The 1996 U.S. Purse Seine Fishery for Tropical Tunas in the Central-Western Pacific Ocean

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Background

Commercial fishing for tropical tunas (yellowfin, *Thunnus albacares*; skipjack, *Katsuwonus pelamis;* and bigeye, *T. obesus*) in the western Pacific Ocean by U.S.-registered purse seiners has been managed according to requirements of the South Pacific Regional Tuna Treaty (SPTT) since June 1988. This treaty is between the United States and 16 Pacific island countries[1]. It provides U.S. tuna purse seiners access to tropical tunas in a 25.9 million km^2 area of the central-western Pacific Ocean (Fig. 1) in exchange for fishing fees and adherence to rules related to closed areas, data reporting, etc. (FFA, 1994; NMFS[2]). The agreement ends in 2003.

Data requirements of the SPTT include reporting of fishery statistics and biological data from the catches. The Southwest Region (SWR) of NOAA's National Marine Fisheries Service (NMFS) is responsible for administering Treaty requirements for the United States and for coordinating with the Forum Fisheries Agency (FFA), Treaty Administrator for the 16 Pacific island countries.

SWR field personnel in American Samoa monitor landings of all licensed vessels, collect fishery statistics, sample the catches, and provide the results to the FFA and the NMFS Southwest Fisheries Science Center (SWFSC). The SWFSC processes the data and transmits the processed data to the FFA on a bimonthly basis. Data involved are records from Regional Purse Seine Logbooks, Unloading Logs, and sizes of fish and species composition from port sampling of landings.

In this report, fishery statistics for the 1996 fishing season are summarized and reviewed along with similar historical data for the fishery. The fishing season used is the calendar year, January–December, which is different from the "SPTT year," 15 June of one year to 14 June of the next year. Because complete 1996 statistics are not yet available, year-end results are extrapolated from 86% of the available statistics to provide a preliminary estimate of 1996 results.

Fishery Monitoring

In 1996, a U.S. fleet of 40 purse seiners fished in the SPTT area and completed a total of 175 fishing trips. Regional Purse Seine Logbooks and Unloading Logs were collected after every trip. Landings were also sampled for sizes of fish and for species composition. Sampling was conducted largely in Pago Pago, American Samoa, where about 94% of the fleet's catch was landed, and to a minor extent in Tinian, Northern Mariana Islands. Over 58,800 tuna (21,200 yellowfin, 24,200 skipjack, and 13,400 bigeye) were examined and fork length (FL) measurements taken by NMFS technicians. Sampling coverage was in accordance with an agreed-upon sampling program (Coan et al.[3]) designed for estimating with statistical accuracy overall species composition of the landings and sizes of each species landed by the fleet.

Yellowfin and bigeye tuna have traditionally been landed combined and recorded in U.S. statistics as "yellowfin tuna" because these species are difficult to separate, especially for small individuals, and cannery prices for both species are identical. Sampling by

[1] Australia, Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Solomon Islands, Tonga, Tuvalu, Vanuatu, and Western Samoa.

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ABSTRACT—The U.S. tropical tuna purse seine fleet has fished the central-western Pacific Ocean under the South Pacific Tuna Treaty since 1988. The 1996 fishery was the poorest since the start of the Treaty. Fishing effort declined due to the financial collapse of a large fishing enterprise. Catches reached record lows for yellowfin tuna, Thunnus albacares, *and skipjack tuna,* Katsuwonus pelamis, *and continued a declining trend that started in 1995. Catch rates also decreased to the lowest levels since 1991. Whether this declining trend in catch rates is due to reduced availability of fish caused by cyclic ocean environmental changes affecting vulnerability or to reduced abundance from excessive fishing pressure is not yet known and needs to be assessed.*

[2] NMFS. 1993. Purse seine fisherman's guide to the South Pacific Tuna Treaty. U.S. Dep. Commer., NOAA Natl. Mar. Fish. Serv., Southwest Reg., 21 p.

[3] Coan, A. L., N. Bartoo, and G. Sakagawa. 1988. Plan for collection of fisheries data from U.S. tuna purse seiners fishing in the South Pacific. U.S. Dep. Commer., NOAA, Natl. Mar. Fish. Serv., Southwest Fish. Sci. Cent. Admin. Rep., LJ-88-19, 19 p.

