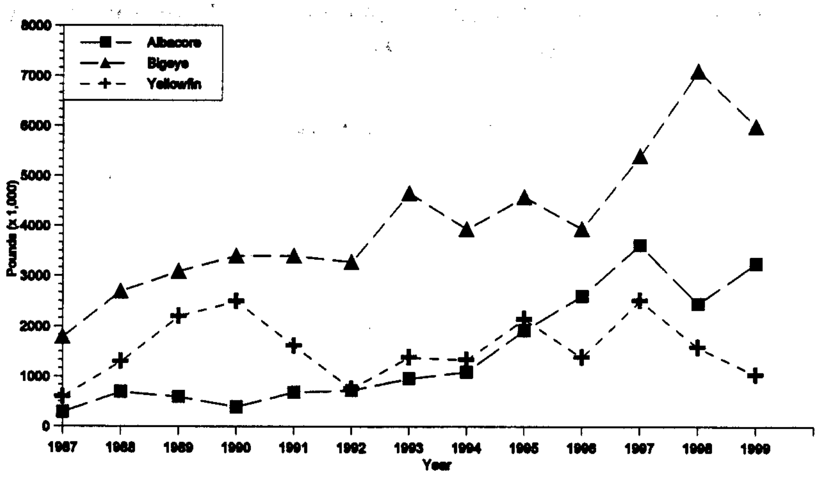
Interpretation: Total billfish catch (including swordfish) have been relatively stable the last few years. However catch of blue marlin has declined over the past four years but was still above the long-term average. The dramatic decline in swordfish catch in 1994 represented a change in vessel targeting practices.[19] A subsequent figures shows the decline in swordfish-directed trips and the stability in accompanying catch per unit effort (CPUE). Nonetheless, swordfish remains the largest single species caught by the Hawaii longline fleet in terms of pounds caught, although the ex vessel revenue of bigeye tuna exceeds swordfish revenue. Most swordfish continues to be exported to the U.S. mainland. All other species are within their recent ranges and above their long-term averages. Swordfish catch was worth $13 million ex-vessel, while the other marlins were $2.6 million.

Data: Data are compiled from Federal logbooks and market monitoring information by NMFS Honolulu Laboratory and HDAR staff.

Data source: P8799N.xls (11/14/00)

19 See the 1995 annual report for a full discussion of the 1994 swordfish CPUE.

Figure 14. Hawaii longline catch -- tunas, 1987 - present.



Interpretation: Bigeye and Albacore have had an increase in landings since the fishery began with the exception of the past year for bigeye and a dip over the past two years for albacore. Yellowfin landings have fluctuated over the time span but have experienced a two year decline and are 37% below the long term average. Yellowfin tunas shows more inter-annual variation than other species. Some longline trips now target albacore (despite its relatively low price per pound). Longline tuna landings in 1999 were $27 million ex vessel.

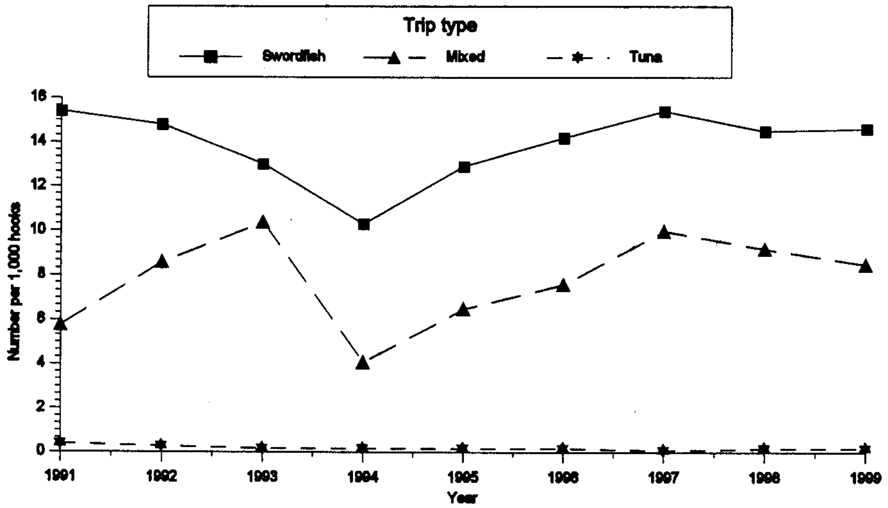
Hawaii longline catch -- tunas, 1987 - present.

	Pounds Caught (x 1,000)				
Year	Albacore	Bigeye	Yellowfin	Skipjack	Bluefin
1987	300	1,800	600		0
1988	700	2,700	1300		0
1989	600	3,100	2200		0
1990	400	3,400	2500		0
1991	690	3,400	1620		0
1992	730	3,280	760		0
1993	970	4,660	1390		0
1994	1,100	3,940	1340	80	30
1995	1,930	4,580	2150	50	60
1996	2,610	3,950	1390	90	50
1997	3,619	5,399	2515	234	52
1998	2,449	7,097	1,588	168	36
1999	**3,248**	**5,987**	**1,042**	**219**	**23**
Average	1,587	4,291	1,650	2,420	19
Standard	1,142	1,435	616	918	25

Data: Data are compiled from Federal logbooks and market monitoring information by NMFS Honolulu Laboratory and HDAR staff. Bluefin and skipjack tuna not recorded on chart due to small magnitudes.

Source: P8799N.xls (11/14/00)

Figure 15. Hawaii longline catch rates -- swordfish catch by trip type, 1991 - present.



Interpretation: Although *aggregate* swordfish CPUE has fallen consistently since 1993, this graph makes clear that there is a tremendous difference between aggregate CPUE (which does not take into account targeting), and trip-type CPUE.

Swordfish CPUE on trips which target swordfish declined from 1992 (the year after the Federal logbook program was initiated and shortly after the inception of the swordfish fishery in Hawaii), dipping dramatically in 1994. Swordfish CPUE has since recovered to its initial levels, although the amount of fishing effort is dramatically lower.

Mixed trip CPUE showed a much steeper decline in 1994, but a similar recovery. This may reflect changes in Mixed trip targeting behavior from techniques which would catch more swordfish to techniques which would catch more tuna.

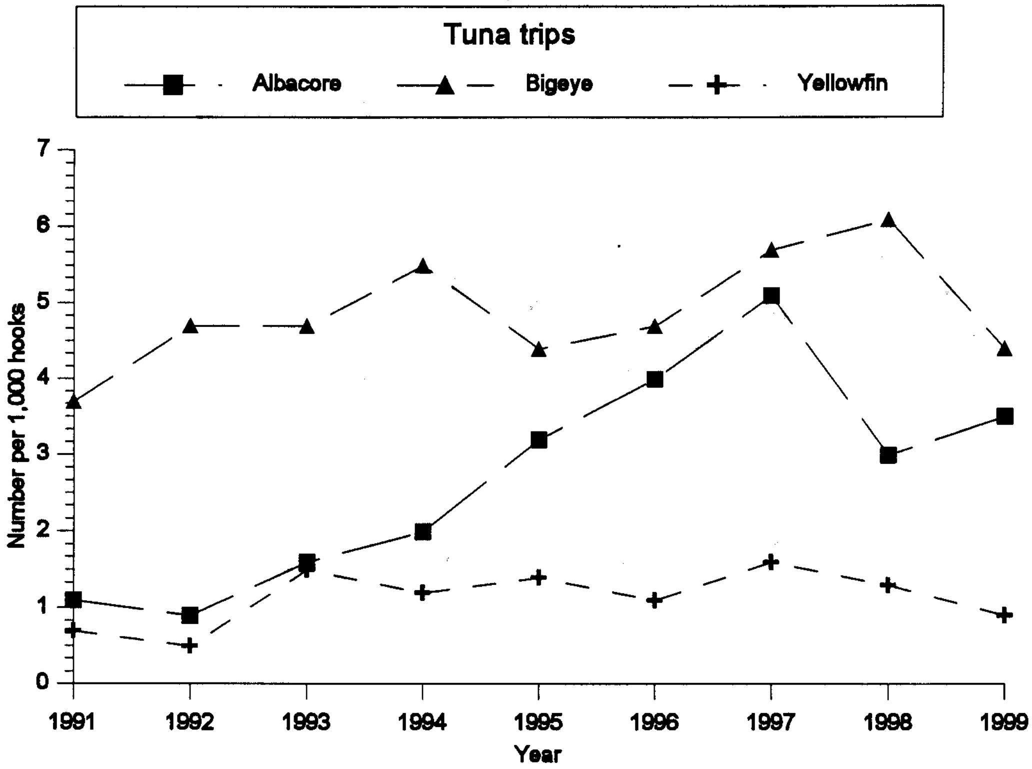
Swordfish CPUE by longline trip type, 1987 - present

Year	Swordfish CPUE (number caught per 1,000 hooks)		
	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**
Average	13.9	7.9	0.2
Standard Deviation	1.6	2.1	0.1

Data: Longline catch rates are compiled from Federal logbooks. CPUE is *Number caught* per 1,000 hooks set. Trips are categorized by longline captains (or by NMFS staff in the absence of a longline captain) as targeting Swordfish, Tuna or Mixed (meaning either switching of target during the trip or the absence of an explicit target).

Data source: LL99trip.cal (11/14/00)

Figure 16. Hawaii longline catch rates -- major tuna species by tuna trips, 1991 - present.



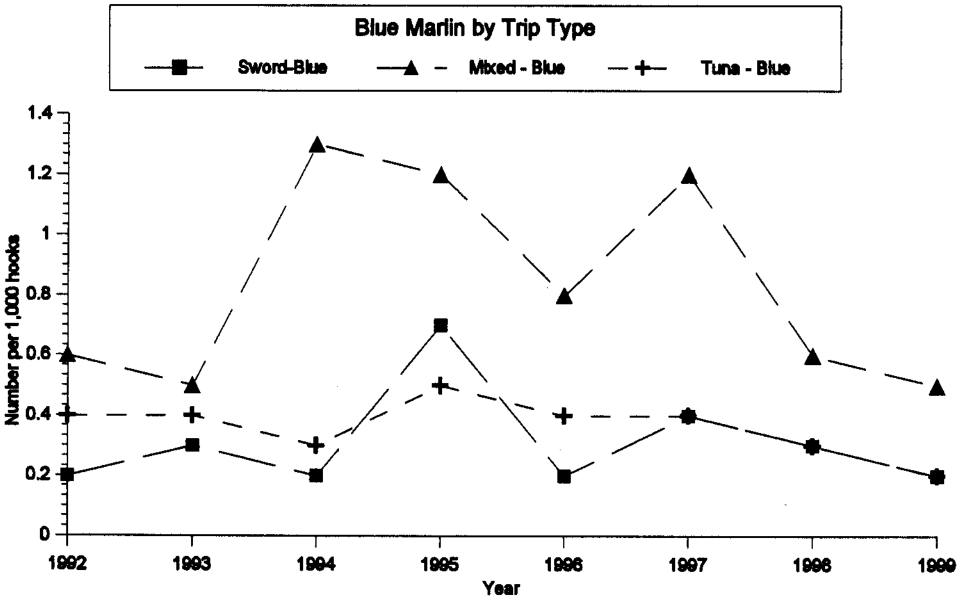
Interpretation: Tuna-trips provide the most realistic view of tuna species catch rates (CPUEs). Albacore is probably more targeted in the past four years than in previous years, but it appears to be more abundant as well. Tuna-directed trip catch rates for albacore in 1999 recovered somewhat from a large drop in 1998, but not nearly to the levels it reached in 1996 or 1997. Bigeye catch rates fell to the lowest level since 1991, even though effort directed at bigeye has increased in the past few years. Yellowfin tuna is slightly below the average but within its recent norm.

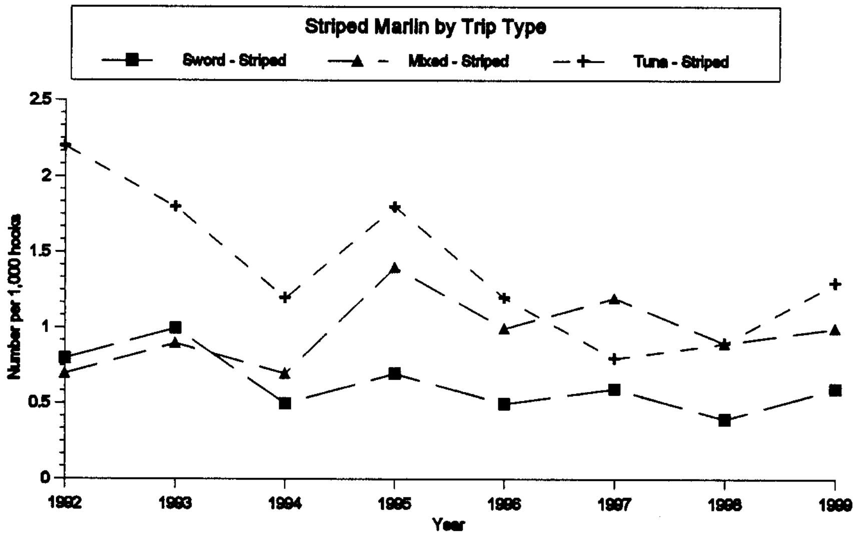
	Tuna-trip CPUEs (number caught per 1,000 hooks)		
Year	**Albacore**	**Bigeye**	**Yellowfin**
1991	1.1	3.7	0.7
1992	0.9	4.7	0.5
1993	1.6	4.7	1.5
1994	2.0	5.5	1.2
1995	3.2	4.4	1.4
1996	4.0	4.7	1.1
1997	5.1	5.7	1.6
1998	3.0	6.1	1.3
1999	**3.5**	**4.4**	**0.9**
Average	2.7	4.9	1.1
Standard Deviation	1.4	0.8	0.4

Data: Longline catch rates are compiled from Federal logbooks. CPUE is *Number caught* per 1,000 hooks set. Trips are categorized by longline captains (or by NMFS staff in the absence of a longline captain) as targeting Swordfish, Tuna or Mixed (meaning either switching of target during the trip or the absence of an explicit target).

Data source: LL99trip.cal (11/14/00)

Figure 17. Hawaii longline catch rates -- blue & striped marlin by trip type, 1991 - present.





Marlin CPUEs
(number caught per 1,000 hooks)

	Blue Marlin			Striped Marlin		
Year[20]	**Swordfish Trips**	**Mixed Trips**	**Tuna Trips**	**Swordfish Trips**	**Mixed Trips**	**Tuna Trips**
1991	poor species identification precluded quantification in 1991					
1992	0.2	0.6	0.4	0.8	0.7	2.2
1993	0.3	0.5	0.4	1.0	0.9	1.8
1994	0.2	1.3	0.3	0.5	0.7	1.2
1995	0.7	1.2	0.5	0.7	1.4	1.8
1996	0.2	0.8	0.4	0.5	1.0	1.2
1997	0.4	1.2	0.4	0.6	1.2	0.8
1998	0.3	0.6	0.3	0.4	0.9	0.9
1999	**0.2**	**0.5**	**0.2**	**0.6**	**1.0**	**0.7**
Average	0.3	0.8	0.4	0.6	1.0	1.3
Standard Deviation	0.2	0.3	0.1	0.2	0.2	0.6

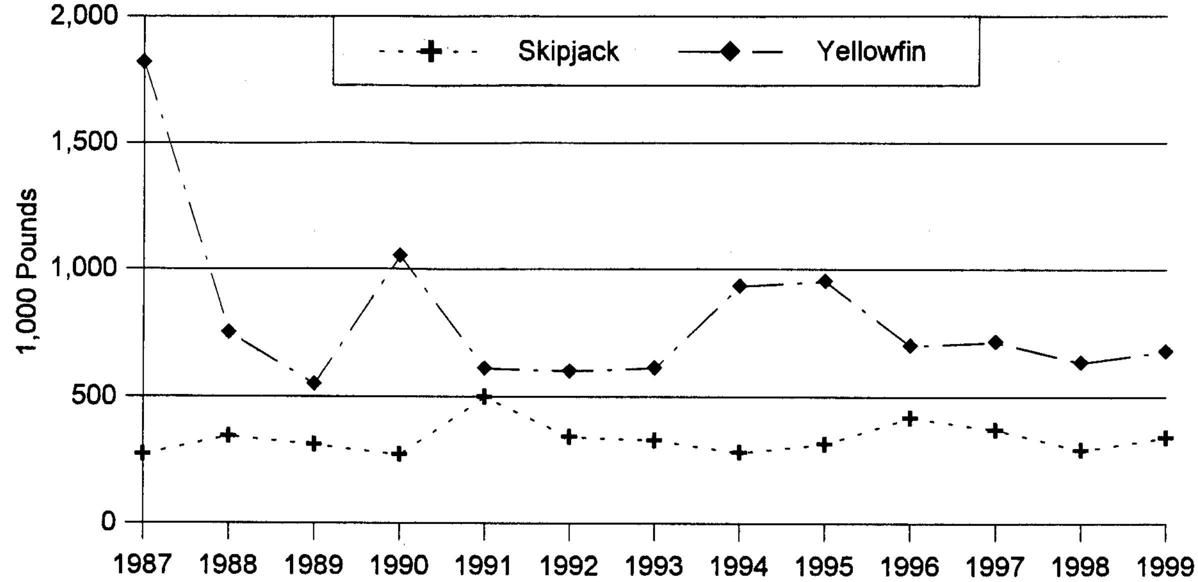
Interpretation: Blue and striped marlin are caught on all three trip types but in different proportions. With the average longline trip setting roughly 1,000 hooks, these catch rates translate into approximately 0.2 blue marlin and 0.7 striped marlin per day. Blue marlin catch rates in 1999 were below average for all three trip types, while striped marlin catch rates were much closer to the average except for tuna-directed trips, where the catch rate was half of the average but consistent with recent years. The blue marlin do not appear to show any trend, but the striped marlin appear to show a declining trend.

Data: Longline catch rates are compiled from Federal logbooks. CPUE is *Number caught* per 1,000 hooks set. Trips are categorized by longline captains (or by NMFS staff in the absence of a longline captain) as targeting Swordfish, Tuna or Mixed (meaning either switching of target during the trip or the absence of an explicit target).

Data source: LL99trip.cal (11/14/00).

20

Figure 18. Main Hawaiian Islands troll catch – major species, 1987 - present.



Interpretation: Skipjack and yellowfin are the primary tuna species caught by trolling vessels. Skipjack catch in 1999 was slightly above the average, while yellowfin catch has been below average for the last four years.

MHI Troll tuna catch, 1987 - present.

1,000 Pounds caught

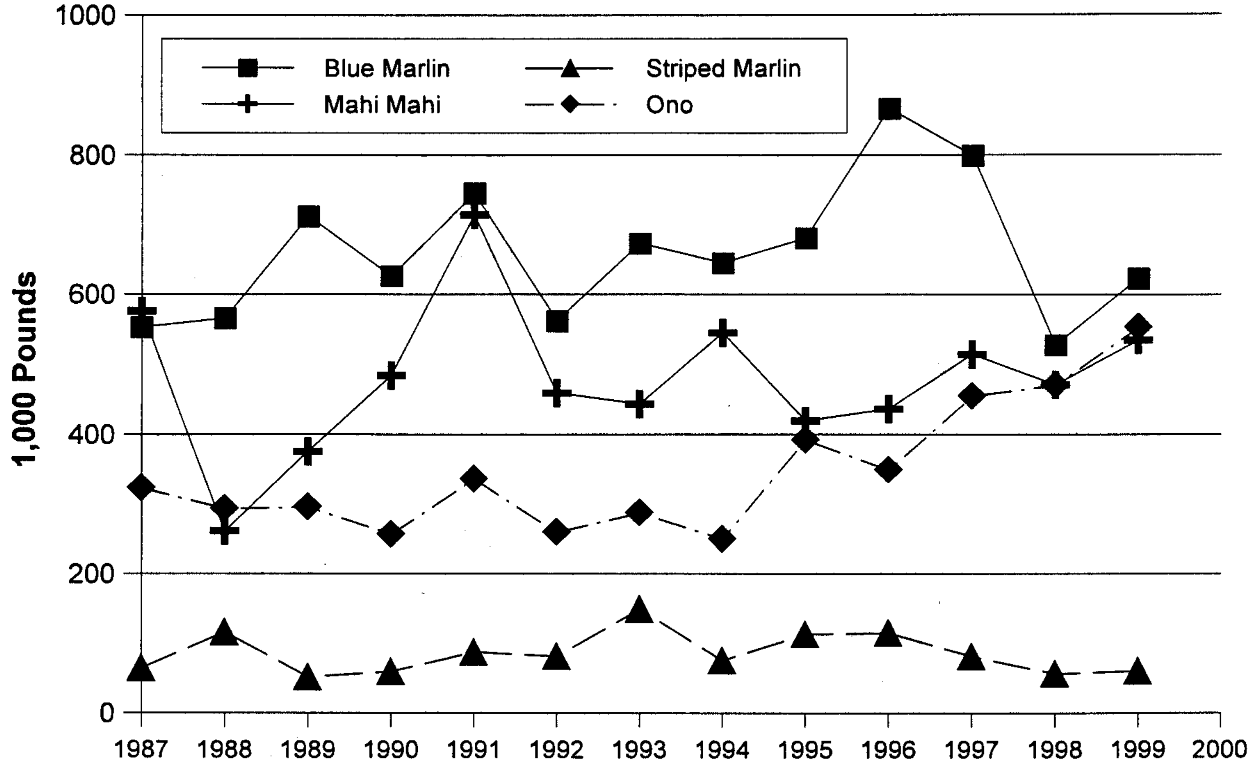
	Albacore	Bigeye	Skipjack	Yellowfin	Other Tuna	Total
1987	1	11	275	1,820	19	2,126
1988	1	10	346	752	16	1,124
1989	1	11	314	551	14	891
1990	1	15	274	1,053	18	1,360
1991	2	11	501	612	14	1,139
1992	3	9	344	602	16	974
1993	3	4	331	614	11	963
1994	* 21	6	283	934	19	1,263
1995	10	10	317	954	11	1,302
1996	5	4	420	702	7	1,138
1997	7	6	374	717	6	1,110
1998	4	6	293	636	10	949
1999	**86**	**7**	**343**	**681**	**7**	**1,124**
Average	11	8	340	818	13	1,189
Standard Deviation	23	3	64	338	5	315

* The albacore "spike" in 1994 was probably distant-water albacore trollers with mis-identified location of catch (i.e., it should have been included in Other).

