

CURRENT OUTLOOK OF STOCK CONDITION AND FISHERIES  
FOR NORTH PACIFIC ALBACORE

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## Current Outlook of Stock Conditions and Fisheries for North Pacific Albacore

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### Background

The United States and Japan have traditionally been the principal nations with fishing fleets for North Pacific albacore (*Thunnus alalunga*). They have an extensive program to monitor and collect statistics from their fleets and have been involved in research on the biology and condition of the stock for many years. In the early 1970s, scientists involved in the research proposed that a special scientific forum be established for exchange of research results and information required to assess the condition of the resource. In 1974, a forum was created through an informal agreement between the Far Seas Fisheries Research Laboratory (FSFRL), Shimizu, Japan and the Southwest Fisheries Center (SWFC) of the National Marine Fisheries Service, La Jolla, California, U.S.A. In 1982, the agreement was extended to include the Pacific Biological Station, Nanaimo, British Columbia, Canada as a co-sponsor.

The eleventh forum, or workshop was held on May 24 and 25, 1989 in La Jolla, California. Invitations to participate were extended to all organizations with an active research program on North Pacific albacore, and many organizations sent scientists. The report of the workshop is being prepared by the conveners, Norman Bartoo of SWFC and Yoh Watanabe of FSFRL. I used information presented at this workshop, and from a comprehensive document on the fisheries and population biology of North Pacific albacore by Parrish et al. ("Albacore management information document", 1989, NOAA-TM-NMFS-SWFC-126) in preparing this report. I thank Norman Bartoo and Richard Parrish for allowing me to freely use their material.

### The Resource

In the North Pacific Ocean, a single population of albacore occurs from approximately the equator to the subarctic convergence (45° N lat., Figure 1). Within this region, the population is unevenly distributed particularly with respect to age/size, season and location of oceanographic features, mainly frontal formations. Mature adults are primarily found associated with the tropical convergence zone (Figure 2), juveniles (ages 1 and 2 yrs) primarily associated with the Kuroshio and Kuroshio Extension Currents, subadults (ages 3 and 4 yrs) mainly in the Subarctic Convergence Zone, the California Current, and young adults (ages 5 and 6 yrs) principally associated with the Kuroshio and Kuroshio Extension

Currents. Spawning appears to be year round in the tropical western Pacific, from approximately the Philippines to near Hawaii.

The condition of the North Pacific albacore resource has traditionally been determined from fisheries information. Because of the uneven distribution of the resource and the limited fishing area of each fishery, data from three different sources -- U.S. jig fishery, Japanese pole-and-line fishery and Japanese longline fishery -- have been used in the determination. The most recent assessments of stock condition are summarized as follows.

In 1987 all indices indicated that the stock abundance was trending upward since about 1980. This was consistent with changes in the fisheries, particularly a 70-90% reduction in fishing effort since the early 1970s and approximately 45% decline in catch. Scientists concluded that the stock was in good condition and was recovering from the heavy exploitation in the early 1970s. However, fishermen on both sides of the North Pacific were indicating that albacore was increasingly less available.

In 1989 the data were re-examined along with additional information. A flaw was uncovered in the standardization procedure used to compute standardized catch-per-unit-of-effort (CPUE) with the U.S. data. This was corrected, and the index now shows a rapid decline from the early 1970s through 1980 and a stable or slightly declining trend since then (Figure 3). Because the U.S. fishery catches principally 3- and 4-year-old albacore, this trend indicates abundance of only the subadults.

The Japanese pole-and-line fishery data were re-examined in a different way. Although the overall CPUE index continues to show an upward trend since 1976 (Figure 3), when examined with consideration for different sizes of fish caught and season, the abundance of juveniles and subadults for 1985 through 1989 appear to be low and decreasing relative to levels for previous years. Furthermore, in spring 1989 at least one age group (3-year olds, 60-70 cm FL) was present in unusually low numbers in the catch. This has not been observed previously and will result in overall lower 1989 catches for this fishery. This has not been observed previously and will result in overall lower 1989 catches for this fishery. This summer (1989) when this yearclass (1986) becomes available to the North American fishery, catches can be expected to be lower in this fishery too.

Complete CPUE information for the Japanese longline fishery has lagged behind by a couple years, so current information is not available. However, CPUE information up to 1986 shows an overall flat trend since the early 1970s and a downward trend between 1984 and 1986 (Figure 3). Re-examination of this information, as well as additional information for recent years by age of fish taken and during only the winter season, indicates that the abundance of subadults has declined between 1986 and 1989, and may be currently at an all-time low.

Given these results, scientists now believe that the North Pacific albacore stock maybe in much poorer condition than believed in 1987. The combination of declining CPUE as fishing effort declined, the recent appearance of weak yearclasses, and the increased drift gillnet activity in the North Pacific causes many to be concerned that adequate recruitment to rebuild the adult stock might not be available.

### The Fisheries

The directed fisheries for North Pacific albacore are categorized for convenience into four: U.S. surface, Japanese surface, Japanese longline and Japanese gillnet. The U.S. fishery occurs off the North American coast during the summer and fall months. This is a surface fishery with participation by U.S. and to a lesser extent Canadian fishermen, both for commercial and sport purposes. The dominant gear is jig, or trolling. Lesser gears are pole-and-line, drift gillnets, and rod-and-reel.