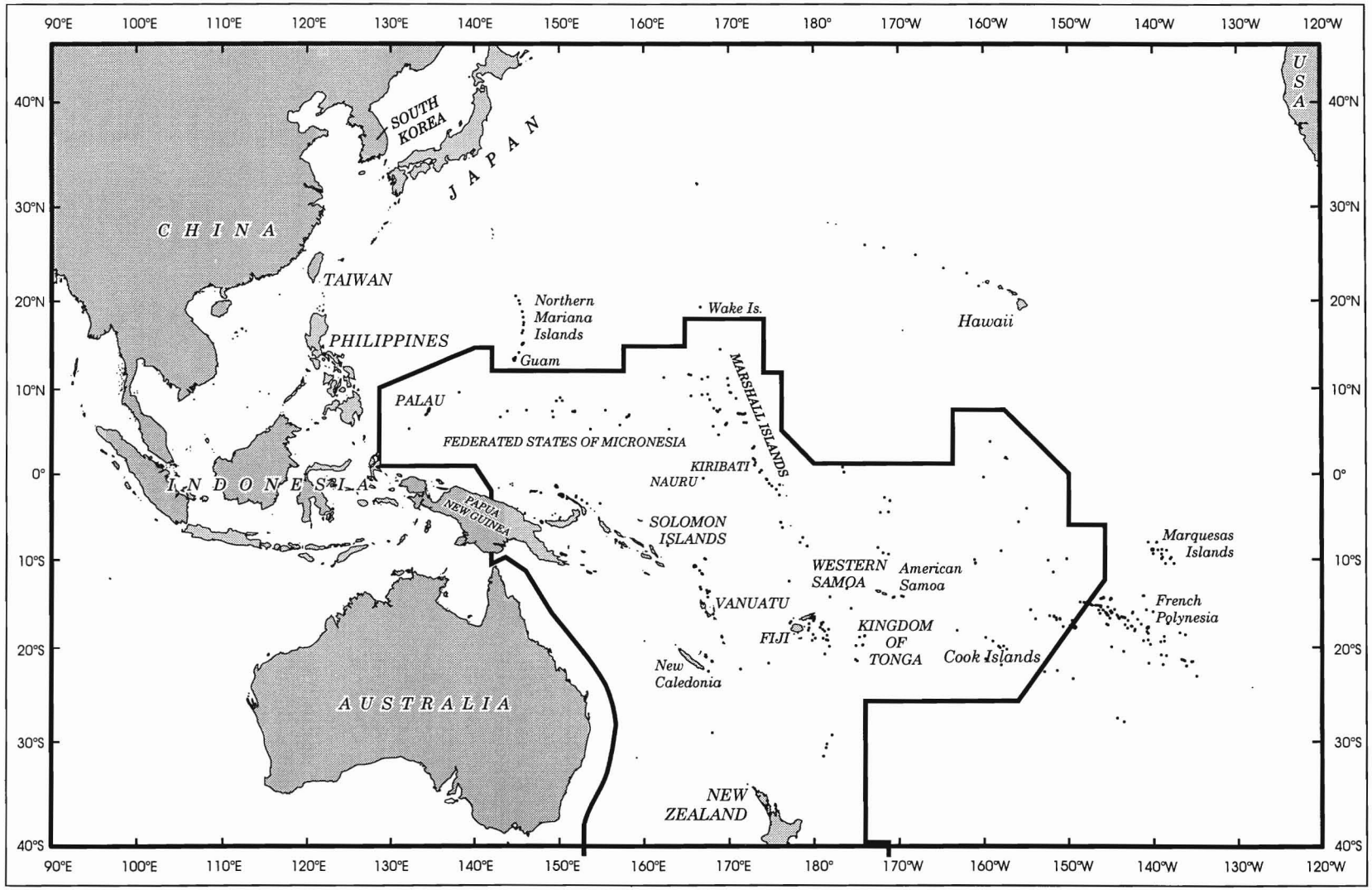

Figure 1.—South Pacific Regional Tuna Treaty (SPTT) area.

NMFS personnel was, therefore, established for accurately determining the species composition in the "yellowfin tuna" landings.

In 1996, canneries in Pago Pago began, for the first time, to separate bigeye tuna from yellowfin tuna and record their landings separately. This practice started in November and has not yet been validated for accuracy. Landings statistics by species from canneries were not used in this report. Instead, data collected solely by NMFS port samplers were used to estimate species composition in "yellowfin tuna" landings. The estimation procedure was similar to that used in the past (Coan et al.[4]) and takes into account differences in species composition between different types of sets and different sizes of fish in the sets.

Fishing Area

During 1996, the U.S. fleet spent 6,038 fishing days in the equatorial belt, extending from about long. 155°W to long. 140°E, which is the traditional fishing zone for the fleet (Fig. 2). Most (75%) of the fishing was conducted in the eastern region, east of long. 160°E, of this zone and in the area between Kiribati and Tuvalu. Traditionally, when fishing is concentrated in this area, catches are primarily from free-swimming, schooling fish, and at most 20% of the sets are on schools associated with floating objects. The 1996 season, however, was an exception; about 41% of the sets were made on floating objects. Furthermore, it appears that this high percentage resulted from increased use of fish aggregating devices (FAD's) by the fleet.