Data: Data compiled by NMFS staff from HDAR commercial catch reports (data for 1999 are extrapolated from preliminary reports). These data reflect only trolling gear codes and main Hawaiian islands locations. Some off-shore seamounts (e.g., Cross) are excluded, as are distant-water albacore catch. However some off-shore seamounts (e.g., Jagger) are included, based on the HDAR area code determinations (area codes less than 1000).

Data source: P8799N.xls (11/14/00)

Figure 19. MHI Troll Billfish and non-Tuna catch, 1987-present



<u>Interpretation</u>: MHI troll catch for non-Tunas has remained fairly steady since being monitored. Blue marlin catch recovered to near its long-term average after a substantial two year decline. Ono has been on a five year increase, with 1999 catch 59% above the long term average.

MHI Troll Billfish and non-Tuna catch, 1987-present.

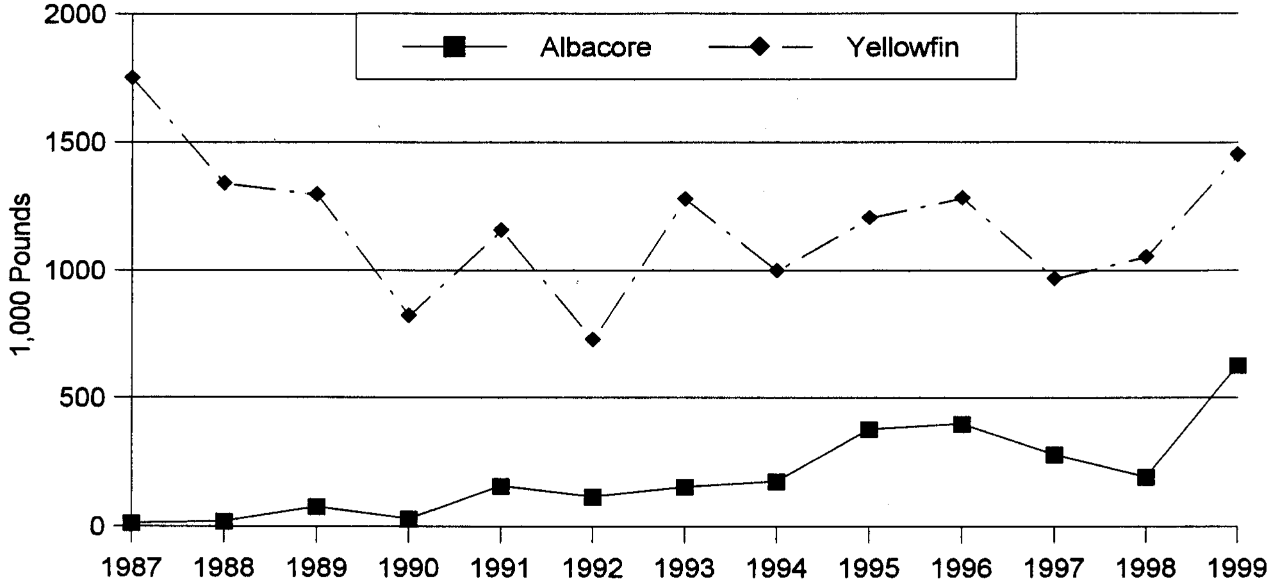
1,000 Pounds caught

	Blue Marlin	Striped Marlin	Swordfish	Mahi Mahi	Ono (wahoo)
1987	553	65	1	576	323
1988	566	117	2	261	294
1989	712	52	2	375	296
1990	626	60	1	484	257
1991	745	88	1	714	336
1992	562	82	0	459	260
1993	673	150	0	443	288
1994	645	76	1	545	250
1995	681	114	1	419	392
1996	866	116	1	436	349
1997	799	82	1	514	455
1998	528	57	1	471	471
1999	**623**	**61**	**1**	**535**	**554**
Average	660	86	1	479	348
Std.deviation	101	30	1	108	94

Data:

Data source

Figure 20 Main Hawaiian Islands handline catch (excluding distant seamounts) -- major species, 1987 - present



Interpretation: MHI handline catch in 1999 increased substantially for both albacore and yellowfin tuna (the mainstay of the fishery). Albacore catch peaked in 1999, three times above its long-term average. Albacore catch was at its highest point since the first year of data, 23% above the long-term average.

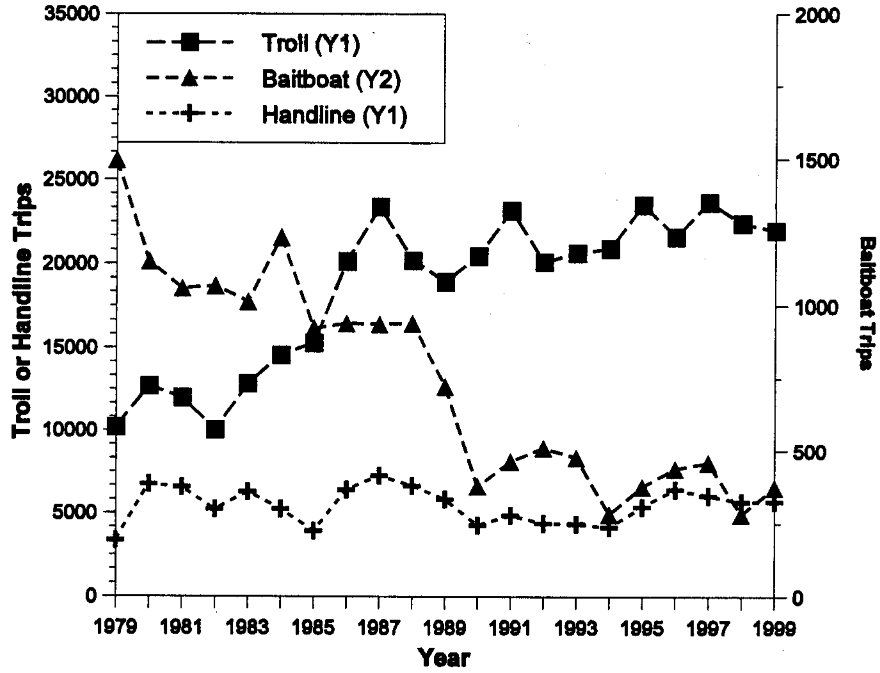
Main Hawaiian Islands handline catch (excluding distant seamounts) -- major species

	MHI Handline 1,000 Pounds Caught					
	Albacore	Bigeye	Skipjack	Yellowfin	Other Tuna	Total
1987	12	6	25	1,750	5	1,798
1988	19	28	31	1,341	9	1,428
1989	77	19	20	1,297	11	1,420
1990	29	42	26	822	6	925
1991	156	45	19	1,158	6	1,383
1992	115	164	21	728	7	1,035
1993	154	2	13	1,280	5	1,454
1994	175	10	21	999	3	1,208
1995	378	33	17	1,207	6	1,641
1996	399	11	70	1,284	4	1,768
1997	280	52	57	969	3	1,360
1998	192	15	38	1,055	3	1,303
1999	**627**	**42**	**50**	**1,453**	**2**	**2,174**
Average	201	36	31	1,180	5	1,454
Standard Deviation	179	42	17	272	3	332

Data: Data compiled by NMFS staff from HDAR commercial catch reports. These data reflect the various handline gear codes in the State data, for fishing within the main Hawaiian Islands. The more distant off-shore seamounts (e.g., Cross) are excluded. However other off-shore seamounts (e.g., Jagger) are included, based on the HDAR area code determinations (area codes less than 1000).

Data source: P8799N.xls (11/14/00)

Figure 21. Hawaii commercial pelagic trips by non-longline gears

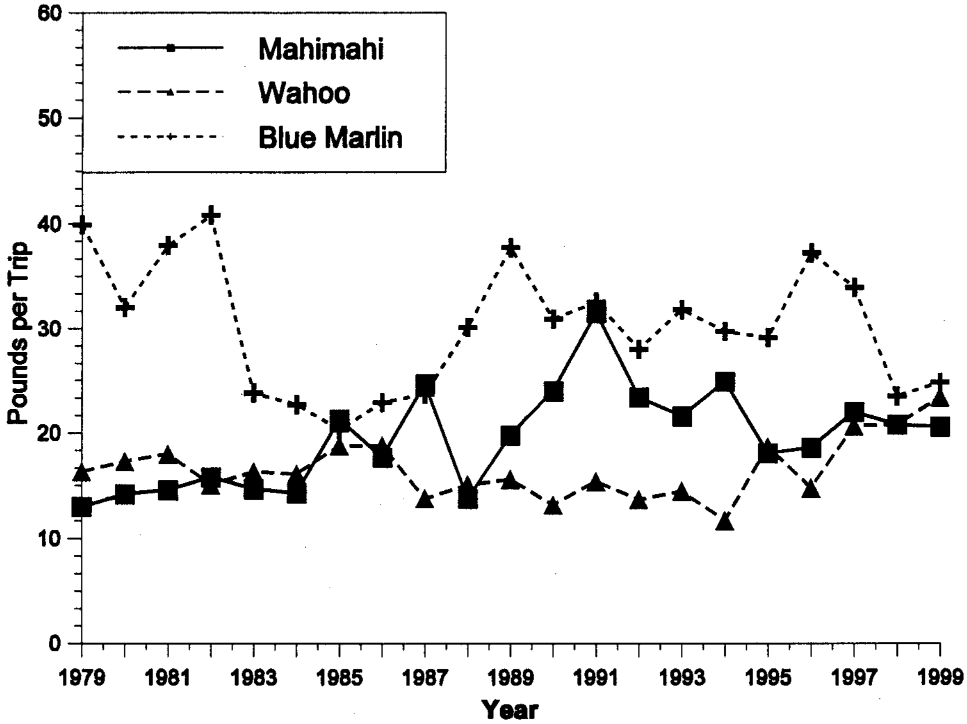


Interpretation: Trips by non-longline pelagic fishing vessels rose slightly in 1999. Commercial trolling activity has continued at a high level between 20,000 and 25,000 trips per year since 1986. The pattern continued in 1999. After a low period in the late-1980's to mid-1990's, handline trips were relatively high from 1996 to 1999. 1999 handline trips remained within the long-term average. Baitboat activity was at a record low in 1998, and although it rose in 1999, it was still lower than the long-term average. Even with the recent success of a new baitboat in the fleet, the rest of the fleet is fading away due to aging and losses of vessels.

Data: Data compiled from HDAR commercial catch reports (preliminary as of April 2000) using unique license number-date combinations for species caught > 0 (i.e., does not include zero catch trips). 1998 data were updated with more complete data available in 2000. Non-commercial data are not available.

Year	Number of Trips		
	Troll	**Baitboat**	**Handline**
1979	10,185	1,495	3,346
1980	12,692	1,149	6,746
1981	11,975	1,059	6,562
1982	10,039	1,067	5,219
1983	12,842	1,014	6,275
1984	14,556	1,232	5,248
1985	15,291	924	3,929
1986	20,139	941	6,412
1987	23,391	938	7,263
1988	20,202	941	6,647
1989	18,924	723	5,834
1990	20,468	378	4,261
1991	23,184	463	4,861
1992	20,109	510	4,374
1993	20,647	477	4,343
1994	20,905	281	4,142
1995	23,527	376	5,357
1996	21,611	438	6,416
1997	23,674	459	6,032
1998	22,403	280	5,660
1999	**21,980**	**373**	**5,681**
Average	18,512	739	5,458
Standard Deviation	4,650	361	1,083

Figure 22. Commercial trolling catch per trip – mahimahi, wahoo and blue marlin

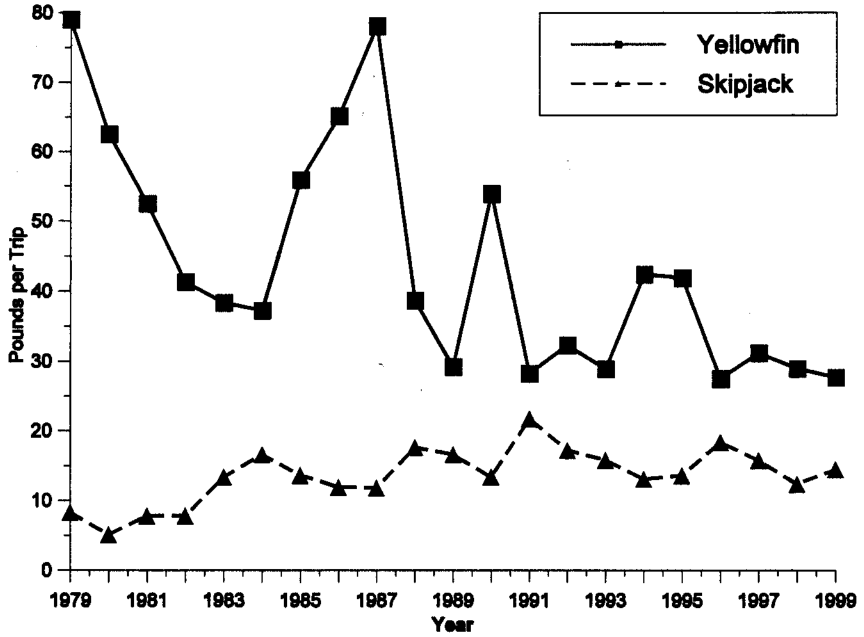


Interpretation: The troll catch rates for non-tuna species were somewhat variable and showed little change from 1998. The mahimahi catch rate was about the same and was within the long-term average catch rate. The wahoo catch rate reached a new peak in 1999 and was above the long-term average. The blue marlin catch rate rose from a low point in 1998 and was just within the long-term average. Reported troll mahimahi landings were 453,605 pounds (-2.8% from 1998), wahoo 514,554 pounds (+10.3%), and blue marlin 544,307 pounds (+3.2%).

Data: Data compiled from HDAR commercial catch reports (preliminary as of April 2000) using unique license number-date combinations for species caught > 0 (i.e., does not include zero catch trips). 1998 data were updated with more complete data available in 2000. Non-commercial data are not available.

Year	Pounds Caught per Trolling Trip		
	Mahimahi	**Wahoo (Ono)**	**Blue Marlin**
1979	13.0	16.3	39.9
1980	14.2	17.3	32.0
1981	14.6	18.0	37.9
1982	15.8	15.1	40.8
1983	14.7	16.3	23.8
1984	14.3	16.1	22.7
1985	21.3	18.8	20.3
1986	17.7	18.8	22.9
1987	24.7	13.8	23.7
1988	13.8	15.1	30.1
1989	19.8	15.6	37.7
1990	24.0	13.2	30.9
1991	31.5	15.4	32.5
1992	23.4	13.7	28.0
1993	21.6	14.5	31.8
1994	24.9	11.7	29.7
1995	18.1	18.7	29.1
1996	18.6	14.8	37.2
1997	22.0	20.7	33.9
1998	20.8	20.8	23.5
1999	**20.6**	**23.4**	**24.8**
Average	19.5	16.6	30.1
Standard Deviation	4.7	2.9	6.2

Figure 23a. Commercial trolling catch per trip -- yellowfin & skipjack tuna

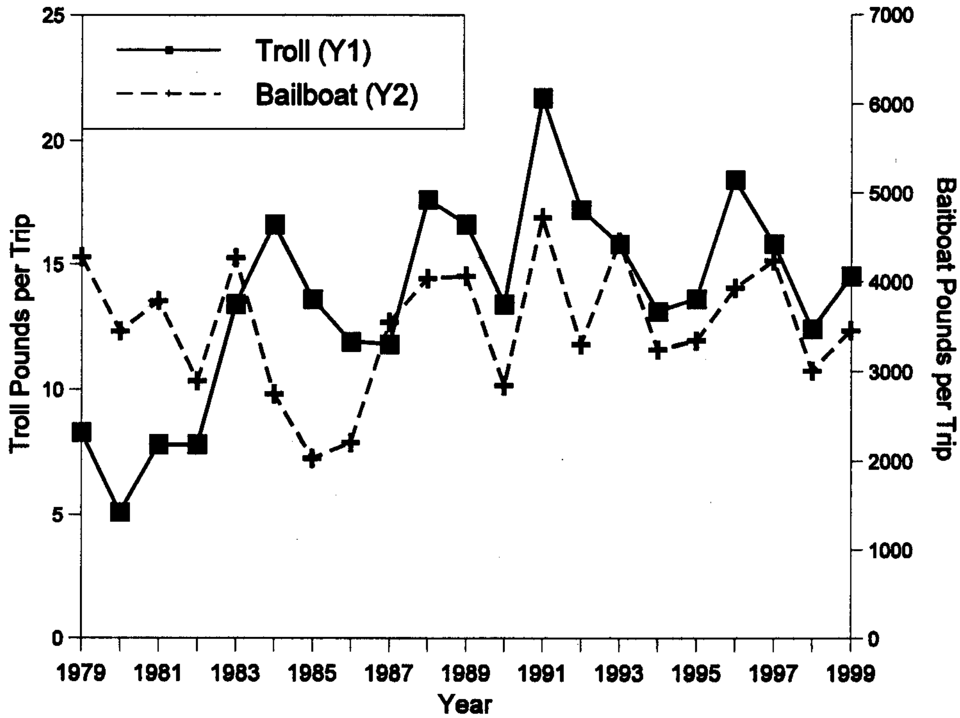


Interpretation: The troll yellowfin tuna catch rate was slightly lower than 1998. The 1996-1999 catch rates echo a period of low catch rates in 1991-1993. The skipjack catch rate rose and was within the long-term average. Reported troll landings were 609,864 pounds for yellowfin (-6% from 1998) and 318,047 pounds for skipjack (+14.7%).

Data: Data compiled from HDAR commercial catch reports (preliminary as of April 2000) using unique license number-date combinations for species caught > 0 (i.e., does not include zero catch trips). 1998 data were updated with more complete data available in 2000. Non-commercial data are not available.

Year	Pounds per Trolling Trip	
	Yellowfin	**Skipjack**
1979	79.0	8.3
1980	62.5	5.1
1981	52.5	7.8
1982	41.3	7.8
1983	38.3	13.4
1984	37.2	16.6
1985	55.9	13.6
1986	65.1	11.9
1987	78.1	11.8
1988	38.7	17.6
1989	29.2	16.6
1990	53.9	13.4
1991	28.2	21.7
1992	32.3	17.2
1993	28.9	15.8
1994	42.4	13.1
1995	41.9	13.6
1996	27.5	18.4
1997	31.2	15.8
1998	29.0	12.4
1999	**27.7**	**14.5**
Average	43.8	13.6
Standard Deviation	16.0	3.9

Figure 23b. Baitboat & commercial trolling catch per trip -- skipjack tuna

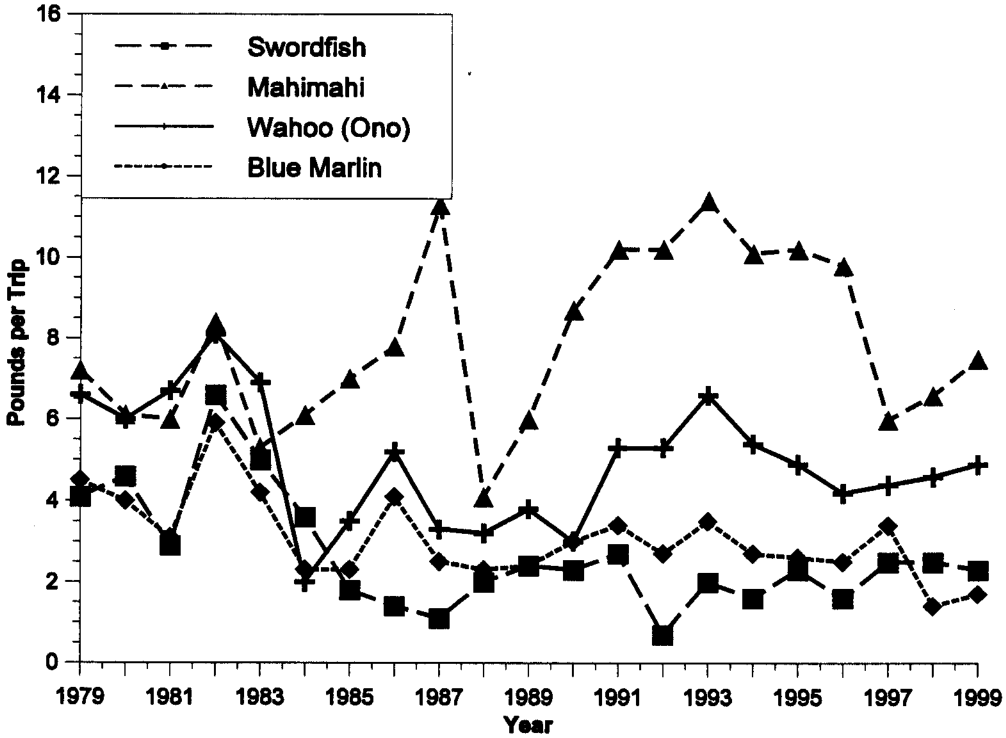


Interpretation: This figure shows the close correspondence of baitboat and trolling catch rates for skipjack once the level of cannery catch declined substantially, beginning in the mid-1980s. Both trolling and baitboat catch rates increased in 1999. The 1999 baitboat catch rate rose 15%, but was well within the long-term average. HDAR reports show the baitboats landing 1,287,976 pounds of skipjack tuna in 1999, a substantial 53% increase from 1998 (841,527 pounds). Part of this can be explained by the 33% increase in effort.

Data: Data compiled from HDAR commercial catch reports (preliminary as of April 2000) using unique license number-date combinations for species caught > 0 (i.e., does not include zero catch trips). 1998 data were updated with more complete data available in 2000. Non-commercial data are not available.