The Japanese surface fishery started in the mid-1920's and consists of various sizes of pole-and-line vessels that operate along the Kuroshio and Subarctic Current fronts during the spring months. The vessels fish skipjack (*Katsuwonus pelamis*) as well as albacore. During the remainder of the year, many of the vessels switch to fishing the southern waters for skipjack and yellowfin (*T. albacares*) tunas.

Since the early 1950's, the Japanese have operated an extensive longline fishery for tunas in the North Pacific. The fishery has evolved over the years with respect to sizes of vessels, setting of gear, and target species. Currently, this fishery is geared primarily to produce high-quality bigeye (*T. obesus*) and yellowfin tuna for the "sashimi" market and not albacore for the canning market. Nonetheless, during the winter months, albacore makes up an important part of the longline catch from the mid-to-Western North Pacific.

The Japanese drift gillnet fishery began as an offshoot of the coastal gillnet ("Omi-ami") fishery for marlins (*Istiophoridae*) near the Japanese home islands. Albacore catches were recorded for this fishery beginning in 1972. Most of the reported catches through 1980 were incidental catches made off Japan. In 1981 gillnet catches of albacore increased substantially due to expansion of the fishery eastward along the Kuroshio Extension Current, and albacore became a target species. Soon after, Taiwan gillnetters joined this fishery and expanded the fishing further eastward. The operations of gillnet fleets, other than for Japan, are not fully known.

Annual albacore catches have ranged from 46,000 MT in 1986 to 123,000 MT in 1976. Most of the variability in the total catch is due to the Japanese surface fishery (Table 1). Available data (since 1952) by country and gear type, indicate that the North Pacific albacore fishery has averaged about 73,000 MT per year.

The Japanese surface fishery averaged 35,467 MT per year or 48% of the 1952-86 catch while the U.S. surface fishery averaged 18,407 MT (25%) and the Japanese longline fishery averaged 16,988 MT or 23%. Japanese gillnet catches were first recorded in 1972 and they have averaged about 5,000 MT since then, reaching a maximum of 13,132 MT in 1985 for the entire Pacific (most of this catch is from the North Pacific). While Japanese longline catches have remained stable, over the last decade the catches in both the Japanese and U.S. surface fisheries have declined markedly. In spite of the recent development of the gillnet fishery, total catches appear to be currently at record low levels.

### Outlook

Current information indicates that the albacore stock of subadults in the North Pacific has declined to a low level despite significant reductions in directed fishing effort since the early 1970s. There are also indications that at least one yearclass (1986 yearclass) may be unusually low in abundance. These signs are disturbing, and signal the immediate need for comprehensive information on the directed and incidental catches by gillnets, particularly on amounts and sizes of fish taken; increased monitoring of the directed fisheries to track the progression of the subadults, particularly the 1986 yearclass, through the population; and increased effort in refining methods to accurately monitor recruitment levels.

The outlook for the fisheries is dim. Given the condition of the stock, scientists so far are forecasting marginal to poor fishing for 1989 with surface fishery catches being the same or lower than the average for recent years. As the weak yearclass(es) move through the population into the adult stock, the longline fisheries should experience the effects with lower catches.

Table 1. Catches of albacore from the North Pacific by country and gear. (mt)

YEAR	JAPAN				TAIWAN			KOREA			UNITED STATES				CANADA		GRAND TOTAL	
	BAIT	LONG LINE	GILL NET <sup>1</sup>	OTHER GEAR <sup>1</sup>	TOTAL	LONG LINE	GILL NET	TOTAL	LONG LINE	GILL NET	TOTAL	BAIT	JIG	SPORT	GILL NET	TOTAL		JIG
1968	16597	23961		1109	41667	15		15				4906	20444	951		26301	1028	69011
1969	32107	18006		1480	51593	21		21				2996	18839	358		22193	1365	75172
1970	24376	15372		956	40704	23		23				4416	21041	822		26279	354	67360
1971	53198	11035		1262	65495	24		24				2071	20537	1175		23783	1587	90889
1972	60762	12649	1	921	74333	25		25				3750	23608	637		27995	3558	105911
1973	69811	16059	39	1883	87792	35		35				2236	15667	84		17987	1270	107084
1974	73576	13053	224	1065	87918	40		40				4777	20187	94		25058	1207	114223
1975	52157	10060	166	402	62785	28		28				3243	18975	640		22858	101	85772
1976	85336	15896	1070	1394	103696	37		37				2700	15932	713		19345	252	123330
1977	31934	15737	688	1039	49398	61		61				1497	10005	537		12039	53	61551
1978	59877	13061	4029	3209	80176	53		53				950	16682	810		18442	23	98694
1979	44662	14249	2856	1280	63047	81		81				303	6801	74		7178	521	70827
1980	46743	14743	2986	1516	65988							382	7574	168		8124	212	74324
1981	27426	18020	10348	959	56753							748	12694	195		13637	200	70590
1982	29615	16762	12511	1054	59942							425	6661	257		7343	104	67389
1983	21098	15103	6884	471	43556							607	9512	87		10206	225	53987
1984	26015	15111	10569	3898	55593							832	9576 <sup>2</sup>	1427		11835	50	67478
1985	20714	14320	13132	1940	50106							872	7059 <sup>2</sup>	1176		9107	56	59269
1986	16096	12945	9749	2192	40982							309	4834 <sup>2</sup>	196		5339	30	46351
1987 <sup>3</sup>	19091	14642	7617	1394	42744							146	2783 <sup>2</sup>	74		3003	104	45851
1988 <sup>3</sup>	7000		5000		12000							627	4198 <sup>2</sup>	64		4889	85	16974