Compared to the 1995 season, the 1996 season was strikingly different. The fleet was about 10% smaller than in 1995 and spent 23% fewer days fishing. Fishing was concentrated in the eastern region, whereas in 1995 it was concentrated in the western region (72%) between Papua New Guinea and Federated States of Micronesia (Fig. 3). Statistics on the number of sets/trip and trips/vessel, on the other hand, were essentially identical for the two years (Table 1). Number of days/trip was about 6% more in 1996 than in 1995, probably because fish schools were harder to find.

Catches

The fleet caught about 126,100 t of tuna in 1996 (Table 2), including 1,400 t of catch discarded at sea. Approximately 56% of this catch was made on schools associated with floating objects and 44% on free-swimming schools. Skipjack tuna was the dominant species in the catch at 100,900 t, or 80% of the total. Skipjack tuna catches were generally high in all months except December (Fig. 4), and high catches were from around Kiribati. Sizes of skipjack tuna landed ranged from 32 cm to 76 cm FL and averaged 51 cm FL (Fig. 5). Fish were slightly smaller, on the average, in catches from schools associated with floating objects (49 cm FL) than from free-swimming schools (53 cm FL).

Yellowfin tuna was second in importance at 16,100 t, or 13% of the total catch. Yellowfin tuna catches were high during January–March and were made mainly off Papua New Guinea (Fig. 4). Average size of yellowfin tuna landed was 64 cm FL, ranging from 32 cm FL to 146 cm FL (Fig. 6). For fish caught in schools associated with floating objects, the average was 59 cm FL and significantly smaller than fish caught in free-swimming schools (average 83 cm FL).

Bigeye tuna made up about 7% of the total U.S. catch, or 9,100 t. Sizes of bigeye tuna ranged from 37 cm FL to 111 cm FL, averaging 58 cm FL (Fig. 7).

Compared to the 1995 season, total catch was down 24%, the lowest since 1988. The skipjack tuna catch declined 24%, yellowfin tuna catch declined 50%, while the bigeye tuna catch increased 184%. This increase in the bigeye tuna catch may be related to the increased use of FAD's, but other factors

Table 1.—Fleet statistics for U.S. tuna purse seiners fishing in the central-western Pacific Ocean.

Year	Vessels			Days/ trip	Sets/ trip	Trips/ vessel
	Licensed[1]	Fished[1]	Trips			
1988	35	31	71	69.25	46.07	2.29
1989	35	35	154	57.96	41.88	4.40
1990	51	43	181	47.32	34.79	4.21
1991	48	43	229	42.38	40.39	5.33
1992	44	44	212	46.23	35.09	4.82
1993	42	42	199	51.92	37.28	4.74
1994	48	49	239	44.22	35.51	4.88
1995	47	44	206	49.14	33.39	4.68
1996[2]	34	40	175	51.93	34.21	4.38

[1] The number of vessels that fished can be different from the number of licensed vessels, since vessels are licensed from 15 June of one year to 14 June of the next year, whereas any vessel fishing in a calendar year is recorded as fished.
[2] Data for 1996 are preliminary.

Table 2.—Catches (t) and catch rate (t/day fished) for U.S. tuna purse seiners fishing in the central-western Pacific Ocean.

Year	Catch				Catch rate		
	Yellowfin	Skipjack	Bigeye	Total	Yellowfin	Skipjack	Total
1988	18,832	93,636	1,948[1]	114,416	3.01[1]	15.37[1]	18.38[1]
1989	42,886	95,027	2,421	140,334	7.26	14.59	21.85
1990	52,089	110,044	1,762	163,895	8.91	16.66	25.57
1991	37,330	177,389	1,550	216,269	5.70	24.78	30.48
1992	43,693	155,898	3,480	203,071	6.39	21.48	27.87
1993	46,011	148,419	3,731	198,161	6.46	18.29	24.75
1994	56,426	151,486	1,711	209,623	7.63	18.61	26.24
1995	31,845	132,518	3,190	167,553	4.68	17.39	22.07
1996[2]	16,070	100,945	9,075	126,090	3.42	12.92	16.34

[1] Estimated from data for 6 months (June–December 1988).
[2] Data for 1996 are preliminary.

[4] Coan, A. L., G. Sakagawa, and D. Prescott. 1995. Bigeye tuna catch in the U.S. tuna purse seine fishery of the central-western Pacific. Fifth meeting of the Western Pacific Yellowfin Tuna Research Group, August 21–23, 1995, Noumea, New Caledonia, WPYRG5/6, 11 p.