Year	Pounds Skipjack Caught per Trip	
	Trolling	Baitboat
1979	8.3	4,278
1980	5.1	3,447
1981	7.8	3,786
1982	7.8	2,892
1983	13.4	2,468
1984	16.6	2,748
1985	13.6	2,031
1986	11.9	2,206
1987	11.8	3,548
1988	17.6	4,036
1989	16.6	4,061
1990	13.4	2,840
1991	21.7	4,722
1992	17.2	3,297
1993	15.8	4,447
1994	13.1	3,240
1995	13.6	3,341
1996	18.4	3,928
1997	15.8	4,231
1998	12.4	3,005
1999	**14.5**	**3,453**
Average	13.6	3,429
Standard Deviation	4.0	740

Figure 24. Combined commercial handline catch per trip -- swordfish, mahimahi, ono (wahoo), & blue marlin

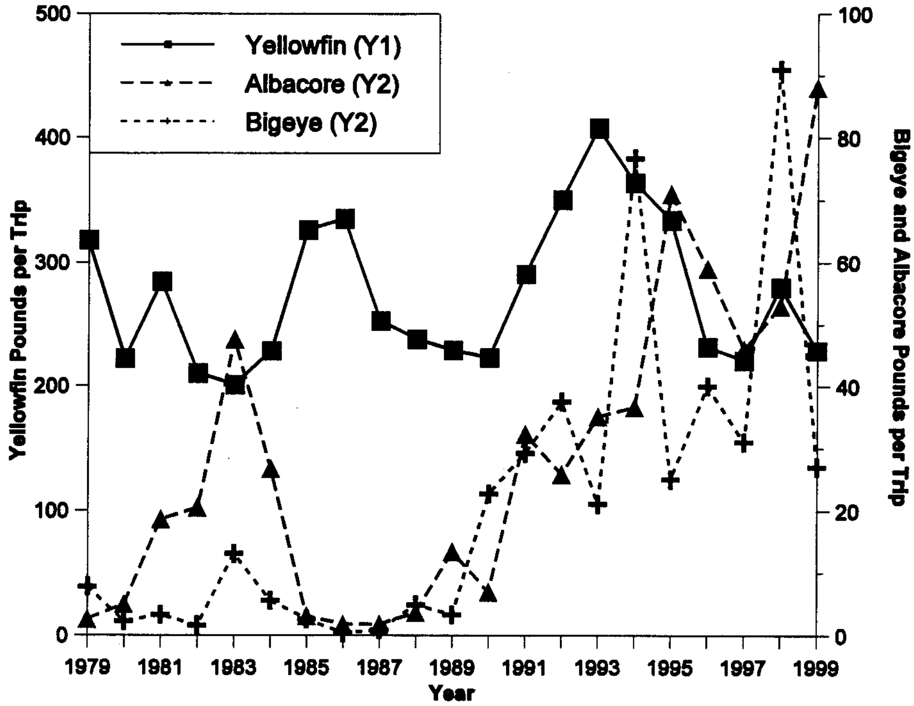


Interpretation: Swordfish and wahoo (ono) catch rates in the handline fishery remained generally within their long-term averages, however, blue marlin catch rates were low. The mahimahi catch rate dropped substantially in 1997, but has been rising through 1999 and is well within the long-term average.. The blue marlin catch rate reached a record low in 1998, but also rose in 1999. Reported handline swordfish landings were 14,086 pounds (+1.2%), mahimahi 30,744 pounds (-18.0%), wahoo 21,549 pounds (-17.7%), and blue marlin 7,229 pounds (-10.8%). Non-tuna species are usually a minor component of the handline fishery landings.

Data: Data compiled from HDAR commercial catch reports (preliminary as of April 2000) using unique license number-date combinations for species caught > 0 (i.e., does not include zero catch trips). Data combined from reported ika-shibi, palu-ahi, and drifting handline methods from all areas. 1998 data were updated with more complete data available in 2000. Non-commercial data are not available.

Year	Swordfish	Mahimahi	Wahoo	Blue marlin
1979	4.1	7.2	6.6	4.5
1980	4.6	6.1	6.0	4.0
1981	2.9	6.0	6.7	3.1
1982	6.6	8.4	8.1	5.9
1983	5.0	5.3	6.9	4.2
1984	3.6	6.1	2.0	2.3
1985	1.8	7.0	3.5	2.3
1986	1.4	7.8	5.2	4.1
1987	1.1	11.3	3.3	2.5
1988	2.0	4.1	3.2	2.3
1989	2.4	6.0	3.8	2.4
1990	2.3	8.7	3.0	3.0
1991	2.7	10.2	5.3	3.4
1992	0.7	10.2	5.3	2.7
1993	2.0	11.4	6.6	3.5
1994	1.6	10.1	5.4	2.7
1995	2.3	10.2	4.9	2.6
1996	1.6	9.8	4.2	2.5
1997	2.5	6.0	4.4	3.4
1998	2.5	6.6	4.6	1.4
1999	**2.3**	**7.5**	**4.9**	**1.7**
Average	2.7	7.9	4.9	3.1
Standard Deviation	1.4	2.2	1.5	1.0

Figure 25. Combined commercial handline catch per trip -- yellowfin, albacore and bigeye tunas

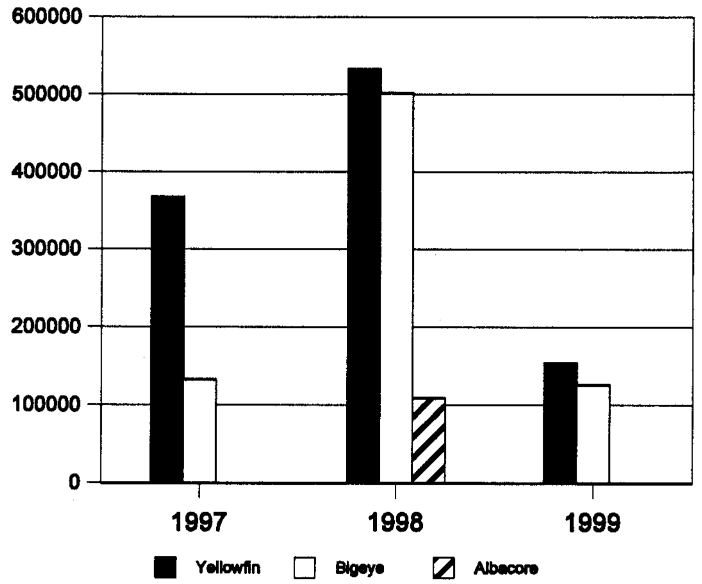


Interpretation: The catch rates for the three tuna species have been somewhat variable. The yellowfin tuna catch rate remained about the same from 1996-1999, after a period of high catch rates from 1991-1995, but similar to the 1987-1990 period. The albacore catch rate rose to an record peak in 1999 and well above the long-term average. After revision of the 1998 data, the bigeye catch rate hit a record peak in 1998,but dropped to more typical levels in 1999. Reported preliminary 1999 handline landings were down for all species from the revised 1998 data; 1,263,947 pounds (-20%) for yellowfin, 274,603 pounds (-10%) for albacore, and 268,358 pounds (-48%) for bigeye (more than double 1997 landings). These will change when 1999 revised data are reported next year. However, the bigeye landings still seem low and may indicate problems in species identification.

Data: Data compiled from HDAR commercial catch reports (preliminary as of April 2000) using unique license number-date combinations for species caught > 0 (i.e., does not include zero catch trips). Data combined from reported ika-shibi, palu-ahi, and drifting handline methods from all areas. 1998 data were updated with more complete data available in 2000. Non-commercial data are not available.

Year	Yellowfin	Albacore	Bigeye
1979	318	3	8
1980	222	5	2
1981	285	19	3
1982	211	21	2
1983	201	48	13
1984	229	27	6
1985	326	3	3
1986	335	2	0
1987	253	2	1
1988	238	4	5
1989	229	13	3
1990	223	7	23
1991	291	32	29
1992	350	26	38
1993	408	35	21
1994	364	37	77
1995	334	71	25
1996	232	59	40
1997	221	46	31
1998	280	53	91
1999	**229**	**88**	**27**
Average	275	29	21
Standard Deviation	60	25	25

Figure 26. Offshore Tuna Handline Landings and Other Data



Interpretation: Landings of major species from the offshore tuna handline fleet are shown in the graph. The table below also shows the number of trips reported, catch rates, and the percent contribution of offshore handline landings to the total combined handline landings. The handline fleet that fishes on the offshore seamounts obviously lands most of the reported bigeye landings and significant proportions of the total yellowfin and albacore landings of the combined tuna handline fleet. Their catch rates are also higher, although these are based on multi-day trips and cannot be directly compared to the "inshore" fleet. Part of the reported yellowfin landings may actually be bigeye, due to species mis-identification. Observers have reported that most of the small tuna landed are actually bigeye.

The offshore handliners use a combination of methods to catch fish, not strictly limited to the "classic" ika-shibi or palu-ahi methods used in the areas closer to the islands. The methods used include a mixture of handline, trolling, and live-bait methods, although fish are still retrieved manually.

The data in 1999, although preliminary, show a substantial decline in both landings and pounds per trip from revised 1998 data for the offshore handline fleet. However, the differences between preliminary 1998 (reported in 1999) and revised 1998 data (reported in 2000) were substantial. It's likely that revised 1999 data to be reported in next year's annual report may also show a similar increase. Even if revised 1999 doubled the preliminary data, the result would still be that 1999 landings would be much lower than 1999.

Data: Data compiled from HDAR commercial catch reports (1999 preliminary as of April 2000) using unique license number-date combinations for species caught > 0 (i.e., does not include zero catch trips). These data are a subset of the combined tuna handline data reported earlier. Data combined from reported ika-shibi, palu-ahi, and drifting handline methods for HDAR fishery statistical areas 15217 (NOAA weather buoy 4), 15717 (W2), 15818 (Cross Seamount), 16019 (W3) and 16223 (W1). 1998 data were updated with more complete data available in 2000. Non-commercial data are not available.

		Yellowfin			Bigeye			Albacore		
Year	**Trips**	**Pounds**	**%HL**	**Lb/trip**	**Pounds**	**%HL**	**Lb/trip**	**Pounds**	**%HL**	**Lb/trip**
1997	137	367,860	27.6	2,685	133,393	70.5	974	0	0	0
1998	211	533,363	33.6	2,528	502,425	97.1	2,381	109,537	36.6	898
1999	**86**	**154,641**	**12.4**	**1,798**	**126,523**	**47.1**	**1,471**	**337**	**1.2**	**3.9**

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 distribute and collect invoice books from 80 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 over 90% of all commercial landings on Saipan, and over 80% of all NMI 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.

To fish commercially within the NMI's exclusive economic zone (EEZ), commercial vessels over five net tons must have a Commercial Fishing License issued annually and jointly by the Department of Commerce and the Department of Lands and Natural Resources. Depending on the information supplied in the application package, the DFW may impose certain fishing restrictions in the form of license conditions. Although commercial boats under five net tons are not required to have a license to fish, all fishing boats are registered with the Department of Public Safety(DPS).

Summary

Trolling is the only 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 1999, about 82% of all registered boats participated in some form of fishing activity. Six-three vessels were identified as being involved in full-time commercial fishing and 58 vessels were classified as part-time. Subsistence fishing and/or recreational usage included 142 vessels.

Twenty- Seven vessels were registered with the Boating Safety Office as charter vessels for 1999. 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 marketable target species for the pelagic fleet is skipjack tuna. Yellowfin and mahimahi are also marketable species. 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 non-native).

Three commercial fishing licenses were issued in 1999, three in 1998, and four in 1997. In 1999 one licensed vessel fished during the full 12-month calendar year. The vessel primarily targeted bottom fish, landing pelagics incidentally.

1999 Recommendations and Status

1) **There were no recommendations made during the 1998 Pelagic Plan Team Meeting**

1999 Accomplishments

1) **Completed a Pilot project of Boat and Trailer Participation activity from all ports on Saipan. The Data was used by NMFS to design our Off-shore Creel Survey program for our office.**

2) **Expanded the data collection system to Rota and Tinian**

3) **The Division of Fish & Wildlife and NMFS has designed and implemented a Creel Survey Census for the CNMI. The Off-shore Creel Survey data has six sample days a month. The data collected will be used in the next Pelagic Plan Team Meeting.**

1999 Recommendations

1) **To request from WPRFMC through NMFS for continuous assistance in providing the CNMI with some expertise (training) in the area of offshore creel survey, both on data collection and analyzing.**

2) **Continue to support Rota and Tinian, to improve there data collection system.**

3) **Work with WPacFIN to convert and improve the existing data system to the Fox Pro system.**

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Table 1. NMI 1999 commercial pelagic landings, revenues and price

Species	Landings (lb)	Revenue ($)	Ave. Price ($/lb)
Misc. tunas	4,953	8,671	1.75
Skipjack tuna	85,087	159,584	1.88
Yellowfin tuna	19,359	40,507	2.09
Subtotal Above Tunas	**109,399**	**208,762**	**1.91**
Dogtooth tuna	9,053	20,969	2.32
Mahimahi	10,305	23,104	2.24
Marlin	2,833	4,751	1.68
Sailfish	40	80	2.00
Wahoo	6,395	15,772	2.47
Subtotal Other PPMUS	**28,626**	**64,676**	**2.14**
Troll fish	2,146	4,042	1.88
Barracuda	37	69	1.86
Rainbow runner	1,044	2,318	2.22
Subtotal Misc.	**3,227**	**6,429**	**1.98**
All Pelagics	**141,252**	**279,867**	**2.01**

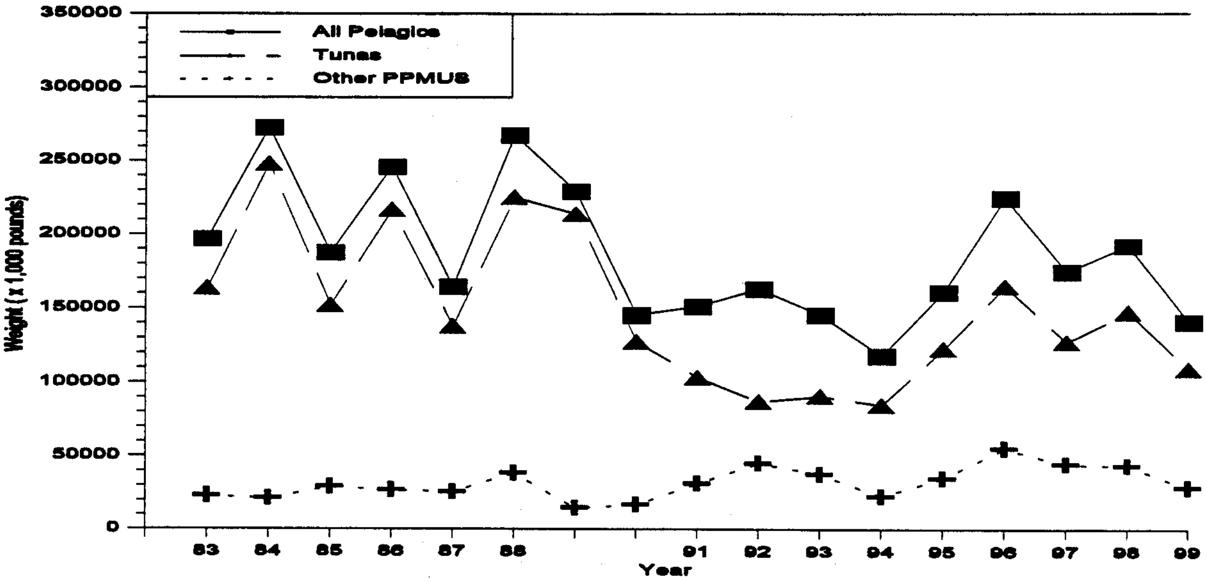
Interpretation: Skipjack landings decreased by 36% or over 48,000 pounds in 1999. Skipjack tuna continues to dominate the pelagic landings, comprising nearly 60% of the (commercially receipted) industry's pelagic catch. Yellowfin tuna and mahimahi were still ranked second and third in total landings during 1999. Mahimahi landings decreased by 50% in 1999 while yellowfin landings increased by 66% from 1998 figures. Skipjack tuna are easily caught in near shore waters throughout the year. Mahimahi are highly seasonal with peak catch rates usually from February through April. Yellowfin season usually runs from April to September. The overall pelagic catch decreased over 51,000 pounds or 27% in 1999.

The highest average price of identified pelagic species was $2.47/lb for Wahoo, which is up from the 1998 low of $2.31/lb. The lowest priced species remained marlin at $1.68/lb, which decreased $0.10 from 1998. In 1999, Dogtooth tuna decreased in value over 1998 prices, from $2.41/lb to $2.32/lb. The average price per pound for Skipjack tuna, the species with the greatest landings, decreased by 6% from $2.00/lb in 1998 to $1.88/lb in 1999. The market share of total pelagic revenues by combining Yellowfin tuna and Mahimahi increased from $69,972 or 18% in 1998 to $63,611 or 23% of total pelagic revenues in 1999. Skipjack revenue decreased from $267,718 or 67% in 1998 to $159,584 or 57% of the total pelagic revenues in 1999.

Blue Marlin, which again brought the lowest average price in 1999, is taken primarily by charter boat fishers. The catch of Blue Marlin decreased from 3,361 pounds in 1998 to 2,833 pounds or by16% in 1999. Other recreational fishers also catch marlin during scheduled fishing tournaments. Although not generally regarded as a high quality food fish, marlin sashimi is sold in local restaurants and hotels. It is also served in public institutions. The low ex-vessel price may be partially related to the manner in which the fish is kept prior to sale. Other attributes of the Blue Marlin that may make it unpopular among the public are its' bulky size and the relative quality of the cooked product. Fishers generally sell the whole fish to avoid cleaning and repackaging into smaller units.

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

Figure 1. NMI annual commercial landings: all pelagics, tuna and PPMUS.

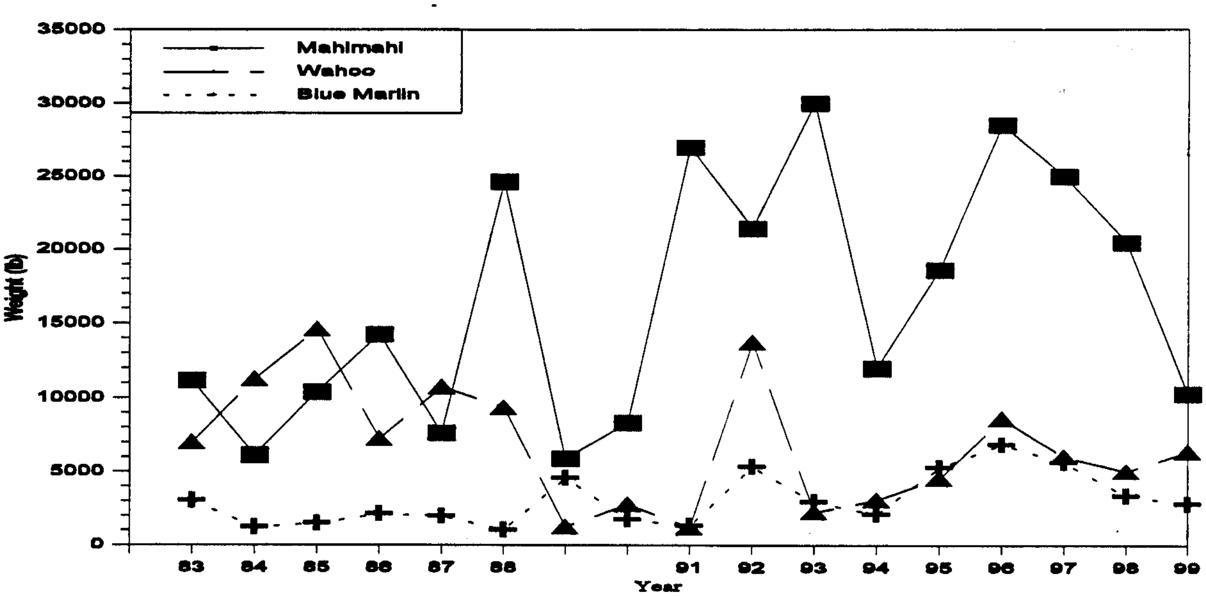


Interpretation: Total weight of pelagics landed in 1999 decreased by 27% from 1998 levels. Tuna landings have also decreased by 26% or over 38,000 pounds from 147,688 pounds in 1998 to 109,398 pounds in 1999. Catch in the 'Other PPMUS' category decreased by 14,813 pounds or 34% from 1998 figures.

Source and Calculation: All pelagics, tuna and other PPMUS landings were summed from the Commercial Purchase Data Base.

Year	Total Landings (lb)		
	All Pelagics	Tunas	Other PPMUS
1983	196,788	163,754	23,081
1984	272,909	248,339	21,223
1985	187,378	151,882	29,105
1986	245,967	217,023	26,800
1987	164,055	137,566	25,467
1988	267,619	225,498	38,368
1989	229,427	214,249	14,650
1990	144,862	127,172	16,893
1991	150,915	103,078	31,300
1992	162,691	86,931	45,061
1993	145,115	90,584	37,628
1994	117,668	8,4598	22,701
1995	160,540	122,616	34,863
1996	224,962	165,122	55,088
1997	174,914	127,580	44,455
1998	192,568	147,688	43,439
1999	**141,252**	**109,398**	**28,626**
Average	187,037	148,416	31,691
Standard Deviation	46,382	51,197	11,096

Figure 2. NMI annual commercial landings: mahimahi, wahoo, and marlin.



Interpretation: Mahimahi landings decreased by 50% in 1999 from 20,529 pounds in 1998 to 10,305 pounds in 1999. 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.

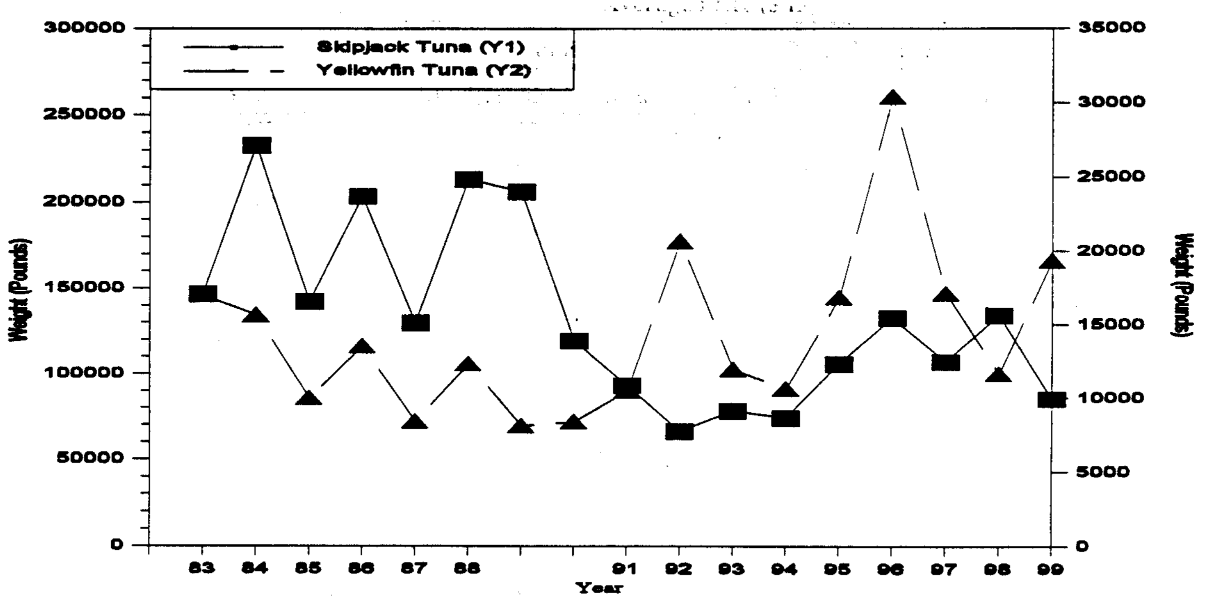
From 1983 to 1988, wahoo landings were somewhat consistent and did not fall below 7,000 lb, but in 1989 landings notably declined by 86% and remained at depressed levels until the dramatic increase in landings during 1992. Following the near-record 1992 landings, the 1993 wahoo landings again decreased by 84%, falling below the mean. Wahoo landings in 1999 increased by 1,356 pounds or 27% over the 1998 landings.

The Blue Marlin landings for 1999 was 2,833 pounds which is a 16% decrease from 1998 figures.

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

Year	Total Commercial Landings (lb)		
	Mahimahi	Wahoo	Blue Marlin
1983	11,151	7,008	3,030
1984	6,091	11,270	1,235
1983	10,364	14,601	1,488
1986	14,237	7,250	2,123
1987	7,602	10,723	1,968
1988	24,639	9,358	1,047
1989	5,856	1,257	4,563
1990	8,306	2,770	1,748
1991	27,005	1,217	1,320
1992	21,462	13,738	5,345
1993	30,036	2,257	2,950
1994	11,993	3,090	2,108
1995	18,657	4,555	5,295
1996	28,524	8,626	6,874
1997	25,021	6,064	5,655
1998	20,529	5,039	3,361
1999	**10,305**	**6,395**	**2,833**
Average	16,575	6,778	3,114
Standard Deviation	8,368	4,152	1,793

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 over 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 pound increase in 1995 landings attained 61% of the 1983-1990 average of 174,020 pounds. In comparison to 1998 skipjack landings, 1999 landings decreased by 36%. This decrease may be due to problems with local vendors refusing to participate in the ticket system. The Division has rectified this problem and has full support from local vendors at this time. In addition to this problem fishers have also reported a decrease in the size of skipjack tuna.

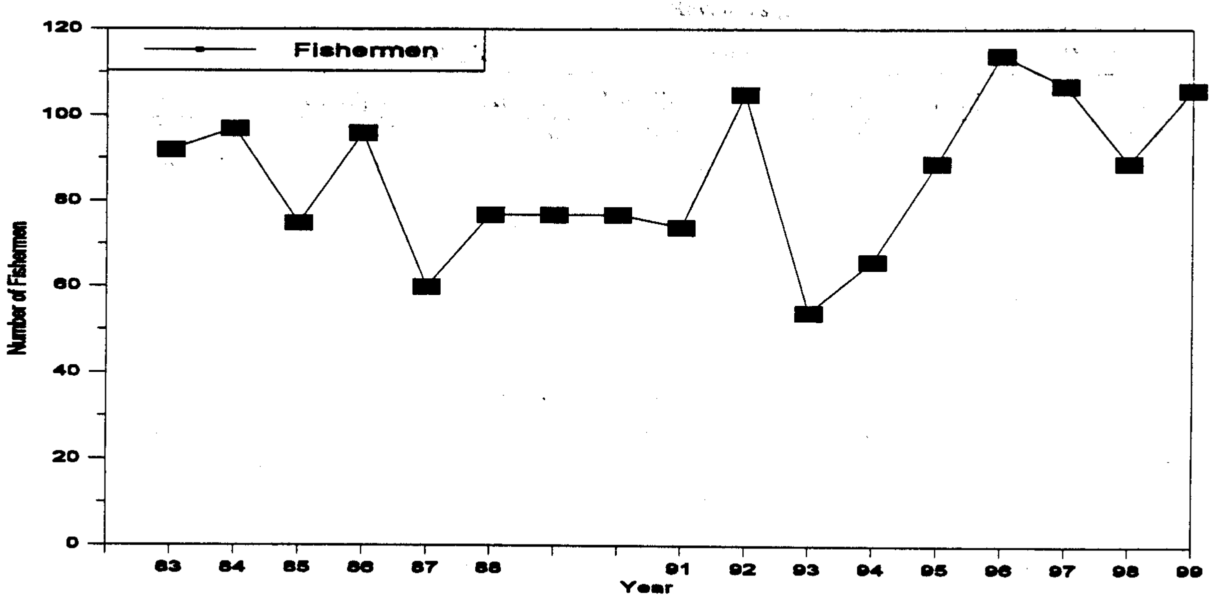
Schools of skipjack tuna have historically been common in near shore waters, providing an opportunity to catch numerous fish with a minimum of travel time and fuel costs. Skipjack are readily consumed by the local populace, primarily as sashimi.

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 1998 landings for yellowfin tuna decreased by 32% over 1997.The total landings in 1999 was 19,359 pounds compared to 11,656 pounds in 1998, which is an increase of 66%.

Source and Calculation: Landings were summed directly from the Commercial Purchase Data Base.

Year	Total Commercial Landings (lb) Skipjack tuna	Yellowfin tuna
1983	146,729	17,025
1984	232,675	15,664
1985	141,910	9,973
1986	203,490	13,533
1987	129,203	8,363
1988	213,198	12,300
1989	206,162	8,087
1990	118,798	8,374
1991	92,642	10,433
1992	65,982	20,672
1993	77,832	11,919
1994	73,769	10,600
1995	105,423	16,824
1996	132,155	30,410
1997	106,757	17,121
1998	133,819	11,656
1999	**85,087**	**19,359**
Average	133,272	14,254
Standard Deviation	52,195	5,717

Figure 4. Number of NMI fishermen (boats) making commercial pelagic landings.



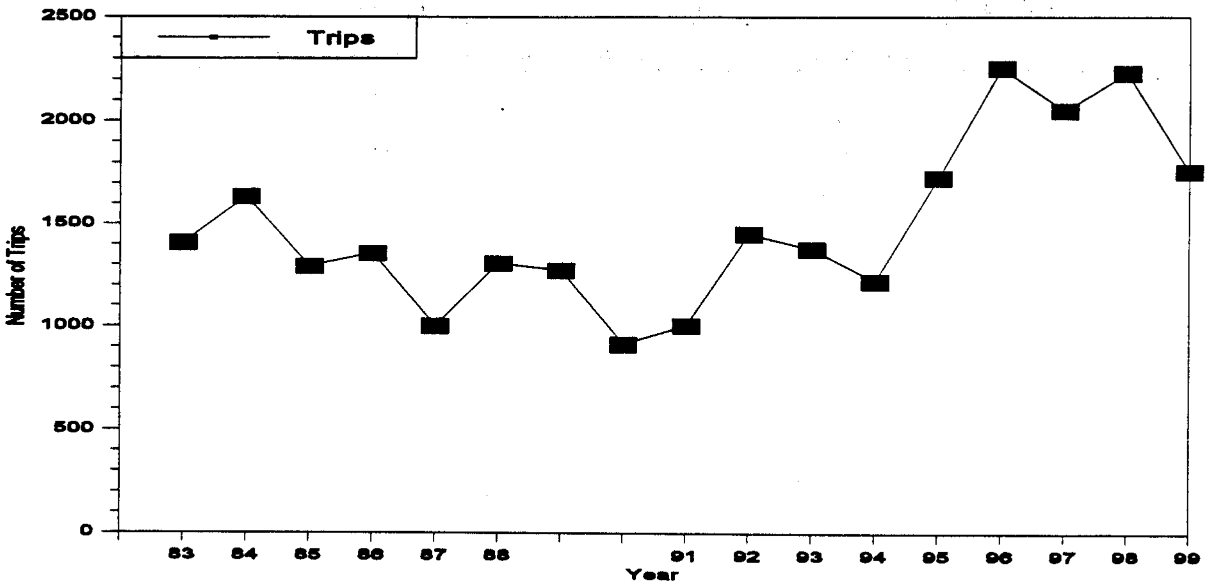
Interpretation: The number of fishers (boats) making commercial pelagic landings was relatively constant from 1988-91 compared to earlier years, but a record high number was recorded for 1992 (30% from 1991). Some of the increase in 1992 was attributable to the influx of new fishing boats as a result of money obtained by leasing property. In addition, it was discovered that some fishers were using several different boats, thus artificially inflating the total number of boats making pelagic landings.

Many of 1992's "new" fishers, with their new boats, are believed to have left the fishery during 1993. The number of fishers in 1999 increased by 19% from 1998. It has been suggested that the 1994 increase may have been due to the re-entry of repaired and refurbished boats from the 1992 fleet.

Source and Calculation: Each invoice from the Commercial Purchase Data Base records the fisherman's name from whom the fish were purchased. The number of fishermen who sold any pelagic species was calculated directly from the data invoices.

Year	No. fishermen landing any pelagic species
1983	92
1984	97
1985	75
1986	96
1987	60
1988	77
1989	77
1990	77
1991	74
1992	105
1993	54
1994	66
1995	89
1996	114
1997	107
1998	89
1999	**106**
Average	86
Standard Deviation	17

Figure 5. NMI number of trips catching any pelagic fish.

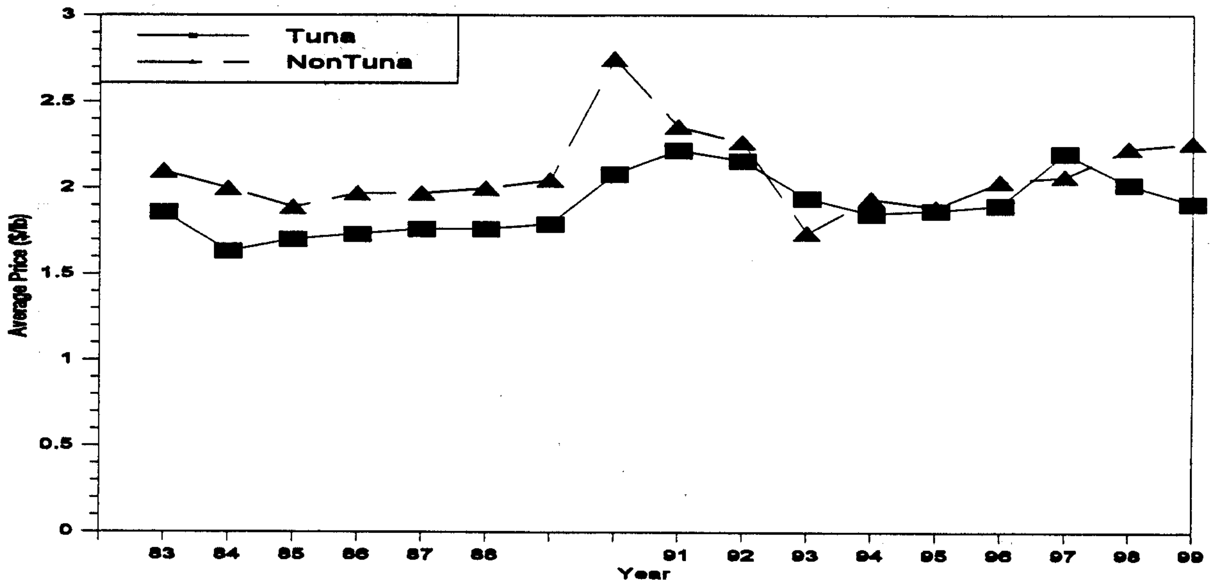


Interpretation: The number of pelagic trips decreased in 1999 by 21% from 2,230 to 1,758. Although the number of pelagic trips rose in 1998, the decrease in 1999 figures is may caused by the refusal of vendors to participate in the Ticket System.

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.

Year	Number trips
1983	1,408
1984	1,634
1985	1,293
1986	1,356
1987	999
1988	1,306
1989	1,272
1990	910
1991	1,002
1992	1,451
1993	1,378
1994	1,221
1995	1,727
1996	2,254
1997	2,050
1998	2,230
1999	**1,758**
Average	1,485
Standard Deviation	406

Figure 6. NMI average inflation-adjusted price of tunas and other PPMUS.



Interpretation: The inflation-adjusted average price of tuna was stable from 1983 until 1989, when an obvious rise was observed. The 1990-92 rise in price corresponds with the notable decrease in Skipjack tuna landings (Fig. 3) during the same period of time. In 1994 commercially receipted tunas commanded a lower price than in recent years. However, considering the inflation-adjusted prices from 1983 to 1996, it would appear that tuna prices have, on the whole, kept pace with inflation. The average price of tuna has continued to decrease since 1997. The inflation-adjusted average price of tuna decreased by 7% from 1998 to 1999.

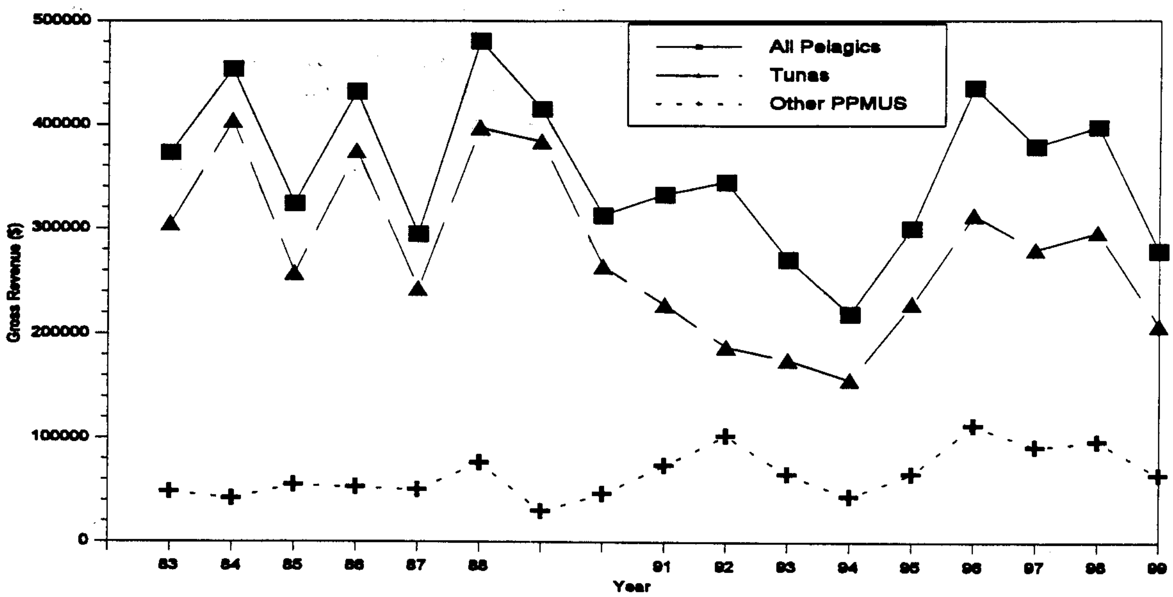
For 1999, the average price of "Other PPMUS" has remained stable in comparison to 1998 rates.

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

Year	Average Price ($/lb) Tunas Unadjusted	Tunas Adjusted	Other PPMUS Unadjusted	Other PPMUS Adjusted
1983	0.99	1.88	1.12	2.12
1984	0.95	1.66	1.15	2.02
1985	1.02	1.72	1.14	1.91
1986	1.75	1.75	1.22	2.00
1987	1.14	1.79	1.27	1.99
1988	1.20	1.79	1.35	2.02
1989	1.29	1.82	1.48	2.08
1990	1.56	2.11	2.07	2.79
1991	1.80	2.25	1.92	2.40
1992	1.91	2.20	2.01	2.31
1993	1.78	1.96	1.59	1.75
1994	1.75	1.87	1.83	1.96
1995	1.80	1.89	1.81	1.91
1996	1.89	1.92	2.02	2.06
1997	2.20	2.22	2.02	2.09
1998	2.02	2.06	2.23	2.28
1999	**1.91**	**1.91**	**2.26**	**2.26**
Average	1.59	1.93	1.68	2.11
Standard Deviation	0.40	0.18	0.41	0.24

Figure 7. NMI annual commercial adjusted revenues.



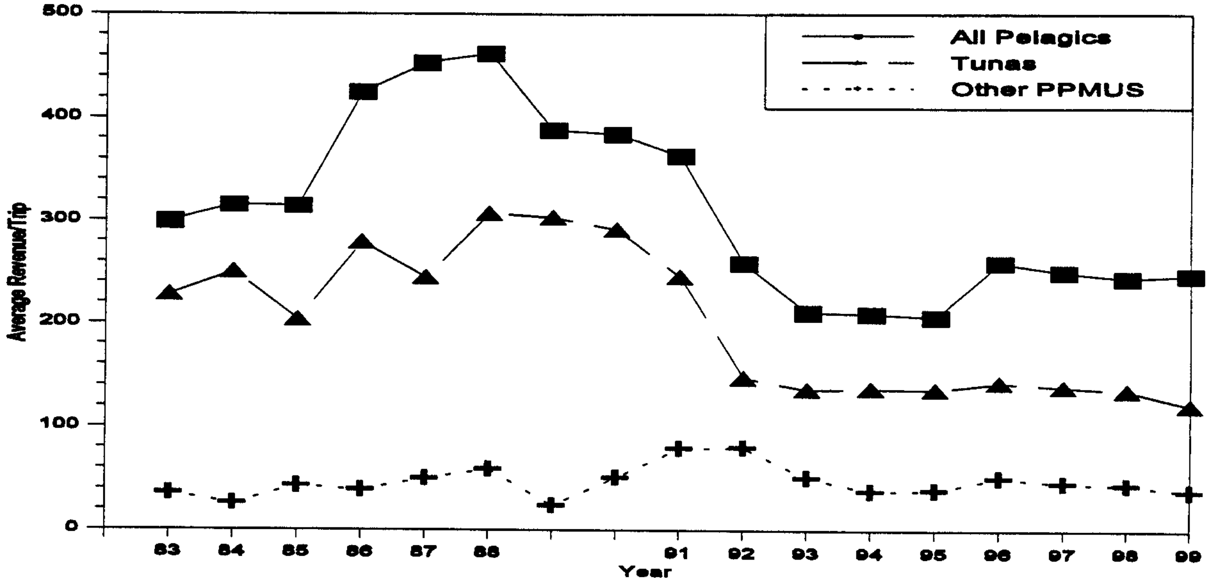
Interpretation: The erratic fluctuations of the inflation-adjusted revenues for Tunas and for All Pelagics prior to 1990 is most likely due to the annual variations in skipjack tuna landings (see Fig. 3) which completely dominate the tuna category and, therefore, the All Pelagics category.

The tunas' inflation-adjusted revenues decreased by 31% in 1999. There was also a decrease of 35% for the "Other PPMUS" inflation-adjusted revenues. This may be the result of a decrease in pelagic landings.

Source and Calculation: Annual revenue in dollars was summed separately for all pelagic fish, tunas and other PPMUS. Inflation-adjusted revenues were calculated using the Consumer Price Index, with 1998 as a base by which previous years' nominal prices are adjusted.

	Revenues ($)					
	All Pelagics		Tunas		Other PPMUS	
Year	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
1983	198,710	377,549	162,240	308,256	25,770	48,963
1984	264,203	462,355	235,262	411,709	24,503	42,880
1985	195,372	328,225	155,171	260,687	33,162	55,712
1986	267,013	437,901	231,745	380,062	32,631	53,515
1987	190,150	298,536	156,634	245,915	32,333	50,763
1988	327,260	487,617	270,679	403,312	51,950	77,406
1989	299,142	421,790	276,671	390,106	21,635	30,505
1990	235,520	317,952	198,775	268,346	34,968	47,207
1991	271,030	338,788	185,662	232,078	60,031	75,039
1992	305,927	351,816	166,235	191,170	90,627	104,221
1993	249,136	274,050	161,100	177,210	60,001	66,001
1994	207,124	221,623	147,940	158,296	41,548	44,456
1995	289,740	304,227	220,633	231,665	63,264	66,427
1996	431,560	440,191	311,271	317,496	111,445	113,674
1997	379,620	383,416	281,291	284,104	91,988	92,908
1998	398,086	406,048	297,906	303,864	96,956	98,895
1999	**279,867**	**279,867**	**208,762**	**208,762**	**64,677**	**64,677**
Average	281,733	360,703	215,763	280,767	55,146	66,662
Standard Deviation	71,036	74,661	55,264	79,889	28,258	23,903

Figure 8. NMI annual commercial adjusted revenues per trip for PPMUS trips only.



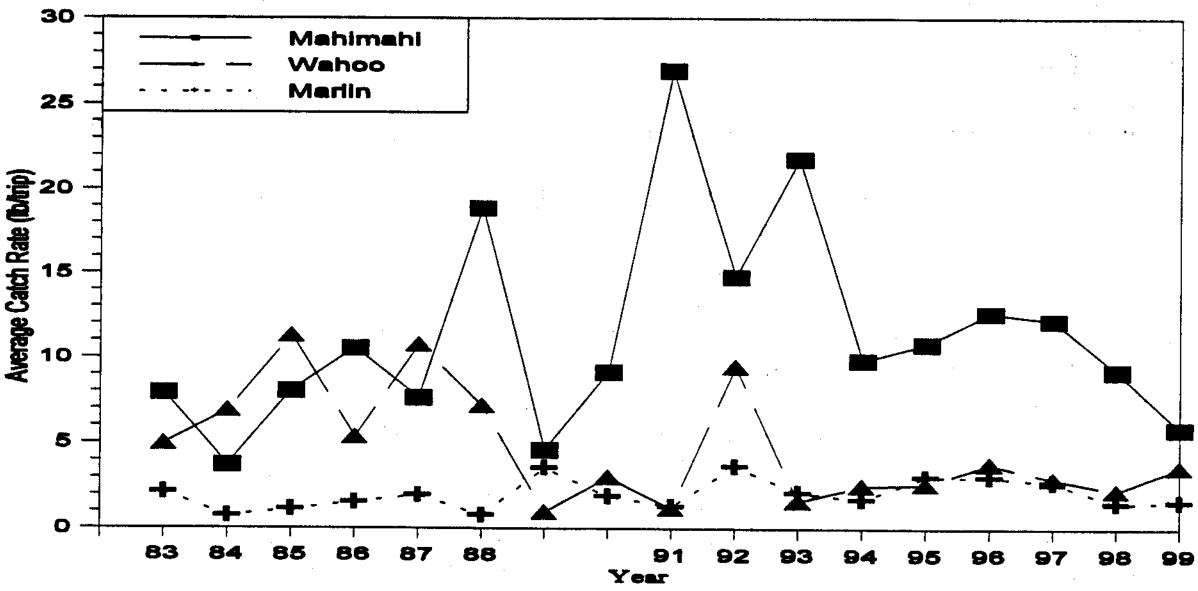
Interpretation: The inflation-adjusted revenues per trip for "All Species" and "Tunas" indicates a decrease by .01% and 12% respectively, in 1999. "Other PPMUS" decreased by 16%. The current year values for all categories were below their respective 17 year means.