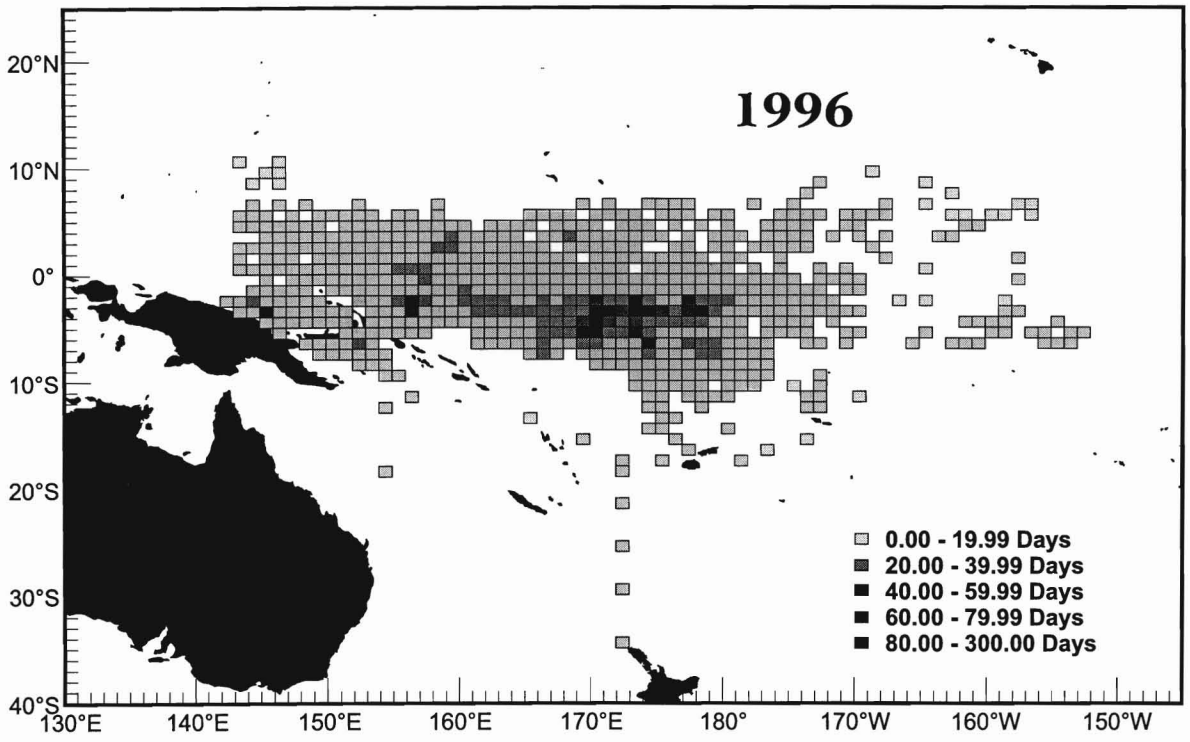

Figure 2.—Distribution of fishing effort (days fished) for U.S. tuna purse seiners fishing in the central-western Pacific during 1996.