The revenue per trip for 1999 remained fairly consistent for all categories. This may be due to the increase in pelagic landings which result in more competitive prices.

Source and Calculation: Values were obtained by selecting, from the Commercial Purchase Data Base, all trips which landed at least one PPMUS, and then calculating a) the average revenue of all species combined, b) the average revenue of other PPMUS only, and c) the average revenue of tuna only.

	Revenues per PPMUS Trip ($)					
	All Species		**Tunas**		**Other PPMUS**	
Year	**Unadjusted**	**Adjusted**	**Unadjusted**	**Adjusted**	**Unadjusted**	**Adjusted**
1983	159	302	121	230	19	37
1984	183	321	145	254	15	27
1985	189	318	122	205	26	44
1986	262	430	172	283	24	40
1987	292	459	157	247	32	51
1988	315	469	209	311	40	60
1989	279	394	218	308	17	24
1990	289	390	219	296	39	52
1991	295	369	199	249	64	81
1992	228	262	130	150	71	82
1993	192	212	125	138	47	51
1994	197	211	129	138	36	39
1995	198	208	130	137	37	39
1996	256	261	141	144	51	52
1997	250	253	139	141	46	46
1998	244	249	135	138	44	45
1999	**247**	**247**	**121**	**121**	**38**	**38**
Average	240	315	154	205	38	48
Standard Deviation	47	88	36	70	15	16

Figure 9. NMI trolling catch rate of mahimahi, wahoo and marlin.



Interpretation: The 1999 mahimahi catch rate decreased by 36% from 1998, which fell below the 17 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 seventeen years. There has also been a three year decline in the species.

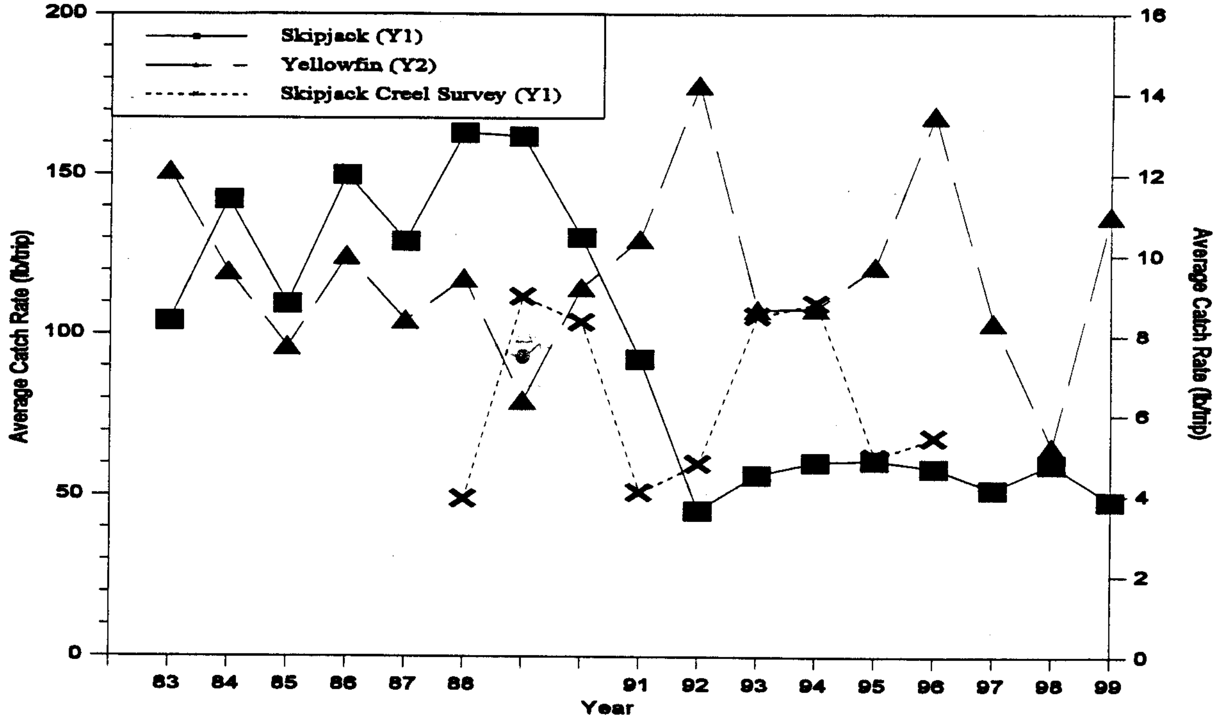
Prior to the 1989 record low, wahoo catch rates rivaled those for mahimahi. Wahoo catch rates have generally never regained those historical levels. The 1999 catch rate increased by 61% from 1998, and remained less than the seventeen year mean of 4.81lb/trip.

Marlin catch rates increased by 7% from 1998 levels, continuing the trend of peaks every three years followed by declines of varying magnitude.

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**	**Marlin**
1983	7.92	4.98	2.15
1984	3.73	6.90	0.76
1985	8.02	11.29	1.15
1986	10.50	5.35	1.57
1987	7.61	10.73	1.97
1988	18.87	7.17	0.80
1989	4.60	0.99	3.59
1990	9.13	3.04	1.92
1991	26.95	1.21	1.32
1992	14.79	9.47	3.68
1993	21.80	1.64	2.14
1994	9.82	2.53	1.73
1995	10.80	2.64	3.07
1996	12.65	3.83	3.05
1997	12.21	2.96	2.76
1998	9.21	2.26	1.51
1999	**5.86**	**3.64**	**1.61**
Average	11.44	4.74	2.05
Standard Deviation	6.16	3.28	0.90

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. Despite several analysis, no explanation of these differences has been satisfactory to the plan team, but the discrepancy prevents any conclusion regarding a trend in skipjack tuna catch rates. Skipjack tuna are the preferred species in the troll fishery of the NMI because of their relative ease of capture and local popularity as sashimi. Previous discussions have suggested that non-tuna PPMUS 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. Yellowfin tuna, although more highly prized than skipjack, are not encountered often and are usually taken incidentally while targeting other species.

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.

Year	Trolling Catch Rate (lb/trip)	
	Skipjack	**Yellowfin**
1983	104.21	12.09
1984	142.40	9.59
1985	109.75	7.71
1986	150.07	9.98
1987	129.33	8.37
1988	163.25	9.42
1989	162.08	6.36
1990	130.55	9.20
1991	92.46	10.41
1992	45.47	14.25
1993	56.48	8.65
1994	60.42	8.68
1995	61.04	9.74
1996	58.63	13.49
1997	52.08	8.35
1998	60.01	5.23
1999	**48.40**	**11.01**
Average	95.68	9.56
Standard Deviation	43.32	2.29

Appendix 5

International

The areas administered by the Council are surrounded by large and diverse fisheries targeting pelagic species. This report contains a summary of the status of tuna stocks in the western and central Pacific Ocean and reported catches of pelagic species in the entire Pacific Ocean by fleets of various nations. The spatial distribution of catch is illustrated for 1998 for the purse seine and pole-and-line fisheries, 1999 for the US purse seine fishery and 1997 for the longline fishery. It is intended that the final version of the International module will include an interpretation of the fishery trends once the PPT identifies the spatial area of interest for the module (e.g entire Pacific, western & central Pacific).

Status of stocks based on summary statements of the Standing Committee on Tuna and Billfish (SCTB12) – June 1999

Skipjack tuna contribute two thirds of the western and central Pacific Ocean (WCPO) catch of the four main tuna species. The best available estimates indicate that the 1998 skipjack catch in the WCPO was the highest on record (1.17 million tonnes, just exceeding the 1991 catch), with purse seine fleets providing both the majority of this catch (76%) and the catch increase observed during 1998. Available indicators (purse seine, pole-and-line) show variable catch rates over time in the fishery, but with no suggestion of a downward trend. Recent studies have begun to provide some understanding of environmental influences on fluctuations seen in skipjack availability and productivity of the stock in the WCPO. Tag-based assessments from the early 1990s found regional exploitation levels to be low to moderate at catch levels similar to those in recent years; combined with the absence of clear trends in fishery indicators, this would suggest that the current catches are certainly sustainable.

The **yellowfin tuna** catch for the WCPO has increased since the 1980's, when purse seine fishing began its significant expansion in the WCPO. Although expansion has slowed in recent years, the catch has reached record high levels. The best estimate of the 1998 catch is about 407,000 mt, which is among the highest on record. This is an increase for the purse seine and other gear catches, and a decrease for the longline and pole-and-line gear catches over 1997 catches. This level of catch appears to be sustainable and is not adversely impacting the stock. Evidence for this conclusion is based on the time series of purse-seine CPUE, which is variable but with no particular trend, and the time series of standardised longline CPUE which is flat, or with a downward trend, depending on fishing area and type of analysis. Other indicators (the MULTIFAN–CL length-based age-structure model and tagging data) show exploitation at low to high levels depending on the yellowfin tuna statistical area, but on a whole and at the stock level, exploitation is at a low to moderate level. In short, the WCPO yellowfin tuna stock appears to be in good condition and able to safely sustain the current level of catch.

Although the catch of **bigeye tuna** for the total Pacific Ocean accounts for a relatively small portion (8 % of total tuna catch in the Pacific Ocean), its economic value is substantial (approximately 1 billion US $ annually). In 1998, the catch was 100,000 mt and 70,000 mt for the WCPO and EPO, respectively. The catch increased gradually in the WCPO reflecting increases in longline and purse-seine catches. On the other hand, the surface fishery catch in the EPO increased markedly beginning in 1994 with decline in the longline fishery catch, and the total catch has stabilized between 70,000 and 90,000 mt. The longline catch of bigeye in the EPO declined from 83,000 mt to about 35,000 mt in 1998, and has been replaced with large purse-seine catch since 1993. The purse-seine catch in the EPO increased from about 8,000 mt in 1993 to over 50,000 mt in 1996 and 1997. It declined to 34,000 mt in 1998.Because a comprehensive stock assessment for this species is hindered by the scarcity of data and the absence or poor estimates for some key biological parameters, the current stock status is uncertain. To overcome this situation, the application of the integrated model (MULTIFAN–CL model), which utilizes all available data and estimates all parameters simultaneously, is planned for the coming year. The Group, however, noted that preliminary estimates of relative stock abundance from standardized longline CPUE indicate a decline in abundance since the late 1970s in the WCPO and since 1990 in the EPO. Although the estimates require further developments, the preliminary results raise concern of overfishing and decline in adult biomass. Cohort analysis performed by the IATTC for the stock in the EPO also indicated a similar decline in the adult biomass. The Group therefore strongly recommends that directed research efforts supporting the appropriate stock assessment be urgently undertaken, for example, (i) determine better estimates of the bigeye catch by surface fisheries, (ii) determine estimates of mixing rates and movements of fish across the range of the stock, and (iii) determine estimates of biological parameters (growth and size-specific natural mortality rates).

Albacore occurring in the south Pacific constitute a single stock. The best fishery estimates indicate that the 1998 albacore catch (41,000 tonnes) was the highest annual catch this decade. South Pacific albacore were mainly harvested by the longline fleet (88%) with a lesser amount contributed by the troll fleet (12%). Longline catches have escalated in several domestic longline fisheries, especially Samoa, American Samoa and French Polynesia. In these three countries, the 1998 catch totalled 10,000+ mt or nearly 25% of the entire south Pacific catch. The Taiwanese distant-water longline CPUE provides the best long-term indicator for the fishery, and catch rates in 1998 were high (>4 albacore per 100 hooks) compared to fishery performance earlier in the decade. Trolling catch rates of the USA and New Zealand fleets are more variable than those of the longline fishery, possibly due to factors affecting availability rather than changes in stock abundance. A length-based age-structured stock assessment (MULTIFAN–CL) applied from 1962 to 1993 suggested that current levels of south Pacific albacore catch are sustainable given moderate exploitation rates and recent increases in catch rates of domestic and distant-water longline fisheries. In addition, there was some evidence of ENSO impacts on both catchability and recruitment. A recent production model analysis is also consistent with the good stock condition interpretation.The MULTIFAN–CL assessment needs updating, and could be improved by updating Taiwanese longline statistics, re-structuring the analysis to better incorporate recent fishery developments, consideration given to the likelihood of localizing the model to smaller scales, incorporating assessment of precautionary reference points and better understanding how fleet behaviour or albacore targeting may be related to economic factors.

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

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

Year	Skipjack	Yellowfin	Bigeye	Total
1967	108,916	76,583	976	186,475
1968	61,847	100,830	2,679	165,356
1969	45,279	123,179	624	169,082
1970	52,687	155,166	2,058	209,911
1971	102,118	125,263	3,371	230,752
1972	46,125	181,232	3,037	230,394
1973	56,284	217,104	2,926	276,314
1974	85,997	220,025	2,279	308,301
1975	128,320	210,651	5,023	343,994
1976	142,863	249,092	11,448	403,403
1977	117,350	214,936	8,640	340,926
1978	205,101	189,610	12,860	407,571
1979	189,797	215,598	9,564	414,959
1980	206,223	192,492	17,480	416,195
1981	207,879	242,248	14,405	464,532
1982	269,374	196,814	9,229	475,417
1983	377,753	194,882	12,532	585,167
1984	384,006	251,316	14,475	649,797
1985	357,844	320,977	11,808	690,629
1986	431,095	370,192	9,448	810,735
1987	433,687	423,448	12,166	869,301
1988	569,348	382,562	8,356	960,266
1989	562,394	448,956	14,121	1,025,471
1990	676,604	444,110	16,844	1,137,558
1991	835,026	446,012	17,113	1,298,151
1992	787,613	473,663	24,872	1,286,148
1993	662,166	466,627	22,329	1,151,122
1994	791,477	436,761	39,861	1,268,099
1995	853,632	406,231	50,256	1,310,119
1996	855,707	368,567	68,997	1,293,271
1997	807,160	511,850	82,123	1,401,133
1998	1,042,232	514,598	54,303	1,611,133
Average	389,185	292,862	17,694	699,740
STD Deviation	308,762	133,130	19,991	448,565

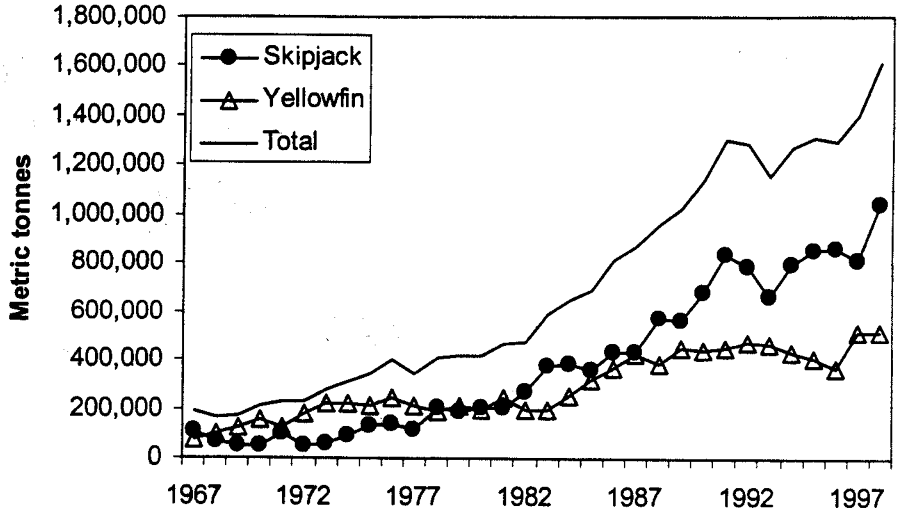


Figure 1. Total purse seine catch of skipjack and yellowfin tuna in the Pacific Ocean, 1967–1998. Source: SPC & IATTC.

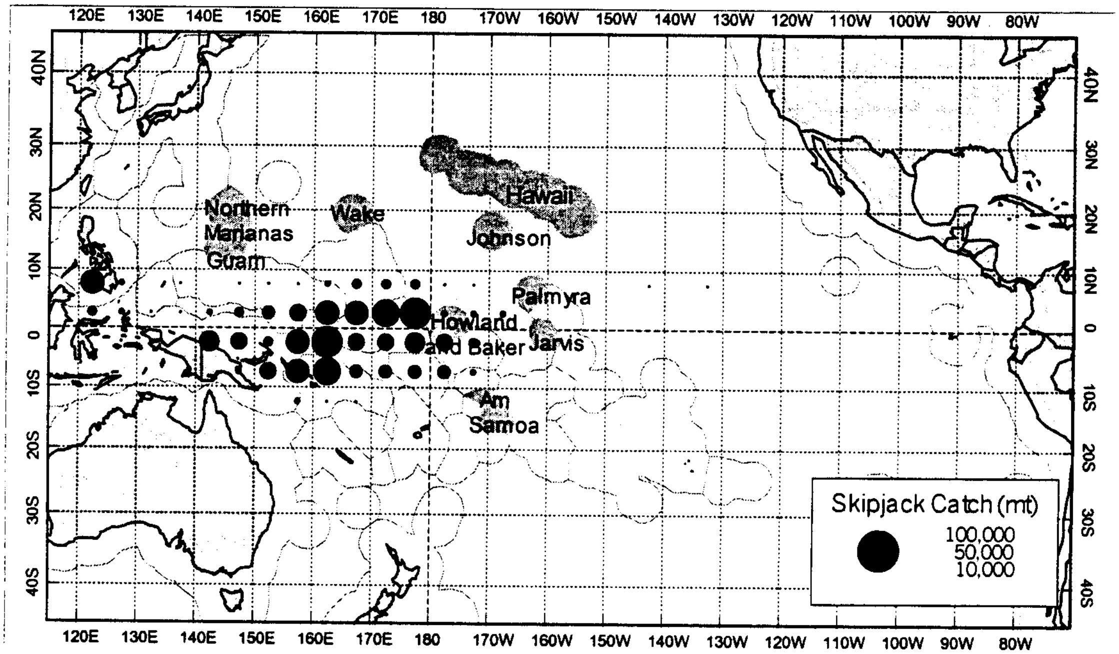


Figure 2. Distribution of total purse seine skipjack catch in 1998.

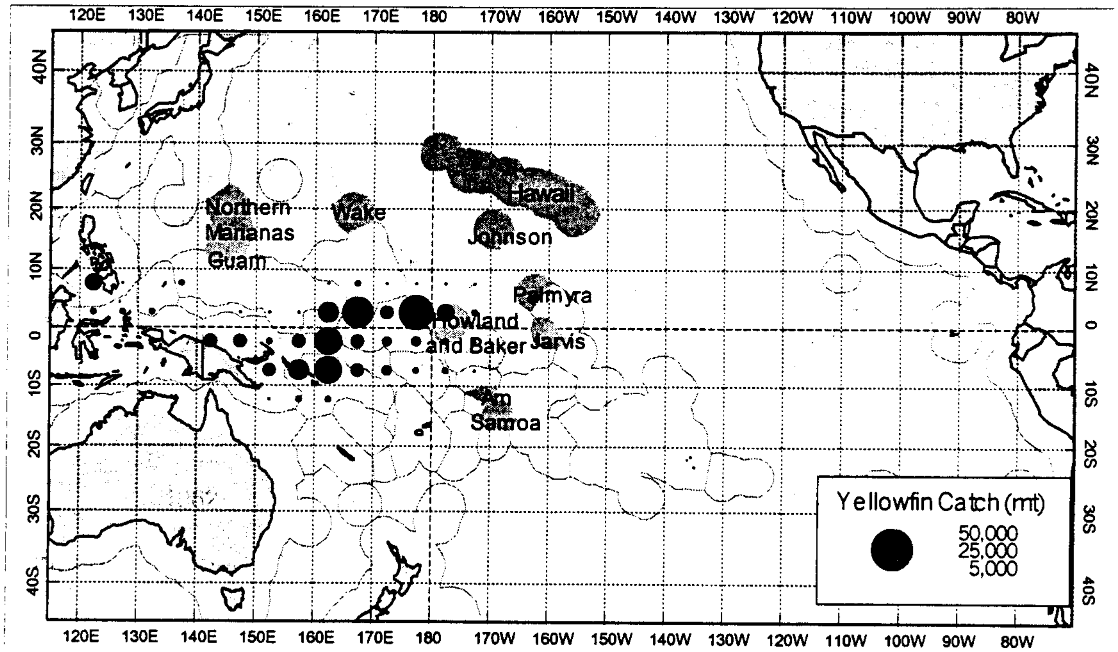


Figure 3. Distribution of total purse seine yellowfin in 1998.