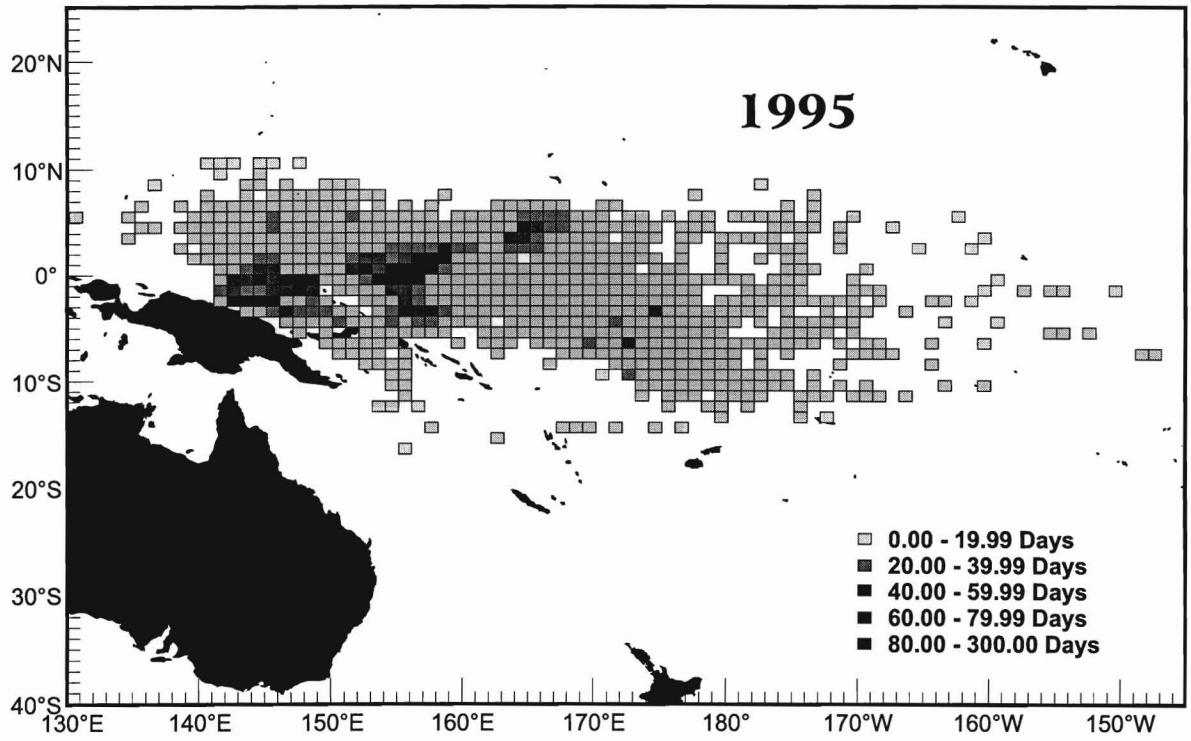

Figure 3.—Distribution of fishing effort (days fished) for U.S. tuna purse seiners fishing in the central-western Pacific during 1995.

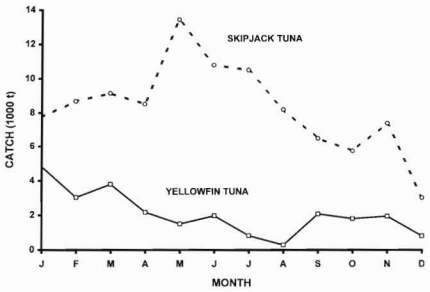

Figure 4.—Monthly catches of yellowfin and skipjack tunas from the 1996 U.S. tuna purse seine fishery in the central-western Pacific.

may also be involved. A comprehensive analysis of this increase has not yet been undertaken.

Pago Pago was the primary destination for the catch in 1996 (Fig. 8). About 94% of the total catch was landed in Pago Pago and the rest in ports of Papua New Guinea (4%, Wewak, Kavieng, Rabaul), Guam/Northern Mariana Islands (1%), Solomon Islands (1%, Honiara), and New Zealand (0.1%, Port Lincoln). Canneries in American Samoa utilized about 85% of the catch, and the rest (15%) was exported to other canneries in the Pacific region as well as to canneries in Puerto Rico and Turkey.

By-catch and Discards

The practice of reporting by-catches and discards is becoming more routine for the fleet. In 1996, about 75% of the trips reported by-catch and/or discard information. The data were tabulated using species and species groups reported in the logbooks. For convenience, the species were grouped under four large categories: Tunas, Billfishes, Sharks, and Others[5] (Table 3). Under this scheme, tunas, by far, made up the largest share (92% by weight) of reported by-catch and discards, with skipjack tuna the dominant species. This discard represented 1.1% of the retained tuna catch and was rejected largely because the fish were too small for the targeted market. Sharks, at 5% of the reported by-catch, were next in importance, followed by others with 2%, and billfishes with less than 1%.