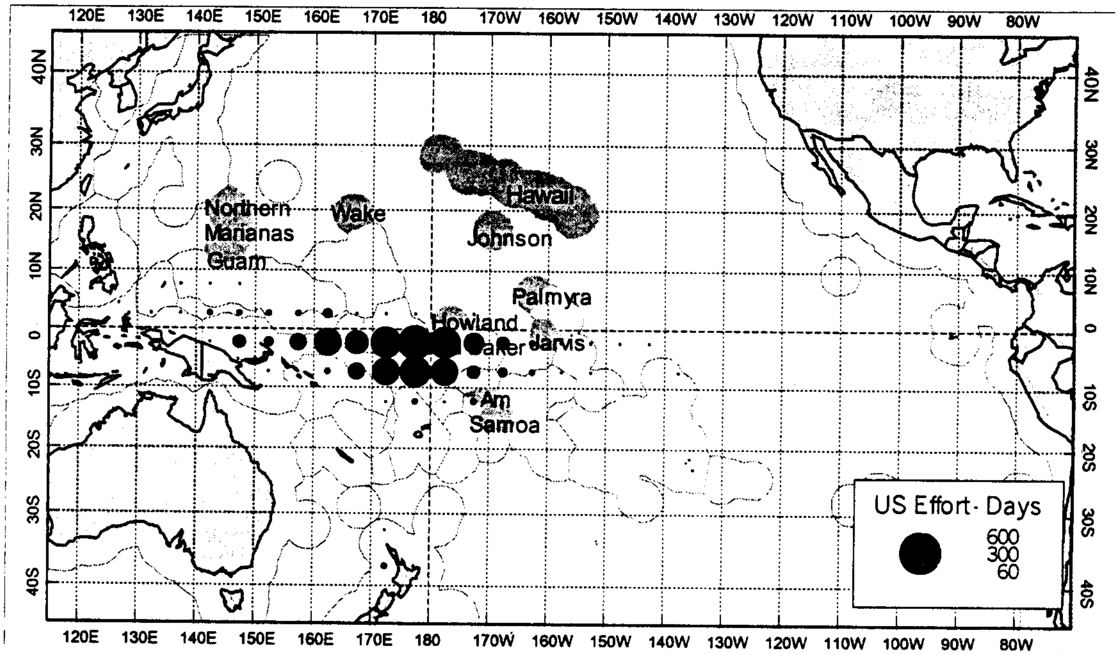


Figure 4. Distribution of United States purse seine effort in 1999. Data are preliminary.

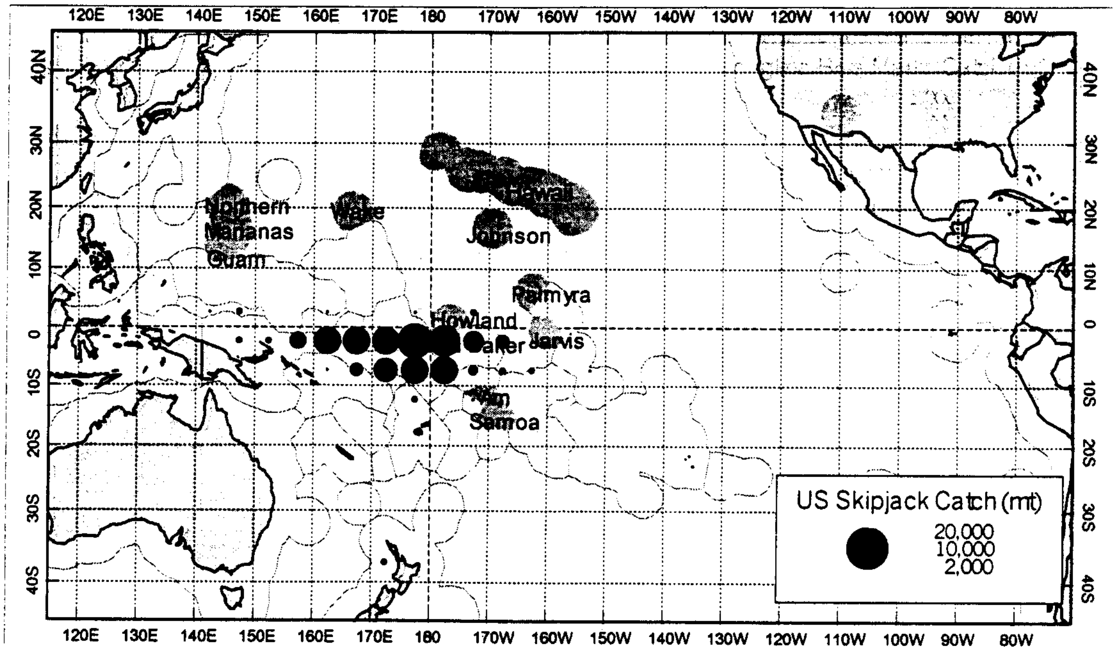


Figure 5. Distribution of United States purse seine skipjack catch in 1999. Data are preliminary.

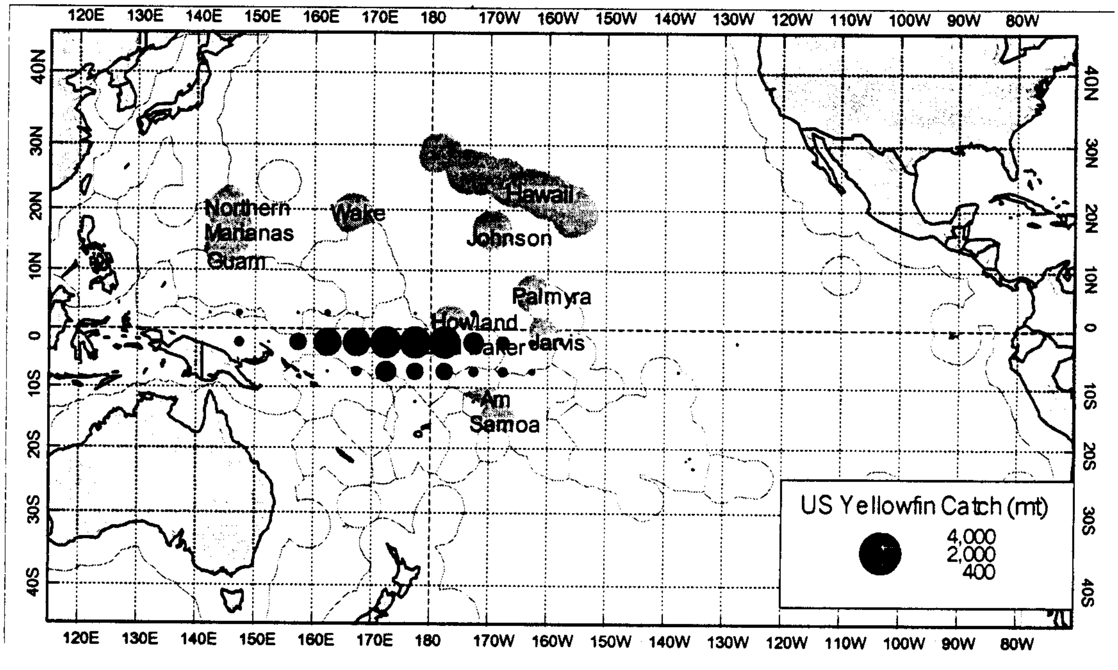


Figure 6. Distribution of United States purse seine yellowfin catch in 1999. Data are preliminary.

Table 2. Total reported longline catch (metric tonnes) of PMUS in the Pacific Ocean. Source: SPC & NMFS. HL. 1998 data is incomplete for some species.

Year	Albacore	Bigeye	Northern Bluefin	Yellowfin	Black Marlin	Blue Marlin	Swordfish	Striped Marlin	Total
1962	50,991	78,406	12,476	66,363	2,229	18,797	11,216	22,507	262,985
1963	44,566	106,027	18,687	73,198	2,342	19,032	11,414	26,602	301,868
1964	38,418	74,716	12,084	62,166	1,876	13,989	8,615	39,524	251,387
1965	39,803	56,918	13,470	60,211	2,375	11,084	9,665	32,794	226,319
1966	64,443	64,861	13,231	67,123	2,172	10,497	11,615	27,351	261,293
1967	69,834	65,388	8,365	39,633	1,825	9,702	12,041	31,827	238,615
1968	53,720	57,744	9,717	50,840	1,883	9,469	11,477	39,418	234,268
1969	43,012	79,842	8,832	58,950	2,073	10,348	14,358	25,564	242,978
1970	49,487	66,485	9,484	66,939	1,607	12,691	10,329	35,416	252,438
1971	47,513	64,346	12,262	57,464	2,127	8,058	9,410	30,975	232,155
1972	49,590	81,127	13,394	67,034	1,884	9,334	9,102	20,922	252,388
1973	53,850	87,861	7,383	69,398	1,935	9,964	9,604	18,603	258,597
1974	44,616	75,302	7,510	63,895	1,620	8,946	8,693	18,559	229,142
1975	40,177	95,327	4,538	73,759	1,845	8,453	9,457	15,620	249,177
1976	42,130	115,479	7,487	86,433	1,056	8,526	11,254	16,136	288,501
1977	52,274	133,973	4,511	100,253	936	8,415	10,891	9,298	320,550
1978	48,485	120,016	4,063	119,891	1,624	9,837	10,888	9,735	324,539
1979	43,461	112,797	5,001	115,159	1,950	10,270	11,159	15,642	315,439
1980	46,694	112,087	7,952	130,375	1,651	10,855	17,195	17,126	343,934
1981	51,454	89,677	204	100,887	2,065	12,715	21,720	19,499	298,222
1982	46,087	88,659	347	93,488	2,277	13,067	18,654	20,178	282,755
1983	40,475	118,849	222	93,796	1,916	10,731	20,230	13,773	299,991
1984	36,171	112,724	437	80,117	1,524	13,074	16,143	11,522	271,712
1985	41,988	121,795	1,816	86,039	1,234	10,980	18,555	12,118	294,525
1986	45,975	153,937	93	84,371	1,247	12,815	20,248	16,268	334,954
1987	41,851	163,055	418	93,212	1,769	17,114	24,666	19,592	361,677
1988	45,889	110,800	140	94,434	2,583	15,284	24,188	18,116	311,433
1989	36,315	115,824	264	81,096	1,467	13,159	19,990	14,856	282,970
1990	39,037	149,403	93	102,946	1,803	11,381	18,173	10,988	333,824
1991	36,047	130,655	5,860	85,556	2,008	12,423	19,238	11,331	303,119
1992	50,549	127,917	6,074	85,323	1,944	13,420	21,038	9,685	315,950
1993	61,493	121,417	690	83,403	1,666	14,907	20,845	11,440	315,861
1994	64,818	118,156	751	90,160	1,586	16,474	18,090	12,530	322,566
1995	57,751	94,070	422	88,683	1,012	16,504	15,520	13,172	287,134
1996	60,305	90,598	983	94,254	770	11,585	15,556	9,108	283,159
1997	67,748	101,152	1,517	88,241	1,067	14,261	18,820	12,746	305,552
1998	70,903	105,910		79,073					255,886
Average	49,133	101,711	5,577	82,004	1,748	12,171	15,002	19,182	285,077
STD deviation	9,734	27,252	5,188	19,186	434	2,929	4,893	8,691	36,022

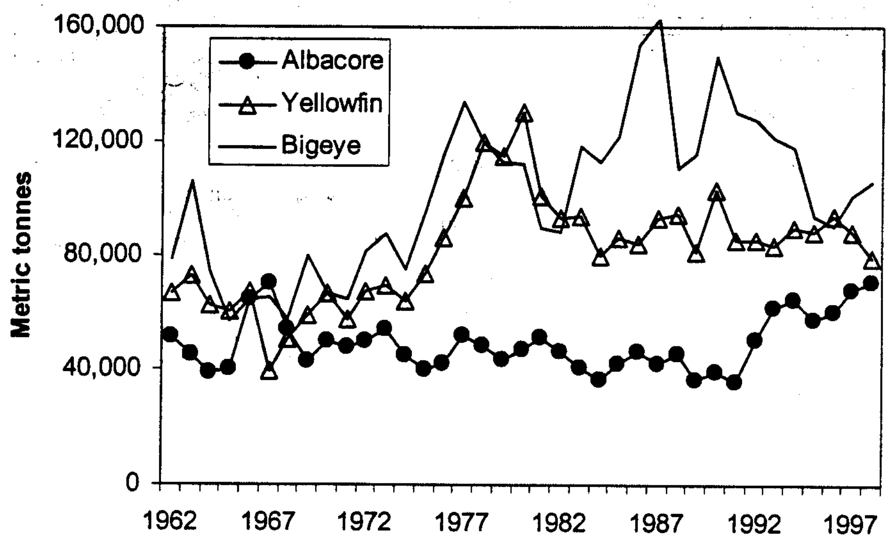


Figure 7. Reported longline tuna (albacore, yellowfin & bigeye) catches in the Pacific Ocean. Source: SPC & NMFS, HL.

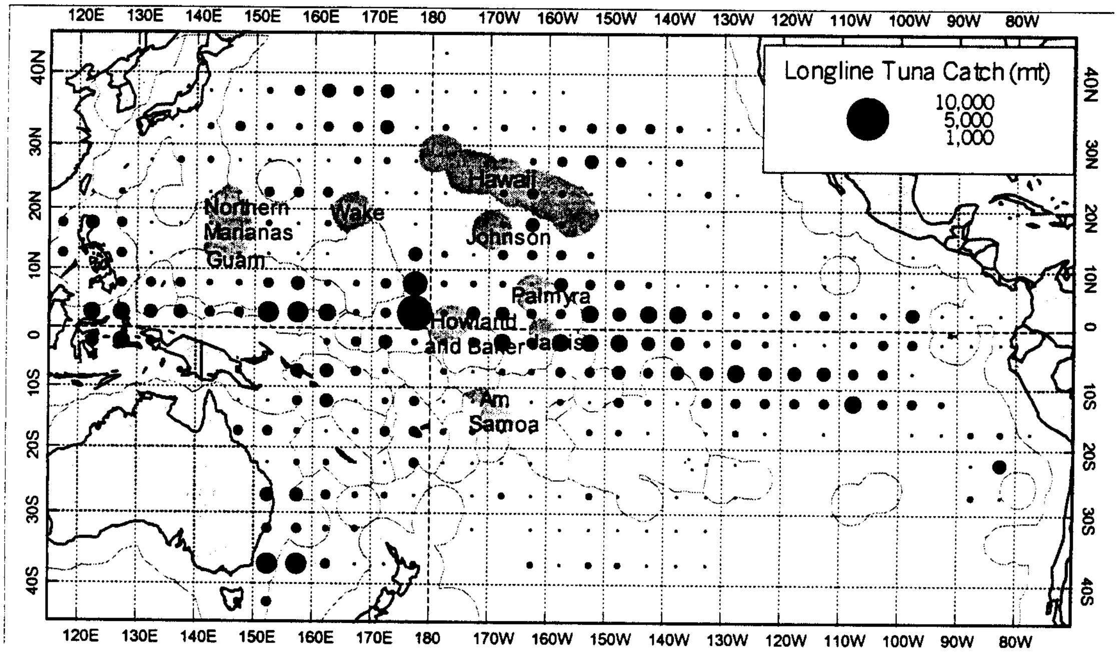


Figure 8. Distribution of all longline caught tuna species reported in 1997. Source: SPC & NMFS, HL.

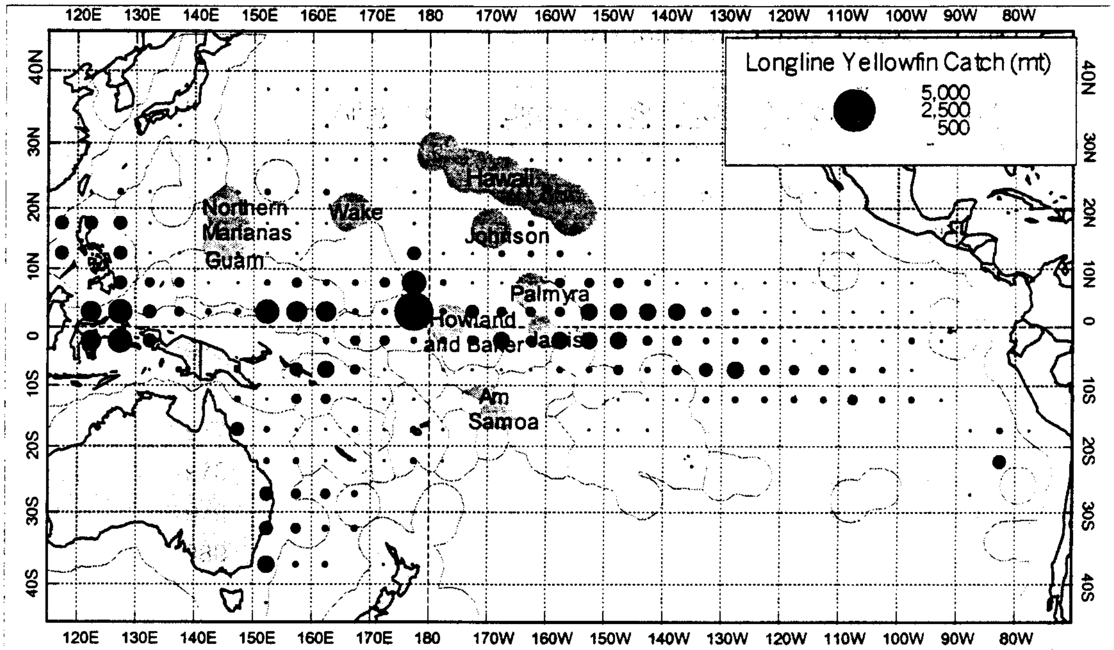


Figure 9. Distribution of longline catches of yellowfin tuna reported in 1997. Source: SPC & NMFS, HL.

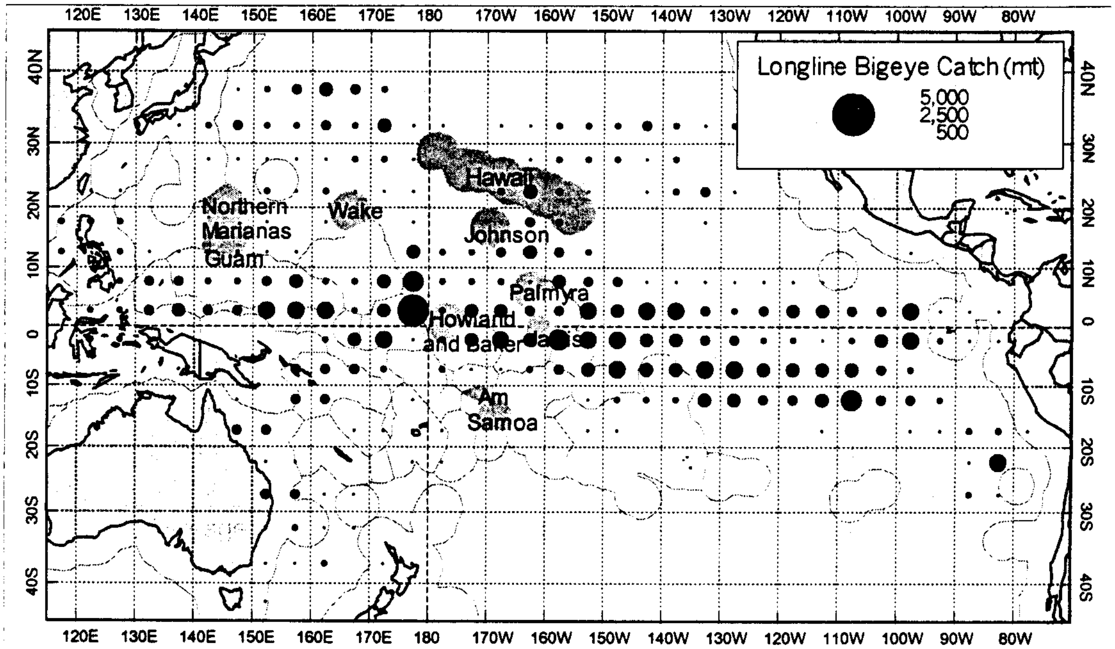


Figure 10. Distribution of longline catches of bigeye tuna reported in 1997. Source: SPC & NMFS, HL.

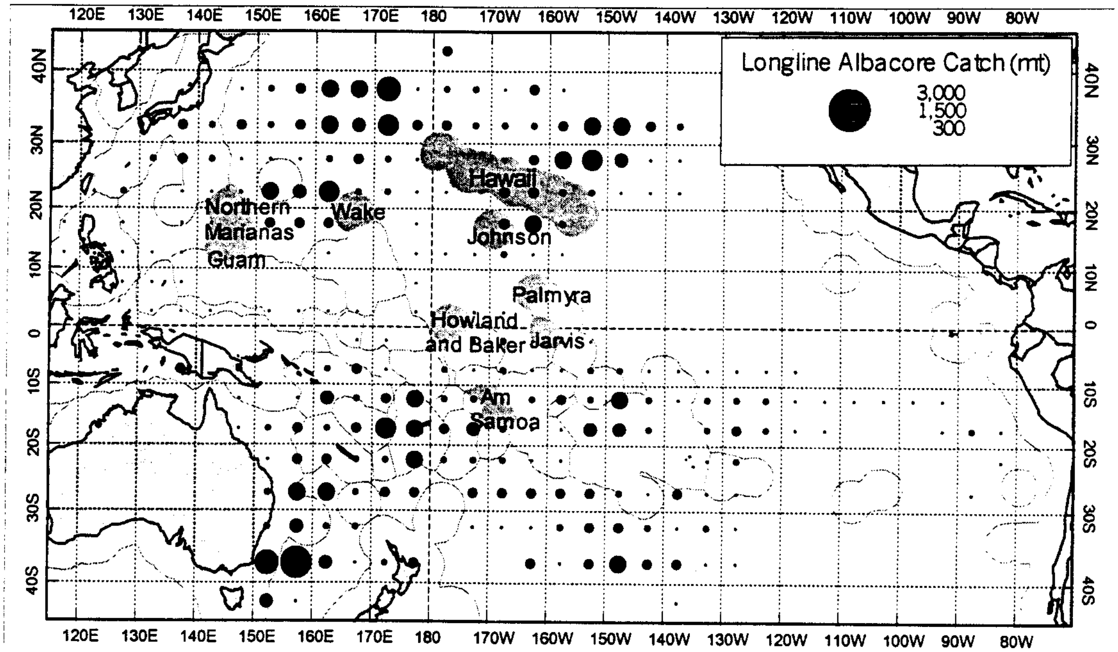


Figure 11. Distribution of longline catches of albacore tuna reported in 1997. Source: SPC & NMFS, HL.