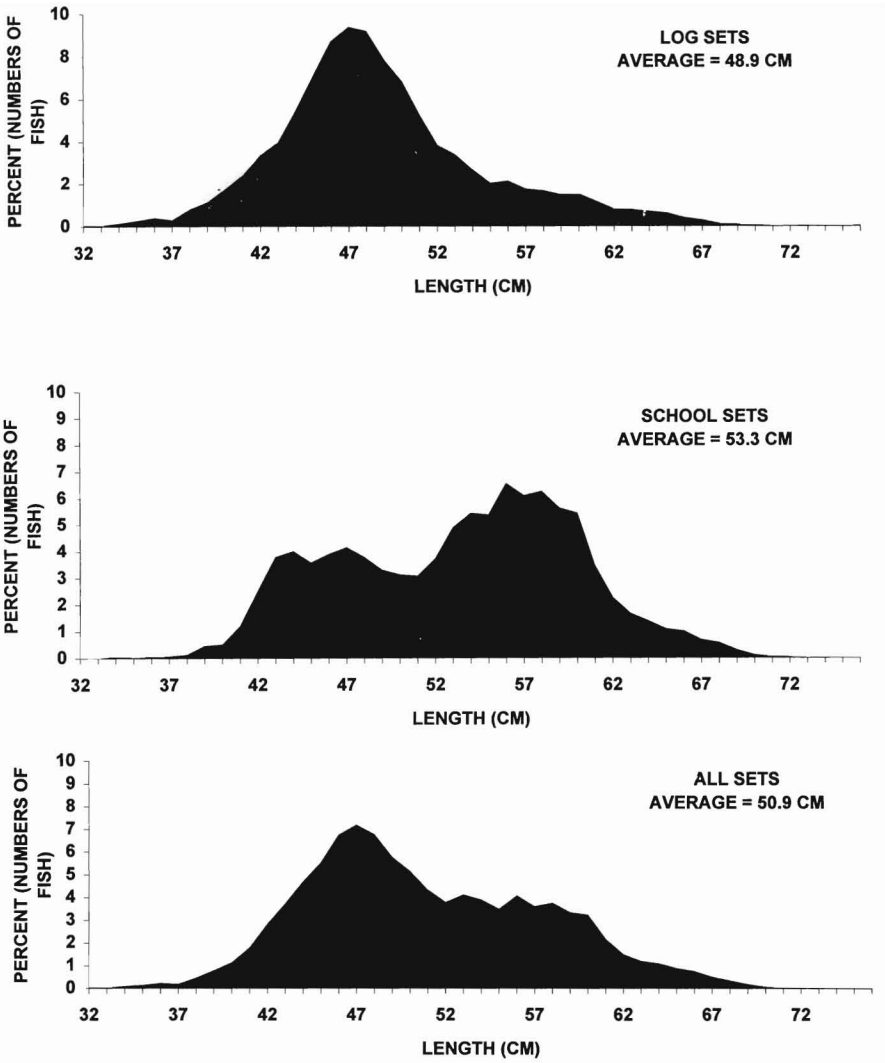

Figure 5.—Length distributions, by set type, of skipjack tuna caught by U.S. tuna purse seiners fishing in the central-western Pacific during 1996.

Catch Rates

Overall catch rate in 1996 was 16.3 t/day fished (Table 2). The rate for yellowfin tuna was 3.4 t/day fished and for skipjack tuna, 12.9 t/day fished. This overall rate is similar to that recorded for other tropical tuna purse seine fisheries, such as 15 t/day fished in the eastern tropical Pacific (IATTC, 1997), 14 t/day fished in the eastern tropical Atlantic (Ariz et al., 1995; Hallier and Diouf, 1995), and 21 t/day fished in the western Indian Ocean (Seychelles Fishing Authority, 1996). The western Pacific fishery, however, is dominated by skipjack tuna catches, whereas the other fisheries are dominated by yellowfin tuna catches. Hence, they are not equally comparable.

Compared to catch rates of past years, the overall 1996 rate continued the decreasing trend that began in 1992 (Table 2). The decline was 40% for yellowfin tuna and 48% for skipjack tuna from the 1991 catch rates. Catch rates in 1996 were significantly below the long-term (1988–95) averages of 6.3 t/day fished for yellowfin tuna and 18.4 t/day fished for skipjack tuna.

[5] In the "Others" category, rainbow runner, *Elagatis bipinnulatus*, and bait fishes such as mackerels (Scombridae), triggerfishes (Balistidae), Pacific bonito, *Sarda chiliensis*, etc., were dominant species.

Table 3.—By-catch and discards from logbooks maintained by U.S. tuna purse seiners fishing in the central-western Pacific Ocean in 1996.

Species	Weight (t)	No. of fish[1]
Tunas (92% by wt.)	73.71	
Skipjack	1,253.50	
Yellowfin	19.32	
Bigeye	2.70	
Skipjack/yellowfin	68.71	
Yellowfin/bigeye	0.09	
Billfishes (0.5% by wt.)		
Black marlin	2.98	
Blue marlin	1.91	
Marlin	2.19	
Sailfish	0.04	
Striped marlin		1
Swordfish		1
Sharks(5% by wt.)	77.93	
Others (2% by wt.)		
"Baitfish[2]"	12.80	
Bat ray		1
Kingfish	0.01	
Mackerel	1.25	
Mackerel/shark[3]	0.09	
Mahi mahi	0.68	
Manta ray	0.07	
Rainbow runner	17.58	
Rainbow runner/shark[3]	0.58	317
Shark/"Baitfish[3]"	1.02	
"Trash fish[4]"	0.07	
Triggerfish	0.26	
Triggerfish/shark[3]	0.53	
"Mixed fish[4]"	0.78	
Wahoo	0.06	
Rainbow runner/triggerfish	0.06	
Rainbow runner/triggerfish/shark[3]	0.16	

[1] "No. of fish" reported is exclusive of those listed under "weight."
[2] Such as mackerels, bonitos, and others.
[3] Sharks were sometimes combined with other species and were reported in different categories since they could not be separated.
[4] The exact species included in these categories is unknown.