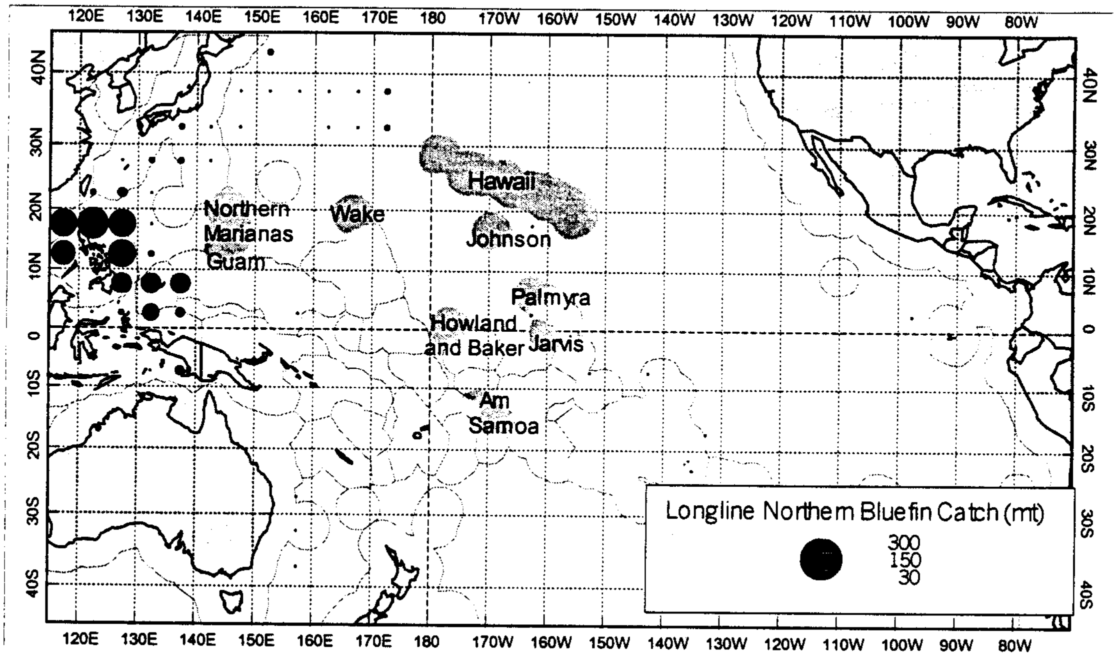


Figure 12. Distribution of longline catches of northern bluefin tuna reported in 1997. Source: SPC & NMFS, HL.

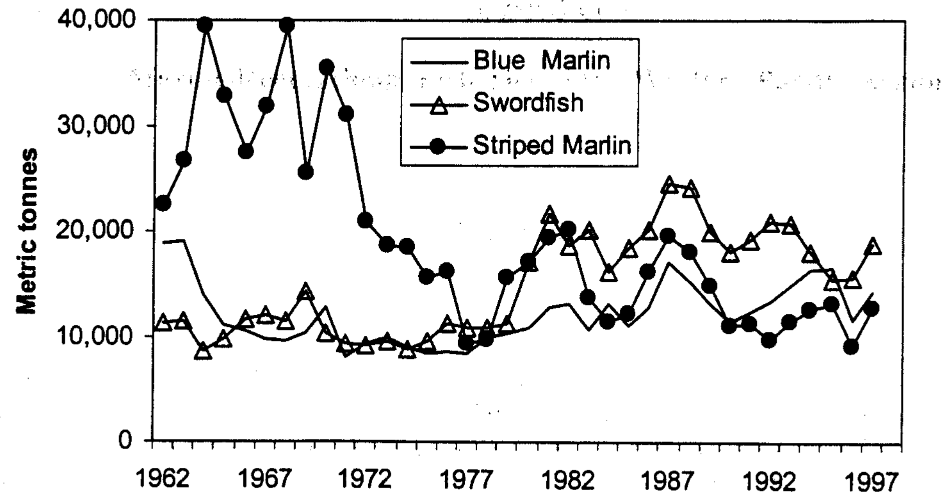


Figure 13. Reported longline billfish catches in the Pacific Ocean. Source: SPC & NMFS, HL.

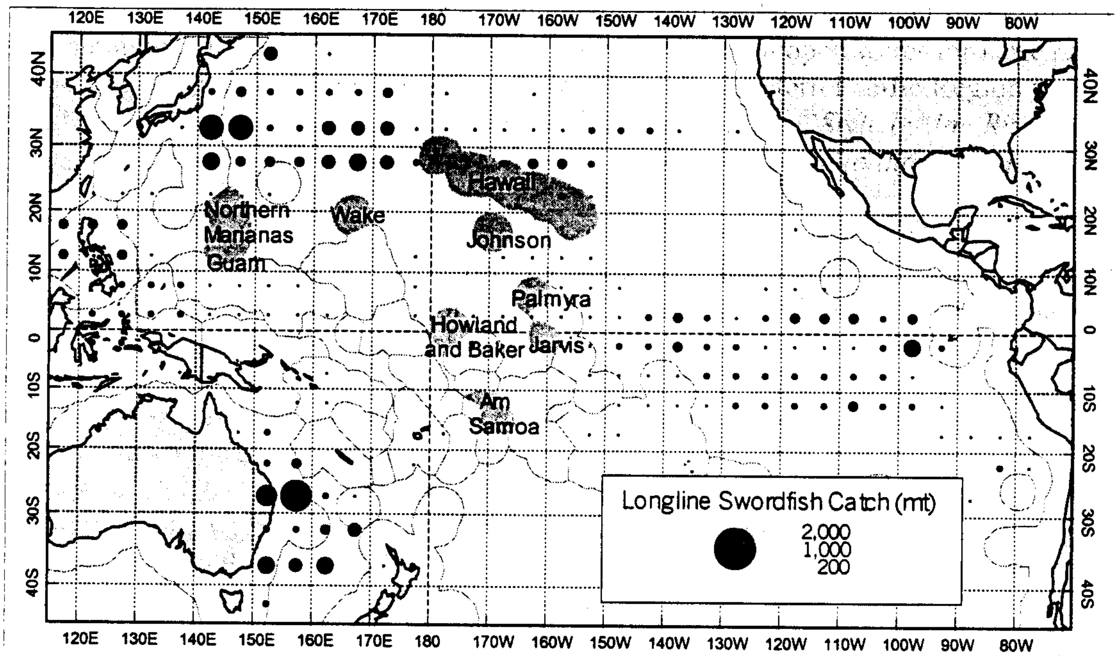


Figure 14. Distribution of longline catches of swordfish reported in 1997. Source: SPC & NMFS, HL.

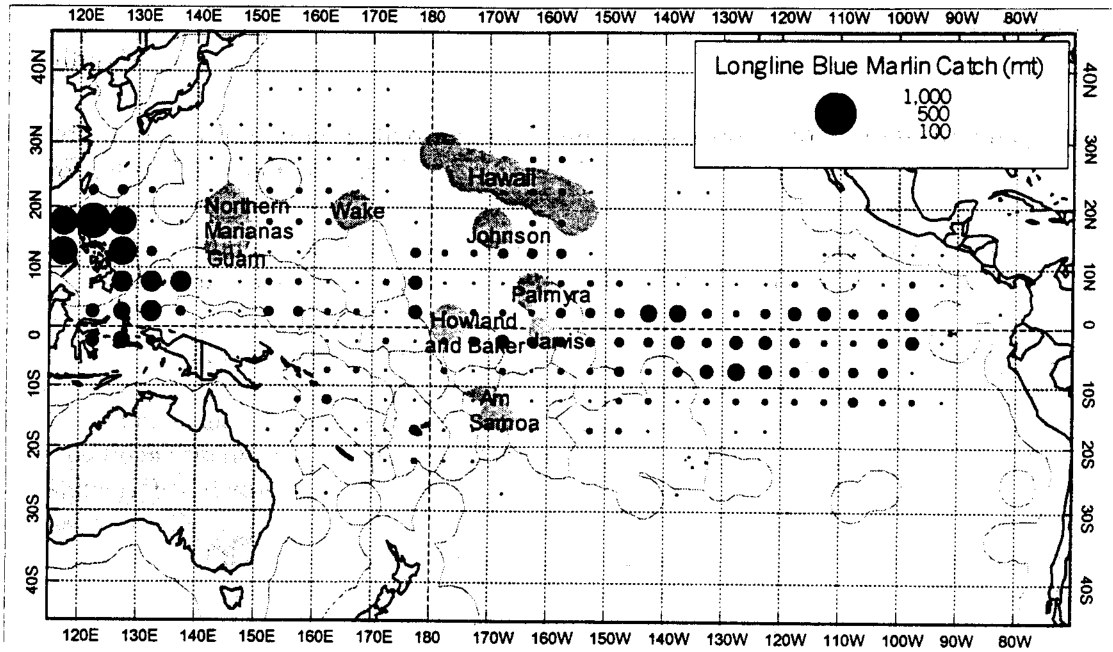


Figure 15. Distribution of longline catches of blue marlin tuna reported in 1997. Source: SPC & NMFS, HL.

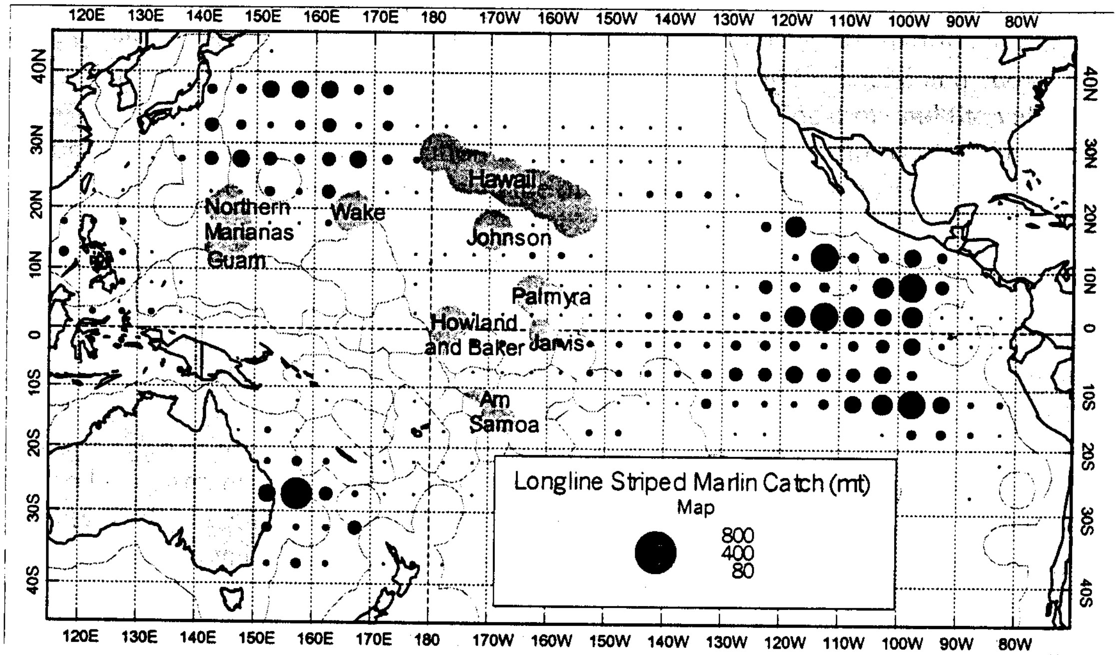


Figure 16. Distribution of longline catches of striped marlin tuna reported in 1997. Source: SPC & NMFS, HL.

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

Year	Skipjack
1970	204,871
1971	192,047
1972	177,569
1973	261,796
1974	296,218
1975	231,296
1976	287,233
1977	301,740
1978	336,749
1979	289,391
1980	337,439
1981	302,225
1982	265,980
1983	304,419
1984	382,687
1985	251,618
1986	340,761
1987	264,701
1988	301,738
1989	289,673
1990	226,361
1991	290,880
1992	230,515
1993	273,754
1994	223,429
1995	276,498
1996	236,085
1997	228,908
1998	226,299
Average	270,099
STD deviation	47,950

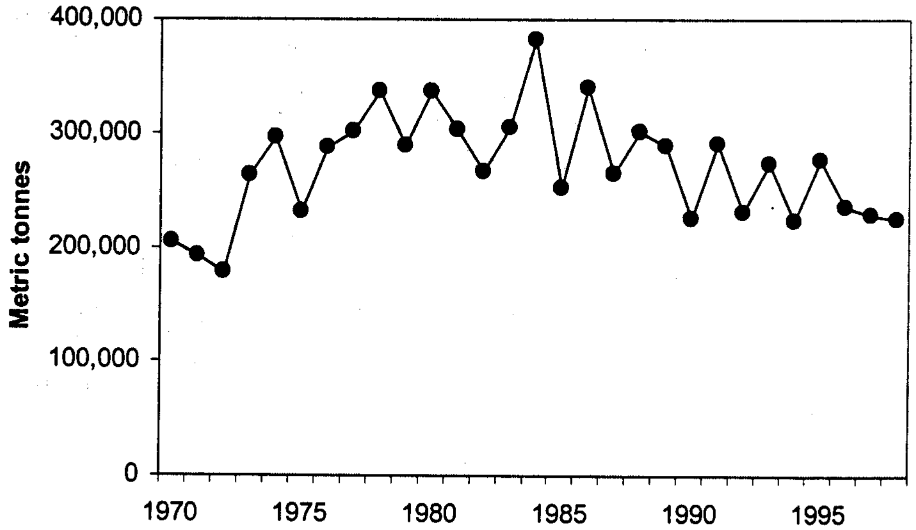


Figure 17. Reported pole-and-line catch (metric tonnes) of skipjack in the Pacific Ocean. Source: SPC.

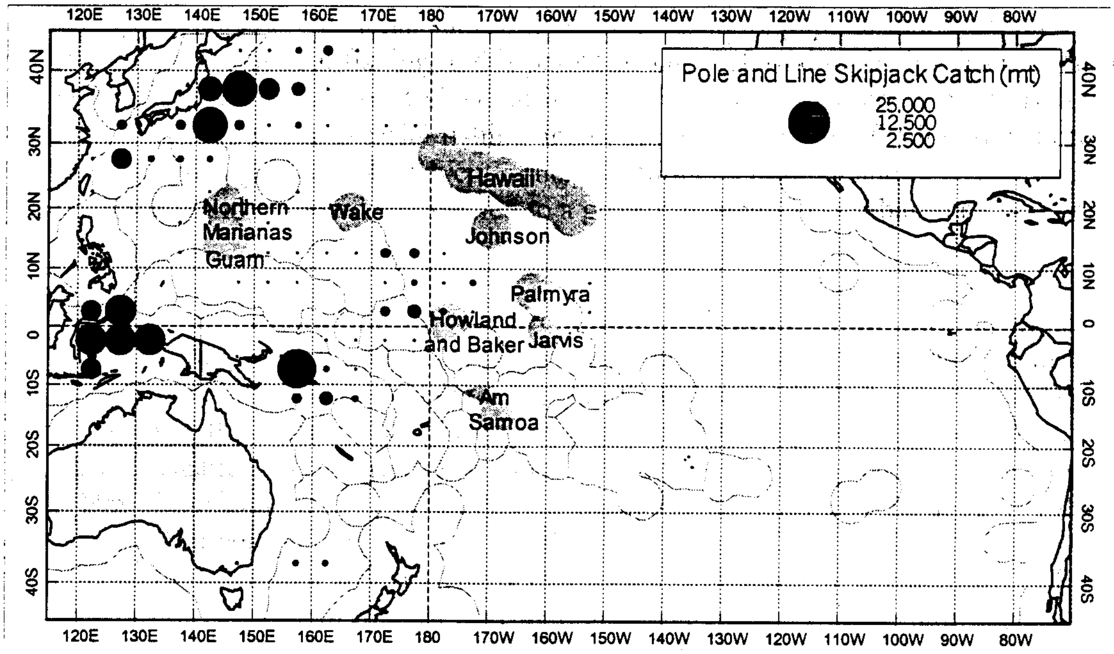


Figure 18. Distribution of pole-and-line catch of skipjack reported in 1998. Source: SPC.

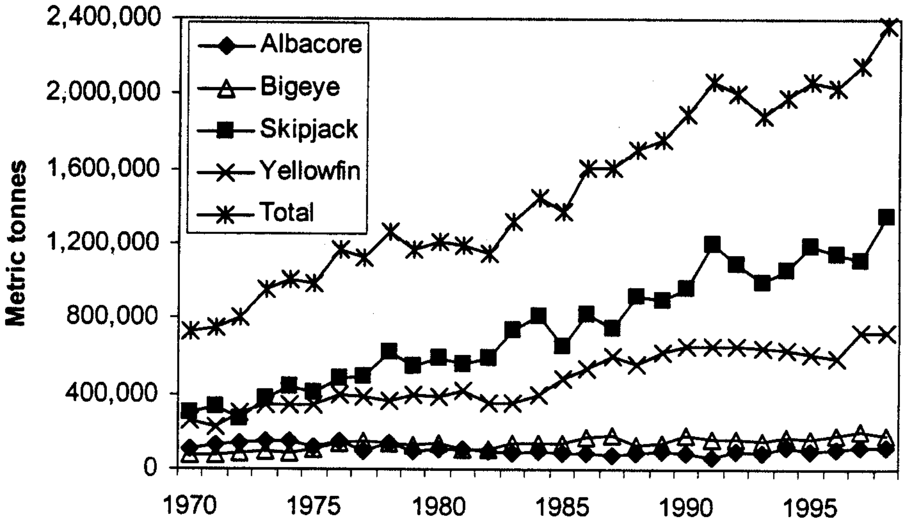


Figure 19. Estimated total annual catch of tuna species in the Pacific Ocean.

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

Year	Albacore	Bigeye	Skipjack	Yellowfin	Total
1970	101,793	71,373	298,212	261,546	732,924
1971	127,609	70,896	331,194	223,002	752,701
1972	143,660	89,489	267,958	299,320	800,427
1973	145,557	96,387	370,583	340,962	953,489
1974	146,924	83,339	434,093	347,782	1,012,138
1975	116,629	106,640	412,106	348,094	983,469
1976	149,714	134,538	483,950	398,089	1,166,291
1977	98,757	151,577	490,527	388,659	1,129,520
1978	135,855	140,453	620,105	366,241	1,262,654
1979	100,887	129,455	543,358	394,894	1,168,594
1980	107,927	136,062	589,140	381,692	1,214,821
1981	106,346	111,608	560,167	414,878	1,192,999
1982	99,546	106,761	589,985	353,066	1,149,358
1983	80,442	140,576	742,171	357,324	1,320,513
1984	95,740	135,870	812,727	401,151	1,445,488
1985	90,891	144,089	654,393	486,652	1,376,025
1986	82,229	172,731	822,591	534,656	1,612,207
1987	78,652	183,920	748,834	594,814	1,606,220
1988	85,440	129,723	922,922	560,275	1,698,360
1989	98,191	141,363	904,180	618,238	1,761,972
1990	90,671	179,020	966,967	654,993	1,891,651
1991	65,335	160,003	1,194,846	649,163	2,069,347
1992	93,083	161,797	1,096,419	648,889	2,000,188
1993	89,832	153,523	994,850	644,161	1,882,366
1994	112,718	170,237	1,065,803	630,674	1,979,432
1995	100,035	159,692	1,194,072	615,212	2,069,011
1996	109,553	176,805	1,151,426	593,795	2,031,579
1997	112,866	199,765	1,115,462	729,537	2,157,630
1998	117,282	176,800	1,348,193	723,657	2,365,932
Average	106,350	138,431	749,215	481,428	1,475,424
STD deviation	21,995	34,691	310,613	148,701	470,957

Appendix 6

Marine Recreational Fisheries of the Western Pacific Region

by

Paul Dalzell[1]

Introduction

Fishing, either for subsistence or recreation is extremely important 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). Further, recreational fishing in the US EEZs of remote Pacific islands, under Council jurisdiction such as Palmyra, may grow in importance if plans to turn this atoll into a wildlife refuge, eco-tourist and sportfishing destination are realized. A similar plan was successfully implemented during the mid-1990s at Midway Island, part of the Northwestern Hawaiian Islands and a former US Navy base.

Recreational fishery activities in the Western Pacific include a variety of fishing methods, both shore and boat-based, but the most common method is some form of hook and line fishing, targeting either pelagic or bottomfish species. However, recreational fishing in the Western Pacific Region encompasses a variety of fishing methods other than hook-and-line fishing, such as spear fishing which is practiced both on near shore reefs and in open water for large pelagic fish. A useful guide to recreational fishing in Hawaii and the Western Pacific Region in the popular literature consists of the three volumes of *Fishing Hawaiian Style by Jim Rizutto* and *Fishing on Guam, the third volume of the University of Guam's Guide to the Coastal Resources of Guam.*

The Council's interest with recreational fishing is directed mainly with fisheries beyond the state or territorial 3 nm margin, and is therefore concerned primarily with boat-based fishing, and principally boat based hook-and-line fishing for pelagic fish.

Recreational pelagic fishing is described in detail in the original Pelagics Fishery Management Plan (FMP), one of the objectives of which is:

> " to promote, within the limits of managing at OY, domestic harvest of the management unit species in the Western Pacific EEZ and domestic fishery values associated with these species, for example, by enhancing the opportunities for:
>
> a. satisfying recreational fishing experiences

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1. Pelagics Coordinator with the Western Pacific Council. This article was based on notes compiled for a presentation at the NMFS Recreational Fisheries Symposium, RecFish 2000, held in San Diego in July 2000

b. continuation of traditional fishing practices for non-market personal consumption and cultural benefits;

c. domestic commercial fishermen, including charter boat operations, to engage in profitable fishing operations."

Further, the revised Magnuson-Stevens Fisheries Conservation and Management Act (MSFCMA) states that Fishery Management Plans (FMPs) required provisions include:

> a description of the fishery, including, but not limited to, the number of vessels involved, the type and quantity of fishing gear used, the species of fish involved and their location, the cost likely to be incurred in management, actual and potential revenues from the fishery, any recreational interest in the fishery, and the nature and extent of foreign fishing and Indian treaty fishing rights, if any, and;
>
> specification of the pertinent data which shall be submitted to the Secretary with respect to commercial, recreational, and charter fishing in the fishery, including, but not limited to, information regarding the type and quantity of fishing gear used, catch by species in numbers of fish or weight thereof, areas in which fishing was engaged in, time of fishing, number of hauls, and the estimated processing capacity of, and the actual processing capacity utilized by, United States fish processors.

Apart from the requirements under the Magnuson Act to report on the volume of recreational catch and fishery trends, recreational fishery data is also essential for estimating the impact of fishery regulations on the recreational sector. and for determining the social and economic impacts of events such as oils spills, coastal construction, quota allocation and the value of the recreational sector. Typically, in allocation issues commercial catches are well documented but recreational catches are not, to the disadvantage of the recreational fishery sector.