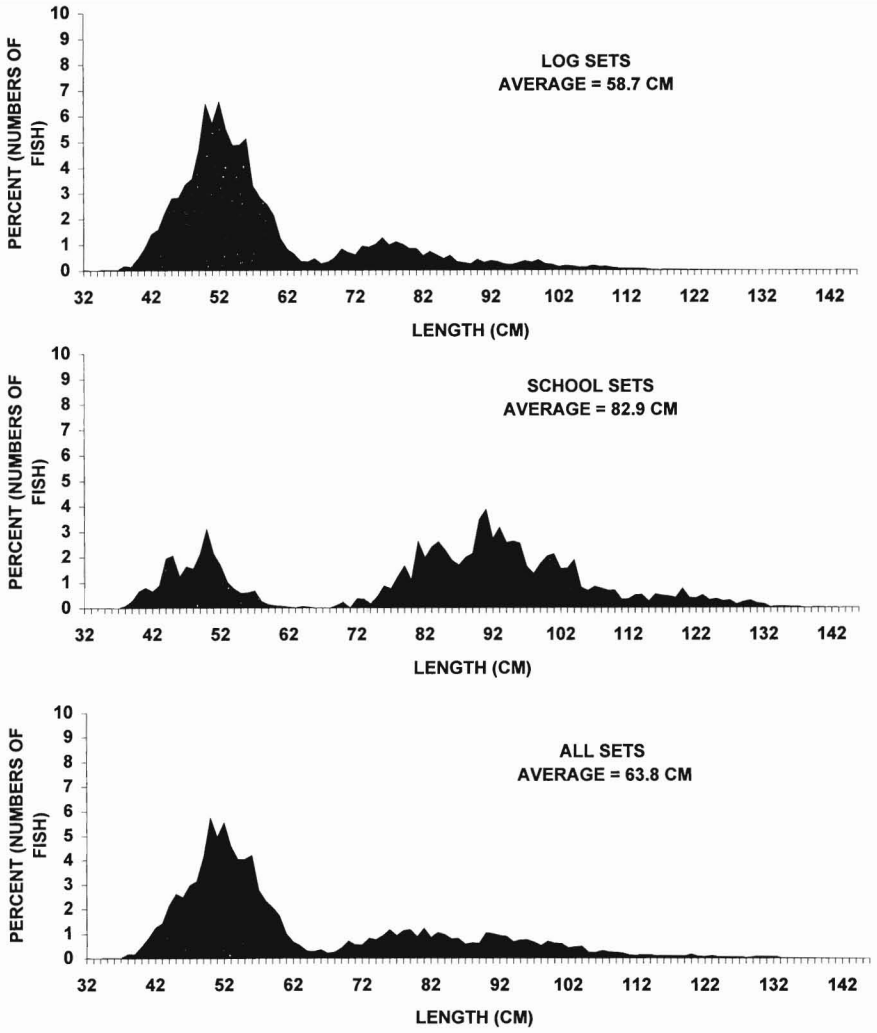

Figure 6.—Length distributions, by set type, of yellowfin tuna caught by U.S. tuna purse seiners fishing in the central-western Pacific during 1996.

Performance

The U.S. fishery was adversely affected by a number of events in 1996 and recorded one of its poorest seasons. Most significant of the events was the financial collapse of a large tuna fishing enterprise that operated 12 licensed vessels and one freezer facility on Tinian (Platt, 1996). The result was a significant decrease in fishing effort and catch for the fishery owing to a withdrawal of about 11 licensed vessels in mid-year. This collapse is likely to have a lasting effect well beyond the 1996 season.

Another adverse event was the reduced availability of fish. The fleet continued to experience declining overall catch rates, with 1996 producing the poorest rate since the start of the SPTT agreement. The highest rate recorded by the fishery was 30.5 t/day fished in 1991. Since then the rate has declined, falling 46% to 16.3 t/day fished in 1996. Whether this declining trend is due to reduced availability of fish owing to cyclic ocean environmental changes affecting vulnerability or to reduced abundance from excessive fishing pressure is not yet known. In the past, scientific evidence has shown that the stocks were moderately exploited and able to sustain current catch levels (SPC[6]). Nonetheless, the fleet struggles to remain profitable and new fishing procedures, such as use of FAD's to improve catch rates, are being more widely used.

Although 1996 was a poor season for the U.S. fleet, the U.S. fishery remained an important source of tuna production for the region and the U.S. market. The catch represented about 14% of the total tropical tuna catch from the western Pacific Ocean, not counting the production of fisheries in Indonesia and the Philippines. It also contributed about 49% of the raw material needs of U.S. canners in 1996 for a production of 27.4 million standard cases of canned light meat tuna.

[6] SPC. 1996. Status of tuna stocks in the western and central Pacific Ocean. Ninth Standing Committee on Tuna and Billfish, 22–23 July 1996, Noumea, New Caledonia. Work. Pap. 3, 37 p.

Acknowledgments

We wish to thank the U.S. captains and cannery personnel for their cooperation and assistance during the 1996 season in the collection and reporting of fishery statistics. Their efforts made it possible for NMFS to complete re-

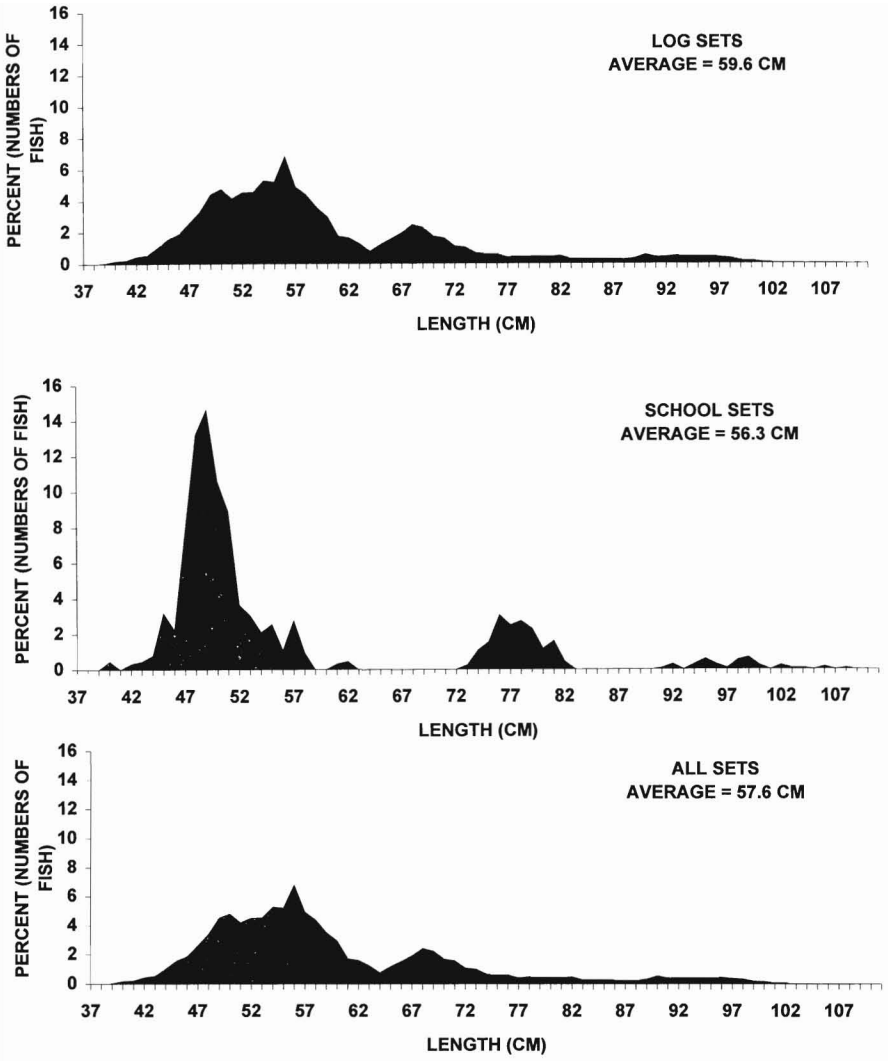

Figure 7.—Length distributions, by set type, of bigeye tuna caught by U.S. tuna purse seiners fishing in the central-western Pacific during 1996.

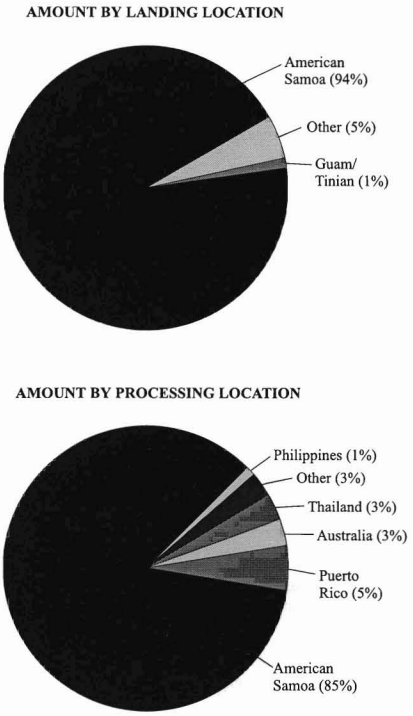

Figure 8.—Locations of landings and processors of catches from U.S. tuna purse seiners fishing in the central-western Pacific during 1996.

quirements of the SPTT agreement and to document the performance of the fishery. The cooperation of the FFA staff is also acknowledged and appreciated.

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