Recreational fisheries in the Western Pacific Region

The pre-contact Polynesian and Micronesian societies of the islands in the Western Pacific Region were heavily dependant on fish as a source of animal protein, and fish, fishing and the sea played a pivotal role forming the culture of these different peoples. Even today in the late 20th century, where diets have been altered through the importation of manufactured foods, fish continue to be a large portion of the annual protein intake. 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). Further, although most people do not need to fish to obtain food, fishing remains an extremely popular pastime and is a cultural link with the pre-contact societies.

In Hawaii, at least one quarter of the population participate in some form of fishing activity at least once per year and the level of community involvement in fishing is higher than in many other US States. Recreational fishing in Hawaii involves not only State residents but also a significant number of the annual 6.6 million tourists who visit the State and want to experience game fishing in the tropical Pacific. This high level of recreational fishing activity is economically important for the State and also of concern to the Council since much of it occurs in waters over which the Council has jurisdiction.

The role of fish and fishing in the maintenance of Samoan culture is well documented and the flow of fish in customary distribution channels continues and contributes to the maintenance of "Fa'a Samoa". Indeed in American Samoa fishing effort by fishermen is often stimulated by pending cultural and ceremonial obligations and fishermen who are able to contribute maintain their status and support their chiefs and villages. While there is a recreational component, it is also tied to the culture. Similar cultural linkages are evident among traditional Micronesian societies such as the Carolinians, some of who now live in Guam and the Northern Marianas. Among Saipan Carolinians, fish is central to the diet, and those that can afford it actively fish both nearshore and offshore waters to continue the pleasure and identity of being "re matau" "people of the blue ocean". Fish is also quite important among the Chamorro of both Guam and Saipan, especially at village fiestas on patron saint days , where fresh ocean fish is necessary for the feasting and where it contributes to the sense of community participation and well being (C. Severance Univ. Hawaii, Hilo, pers comm).

As the US islands in the Western Pacific have little shelf area the greatest volume of commercial and recreational fisheries production comes, not surprisingly from trolling and handlining for highly migratory pelagic fishes, particularly tunas and tuna-like species such as mahimahi (Coryphaena spp), ono or wahoo (*Acanthocybium solandri*) and marlins. Demersal fisheries are of some additional importance in the Western Pacific where there are limited fisheries for snappers and groupers that live on the outer reef slopes, banks and seamounts. Crustacean fisheries are limited to dive fisheries in most islands, apart from Hawaii where there are species which can be caught in lobster pots.

The development of recreational fisheries as we know them in the islands of the Western Pacific occurred with increasing urbanization and to some extent paralleled the development of commercial fisheries. When Hawaii was annexed by the United States in 1898, the population of 150,000 residents lived in small towns and villages spread across the six major islands. Fishing at this time was primarily shore based or conducted from canoes. A total of 2000 commercial fishermen were registered with the territory and landed a catch of over 6 million pounds (Shomura 1987).

Gaffney (1999) includes a brief history of coastal fisheries in Hawaii in the 20^{th} Century noting that modern sports fishing with rod and reel dates back to at least 1914 in Hilo. The oldest known shoreline fishing club in the Hawaiian Islands is the Atlapac Fishing Club in 1926, followed by the Honolulu Japanese Casting club in 1929 and the Hilo Casting Club in 1933. The use of light tackle for game fishing and its associated sporting ethics dates back as early as 1914 and the use this gear for sports fishing has been reinforced by several world records in Hawaii (Gaffney pers. comm.) 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.

Glazier (2000) notes that recreational shoreline fishing was more popular than boat fishing up to and after WW II, and that boat fishing in this period usually referred to fishing from traditional canoes. 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 (Allen 1950). Following WWII, the advent of better fishing equipment and new small boat hulls and marine inboard and outboard engines led to a growth in small vessel-based recreational fishing.

A major period of expansion of small vessel recreational fishing occurred between the late 1950s and early 1970s, through the introduction of fibreglass technology to Hawaii and the further refinement of marine inboard and outboard engines. 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. Hawaii 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.

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. According to Davis (pers. comm.) four such clubs were founded in the past 20 years but none lasted for more than a 2-3 years. 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.

Charter boat recreational fishing

Charter fishing is a major recreational fishing industry in Hawaii and dates back to the late 1890s when a local family ran shark fishing trips off Honolulu harbor where the city's garbage was dumped (Gaffney pers. comm. Glazier 2000). Large sharks were caught on big hooks and then killed with shotguns for sport. By the 1900s and through the first half of the century, wealthy tourists came to the Hawaiian Islands, and especially Kona to fish for marlins. These included celebrities such as Zane Grey, Jack London, Earnest Hemingway and Franklin Roosevelt. Charter fishing in Hawaii remained an exclusive activity of the affluent for the first half of the century. As with the small boat fishery in general, however, there was a rapid expansion of the charter fishery following WWII and the advent of mass tourism to Hawaii. In the early 1950s there were few charter vessels in the State of Hawaii with only seven vessels in Kona. By 1961 there were over 80 charter vessels in the State and this grew to over 180 charter vessels by the mid-to-late 1990s. Almost all charter fishing activity is directed at catching pelagic fish, and only a very minor level of charter vessel activity is for bottomfish.

Over the past 30 years there have been a number of studies on the Hawaii the charter fishing industry (Glazier 1999), the most recent being by Hamilton (1999). Further, since the late 1980s, the Hawaii Division of Aquatic Resources has categorized charter vessels separately from commercial troll fishers and therefore it is possible to report separately on the catch rates and catch composition of charter vessels Most charter fishing in Hawaii is focused on catching blue marlin, which form about 60 % of the total annual charter vessel catch by weight (WPRFMC 1998). Although commercial troll vessels also take blue marlin, these only form about 25% of their catch, with the majority of the target species being yellowfin, mahimhi, aku and ono. 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 the NMI is limited, with less than ten boats operating on Saipan, and a few vessels on Tinian doing occasional fishing charters. No data are available on the operations of these boats.

Recreational Fish Catches

The best estimates of recreational catch that can be generated at present for the Western Pacific Region are given in Table 1. Estimates of recreational catch for the Guam, NMI and American Samoa are based upon expansions of creel survey data (see below), and specifically that portion of the catch which not sold. Whether this is true recreational catch or not is debatable as there is no accompanying data on trips motivation. Data for recreational catch volume for

Hawaii were generated empirically by NMFS Honolulu Laboratory, based on proportions of the commercial pelagic and bottom fish catches (recreational troll catch = commercial troll catch; recreational bottomfish catch = 0.5 commercial bottomfish catch). The percentage of recreational fishing from Hamilton and Huffman (1997) was determined from intercept surveys at several small boat harbors in the State. There is the possibility that this figure is affected by avidity bias, although Glazier (Ed Glazier NMFS Honolulu Laboratory pers. comm.) in another small boat study obtained a similar percentage (24%) in his survey.

The various federal, state and territorial agencies that collect fisheries data on a regular basis in the Western Pacific Region including Hawaii, are collectively grouped under a system known as the Western Pacific Fisheries Information Network or WPacFIN. WPacFIN was initiated in 1981 as a means of focusing cooperative efforts of fisheries agencies in the central and western Pacific to improve fishery monitoring and reporting systems to better meet local and federal fishery management needs. WPacFIN is a federal, state and territory partnership for collecting, processing, analyzing, sharing, and managing fisheries data. Through the cooperative efforts of all member agencies, the overall goal of WPacFIN is to provide fisheries data and information when, where, and in the quality needed by NMFS and the Council and its various support groups to develop, implement, evaluate, and amend fishery management plans (FMPs) for the western Pacific region.

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

Islands	% of small boat trips for recreational fishing	Rec catch (lb)[b]	Total small boat catch (lb)	% small boat catch
Guam*	72.50	455,444	1,445,033	31.52
NMI	27.20	34,408	522,338	6.59
Hawaii*	28.36[a]	4,750,000	13,909,678	34.15
Am Sam	10.67	157,198	1,455,481	10.80

*Hawaii charter fishery catch = 530,000 lb, Guam = 154,000 lb
a. based on Hamilton & Huffman 1997
b Hawaii 1998 only, Guam & Am. Samoa average 1990-1999, NMI average 1990-1996

In Hawaii, until recently, there were no regular creel surveys intercepting small vessels landing at the various boat harbors in the State. Commercial small vessel fishing landings are self reported by fishermen on a State reporting form, and these are submitted monthly to the Hawaii Division of Aquatic Resources. The present form often used as a record of fish sales and is therefore not ideal for reporting effort and catch data, particularly catches which are discarded for economic or other reasons. In response, HDAR is in the process on introducing new catch forms for different fisheries, which will relieve the fishermen of the necessity of reporting sales, although demand a higher level of detail concerning fishing effort, catch composition and its disposition. Fish sales, will in future be reported by dealers, mostly electronically through computer links with HDAR.

In Guam and American Samoa the local fish and wildlife offices have been collecting landings data through intercept creel surveys for at least a decade monitoring both commercial and non-commercial or recreational fishing. From the data base it is possible to extract the catch volume of unsold portions of the catch and vessels landing which do not sell catch. A similar creel survey was conducted for several years in the Northern Mariana Islands, and then discontinued after 1996 for administrative reasons. Recently, however, it has been re-implemented and like the surveys in Guam and American Samoa will record unsold catch and vessels landing fish but not selling.

Creel surveys for mainly shore based fishing have been conducted on the eastern island of Hawaii by HDAR for a number of years and are now expanding to western Hawaii and Maui, and will include boat-based catches. To date, recreational fishing on Hawaii has been reported via short-term surveys, usually of all small vessel fishing, which includes commercial and recreational catches. One of the major problems, however, facing fisheries surveys in Hawaii and the the Western Pacific is categorizing recreational and commercial fishermen. In the Pacific Islands, nearly every person is a potential fisherman and every village is a potential landing site. Davis (Gerry Davis Guam DFWR pers. comm.) notes that the concept of sports fishing is still not seen as something attractive to most islanders in the Pacific. Fishing is still a food gathering activity and that sports fishing, particularly catch and release fishing is frowned upon as "playing with your food". In Guam, American Samoa and NMI, it is probably more accurate to divide catches into commercial and subsistence with subsistence catch comprising that portion of the total catch not sold but kept for home consumption or given to friends, relatives, church minister or local chief.

On the other hand in Hawaii, where true subsistence fisheries production is very low, a large volume of the recreational catch is sold through the public auction or along the roadside. Hamilton & Huffman (1997) recognized four categories of fishermen in Hawaii during their survey of the economics of small boat fishing in Hawaii. fishermen making no sales of fish in the past year were classed as *"recreational fishermen"*, i.e. fishermen for whom the sporting aspect of fishing was most important. Fishermen who sold only to cover trips costs were classed as *"expense fishermen"*. Fishermen gaining ≤50% of their income from fishing profits were classed as part time commercial fishermen and those gaining ≥ 50% of income from fishing profits were classed as full time fishermen. Hamilton (1998) performed a means test on eleven variables for the four fishermen classes and found statistically significant differences for six of the variables examined, suggesting that the four categories were indeed useful descriptors of different fishermen types. Hamilton & Huffman (1997) found that in the mid-1990s about 28% of the total number of fishing trips in their survey were by recreational fishermen, trips on which no fish were sold. A similar result (22%) was obtained by Glazier (1999) in a comparable survey conducted at different landing sites in Hawaii at about the same time.

Improving the collection of recreational fisheries data

Recognizing that the need for recreational fishery data is critical, the Western Pacific Council recommended the formation of a Recreational Fisheries Data Task Force at the end of 1998. A planning meeting, convened in April 1999, and comprising input from NMFS Honolulu Laboratory, NMFS Pacific Islands Area Office, State of Hawaii' Division of Aquatic Resources and University of Hawaii developed the following terms of reference for the Task Force:

> The Task Force will be comprised of active and retired small boat-fishermen (recreational, part-time commercial, and subsistence) spokespersons for the recreational and sports fishing sector and fisheries management and data specialists.
>
> The objective of the Task Force will be to provide advice to the Council on the best ways

to collect information on recreational, part-time commercial and subsistence fishing activities in Hawaii, including levels of participation, catch and fishing effort.

The Task Force held several meetings during 1999 and 2000 and developed four main recommendations concerning improving the recreational fishery data collection. These were as follows:

1. Development of a meta-data base for previous recreational surveys, club and tournament data

2. Conduct a rapid assessment mail & phone survey to get an estimate of total and recreational pelagic catch

3. Support expansion of Hawaii Division of Aquatic Resources' (HDAR) comprehensive creel survey for Hawaii

4. Have the NMFS Marine Recreational Fisheries Statistical Survey (MRFSS) return to Hawaii

The NMFS Office of Science & Technology conducts an annual nationwide survey of recreational fisheries in the United States using methodologies that allow for comparisons between states and across time. This survey MRFSS conducted a survey in Hawaii between 1979 and 1981, but funding problems led to the survey being discontinued in Hawaii for the next 20 years.

Fortunately, in 2000, an opportunity presented itself through the auspices of the Recreational Task Force for the Office of Science & Technology to work collaboratively with HDAR, which had already established a recreational creel sampling program on the Big Island of Hawaii. As mentioned above, the HDAR creel survey program was restricted to mainly shore based fisheries on the eastern coast of the Big Island, but received funding in 2000 to enable expansion to west Hawaii and part of Maui. Through several meetings involving NMFS, HDAR and Recreational Task Force personnel, a cooperative agreement was developed under which NMFS will provide funding to enable a telephone survey of the entire state, to obtain fishing effort, and expansion of the creel survey to all of Maui and Oahu to generate recreational catches. There was also an expectation that further resources would be found in 2001/2002 to include creel surveys in the remaining islands of Kauai, Lanai and Molokai. As the MRFSS-HDAR work was scheduled for 2001, it was thought that this made redundant the need for a rapid assessment mail and phone survey as proposed by recommendation 2 as well as fulfilling the objectives of recommendations 3 and 4.

With respect to recommendation 1, NMFS and Council staff developed a funding proposal for a project to establish a database to archive both the data collected during previous non-commercial fishing surveys in Hawaii, and data from fishing clubs and recreational fishery tournaments. This proposal will be funded through the University of Hawaii's Pelagic Fisheries Research Program and is likely to commence in 2001. The project will develop a meta-database whereby all the data from existing surveys of non-commercial fisheries are stored in electronic format and with data descriptors to assist in the interpretation and comparison of data. It is expected that this database will be used to generate information on trends in recreational and charter fishing in Hawaii, as required of Council's by the Magnuson Act. It is hoped that next year the Council's annual report will contain summaries generated by the metadata and recreational fishery projects discussed here.

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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 during the 1980s and 1990s. 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
1981	13,712	76,091	57,869	1,168	868	749	1,521	0	0	182	92
1982	5,410	61,769	41,904	968	2,404	1,112	1,848	0	28	351	27
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

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
1981	46,220,539	172,056,616	115,634,553	2,735,329	2,198,347	5,846,003	2,573,723	0	0	282,842	102,910
1982	13,167,979	122,114,308	66,432,060	1,864,472	4,405,204	8,385,654	3,241,669	0	25,192	555,869	30,839
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

[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 (mt) of highly migratory species by state, 1981-99.

Year	Albacore	Yellowfin	Skipjack	Bigeye	Bluefin	Swordfish	Common Thresher	Pelagic Thresher	Bigeye Thresher	Shortfin Mako	Blue Shark
Washington											
1981	875	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	<.05
1982	266	N.A.	0	N.A.	0	0	0	N.A.	N.A.	N.A.	<.05
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
Oregon											
1981	3,505	0	0	N.A.	0	0	0	N.A.	N.A.	0	0
1982	863	<.05	<.05	N.A.	0	0	0	N.A.	N.A.	0	0
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
California											
1981	9,333	76,091	57,869	1,168	868	749	1,521	0	0	182	92
1982	4,281	61,769	41,904	968	2,404	1,112	1,848	0	28	351	27
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

Table 4. Pacific coast real commercial exvessel revenues ($) (1999)[1] from highly migratory species by state, 1981-99.

Year	Albacore	Yellowfin	Skipjack	Bigeye	Bluefin	Swordfish	Common Thresher	Pelagic Thresher	Bigeye Thresher	Shortfin Mako	Blue Shark
Washington											
1981	2,909,770	NA	0	NA	0	0	0	NA	NA	NA	169
1982	596,514	NA	0	NA	0	0	0	NA	NA	NA	102
1983	1,002,286	NA	0	NA	0	0	0	NA	NA	NA	201
1984	137,861	NA	0	NA	0	0	0	NA	NA	NA	11
1985	292,000	NA	0	NA	0	0	0	NA	NA	NA	183
1986	1,348,513	NA	0	NA	0	0	303,270	NA	NA	NA	170
1987	1,160,514	NA	0	NA	0	0	298,466	NA	NA	NA	580
1988	4,666,429	NA	0	NA	0	13,526	31,385	NA	NA	NA	65
1989	1,730,680	NA	0	NA	0	0	10,541	NA	NA	NA	0
1990	2,693,806	NA	0	NA	0	0	33	NA	NA	NA	0
1991	818,179	NA	17	NA	0	0	287	NA	NA	NA	52
1992	5,014,569	NA	82	NA	0	0	655	NA	NA	NA	39
1993	4,603,209	NA	0	NA	0	5,907	953	NA	NA	NA	34
1994	10,609,267	NA	0	NA	0	0	102	NA	NA	NA	0
1995	6,429,656	NA	0	NA	0	328	16,541	NA	NA	NA	16
1996	9,515,982	NA	0	NA	0	0	11,619	NA	NA	NA	44
1997	7,000,641	NA	0	NA	0	0	10,922	NA	NA	NA	10
1998	8,962,842	NA	0	NA	0	0	19,243	NA	NA	NA	71
1999	3,637,282	NA	0	NA	27,772	9,445	144,232	NA	NA	N.A.	0
Oregon											
1981	11,649,142	0	0	NA	0	0	0	NA	NA	0	0
1982	2,073,809	233	164	NA	0	0	0	NA	NA	0	0
1983	2,961,338	118	13	NA	0	0	0	NA	NA	0	0
1984	1,367,247	277	0	NA	0	0	0	NA	NA	0	0
1985	1,204,367	0	0	NA	0	0	3,064	NA	NA	0	0
1986	1,891,052	173	4	NA	0	0	874,406	NA	NA	0	0
1987	2,319,249	0	0	NA	9	0	214,998	NA	NA	0	0
1988	4,444,898	0	0	NA	0	0	180,477	NA	NA	0	0
1989	1,142,060	0	0	NA	0	0	19	NA	NA	0	0
1990	2,167,028	0	0	NA	0	0	664	NA	NA	0	69
1991	1,166,314	0	0	NA	0	0	0	NA	NA	0	73
1992	4,554,091	0	0	NA	0	0	1,228	NA	NA	0	99
1993	4,350,334	0	0	NA	0	0	498	NA	NA	0	130
1994	4,103,617	0	0	NA	0	0	0	NA	NA	0	93
1995	4,332,302	336	9	NA	454	25,141	1,681	NA	NA	0	192
1996	7,801,152	9	0	NA	1,203	125,422	234	NA	NA	0	438
1997	7,567,729	536	424	NA	3,332	51,790	199	NA	NA	0	209
1998	6,665,217	0	0	NA	15,783	263,820	114	NA	NA	2,726	5,628
1999	3,782,057	198	0	NA	38,117	46,955	2,588	NA	N.A.	787	48
California											
1981	31,661,627	172,056,616	115,634,553	2,735,329	2,198,347	5,846,003	2,573,723	0	0	282,842	102,741
1982	10,497,656	122,114,075	66,431,896	1,864,472	4,405,204	8,385,654	3,241,669	0	25,192	555,869	30,736
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

[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.

Appendix 8

Honolulu Laboratory

At the Southwest Fisheries Science Center's Honolulu Laboratory, scientists assess and investigate the dynamics of various tuna and billfish species in the central Pacific Ocean, Pacific island resources such as bottomfishes, lobster, and 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. Honolulu Laboratory scientists conduct research and recovery work on the threatened green turtle and the endangered Hawaiian monk seal. Staff scientists study the effects of environmental changes and human activities on fisheries and marine animal habitats and 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 Honolulu Laboratory was built in 1950 on a site adjacent to the University of Hawaii on land deeded to the U.S. Government by the State of Hawaii. It sits on a 2.2-acre site with one two-story permanent facility and two one-story annexes. Being next to the university encourages active cooperation of laboratory and university scientists from a number of disciplines. The Laboratory also includes the dockside Kewalo Research Facility on land leased from the State of Hawaii. This facility includes laboratories tailored for various research activities, including saltwater tanks for fisheries and protected marine animal research. The NOAA ship Townsend Cromwell is assigned to the Honolulu Laboratory primarily to investigate nearshore and offshore fishery resources. The laboratory also houses the Hawaii CoastWatch/Ocean Color regional node for oceanographic research.

A special research relationship exists with the Joint Institute of Marine and Atmospheric Research (JIMAR), a NOAA-University of Hawaii cooperative institute. This arrangement promotes formal interaction between the university and the Honolulu Laboratory, including visiting scientist programs and facilitation of funding of research with the university.

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Appendix 9

The Pelagic Fisheries Research Program

The Pelagic Research Fisheries 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 PRFP 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 PRFP has funded more than 30 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.

Research Projects Funded in 1999

Biology projects: (1) Population Biology of Pacific Oceanic Sharks, (2) Developing Tools to assess Sex and Maturational Stage of Bigeye Tuna (Thunnus obesus) and Swordfish (Xiphias gladius)

Economics projects: (1) Economic Fieldwork on Pelagic Fisheries in Hawaii, (2) Analysis of Alternatives for Participation in International Management of Pelagic Fisheries, (3) Analyzing the Technical and Economic Structure of Hawaii's Pelagic Fishery

Oceanography project: The Role of Oceanography on Bigeye Tuna Aggregation and Vulnerability in the Hawaii Longline Fishery from Satellite, Moored, and Shipboard Time Series

Statistics and modeling project: Pacific-Wide Analysis of Bigeye Tuna (Thunnus obesus) using a Length-Based, Age Structured Modeling Framework (MULTIFAN-CL)

PRFP Publications for 1999

Chakravorty, Ujjayant and John Sibert, 1999. Ocean-scale management of pelagic fisheries: Economic and regulatory issues. (Proceedings of an international workshop organized by the Pelagic Fisheries Research Program, JIMAR, UH, November 12-13, 1997). SOEST Publication 99-01, JIMAR Contribution 99-321, 102 pp.

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Appendix 10
GLOSSARY — PELAGICS

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

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.

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.