11,000

<sup>1</sup> "Gillnet" statistics are for directed gillnet fishing and for the entire Pacific; incidental gillnet catches are included in other gears.

<sup>2</sup> Small amounts of catch with drift gillnets are included in this jig category.

<sup>3</sup> Preliminary estimates.

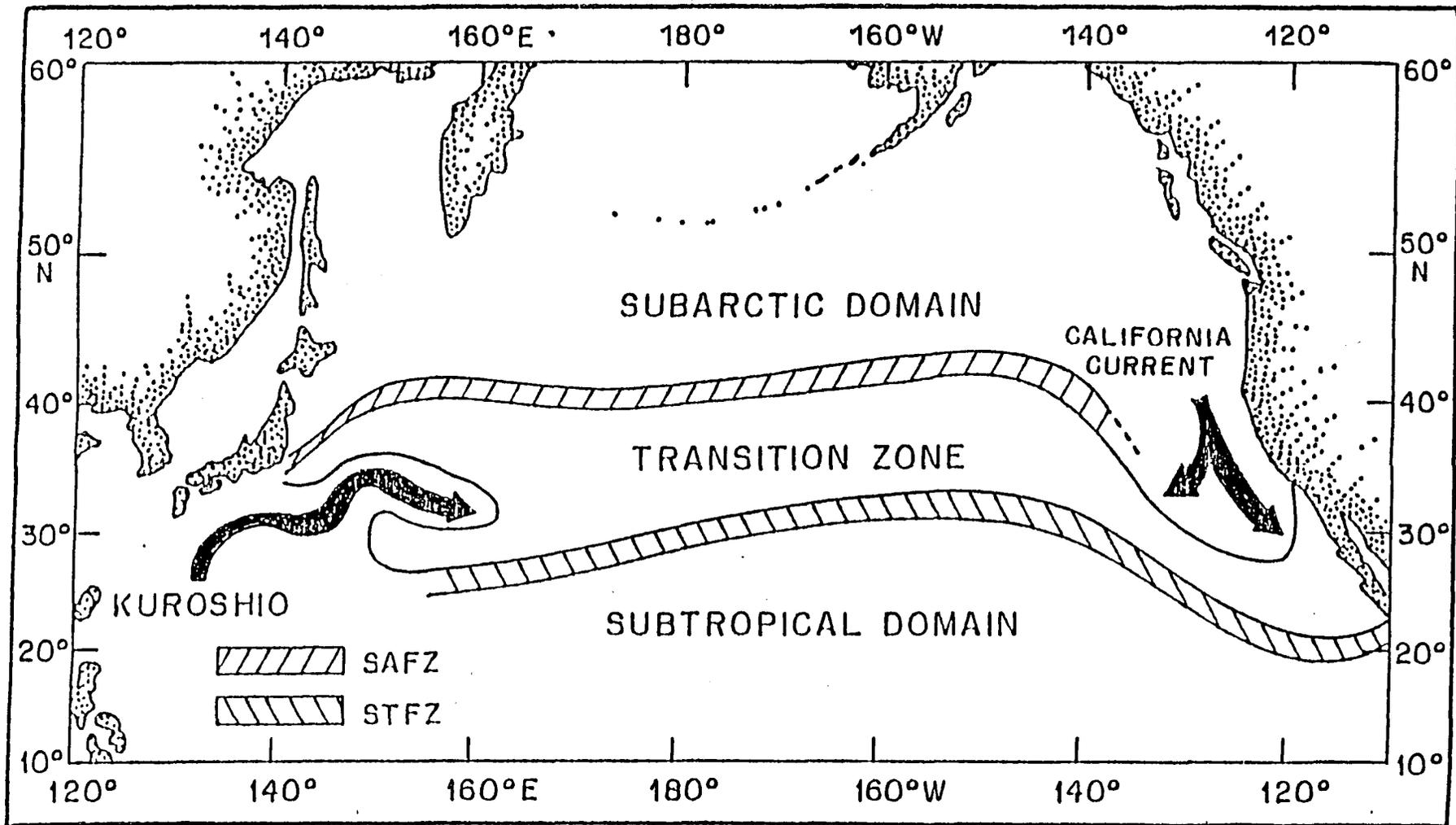


Figure 1. Map of the North Pacific Ocean showing approximate locations of the Subarctic Frontal Zone (SAFZ) and Subtropical Frontal Zone (STFZ). Black arrows indicate boundary current intrusions of the Kuroshio and California Currents.

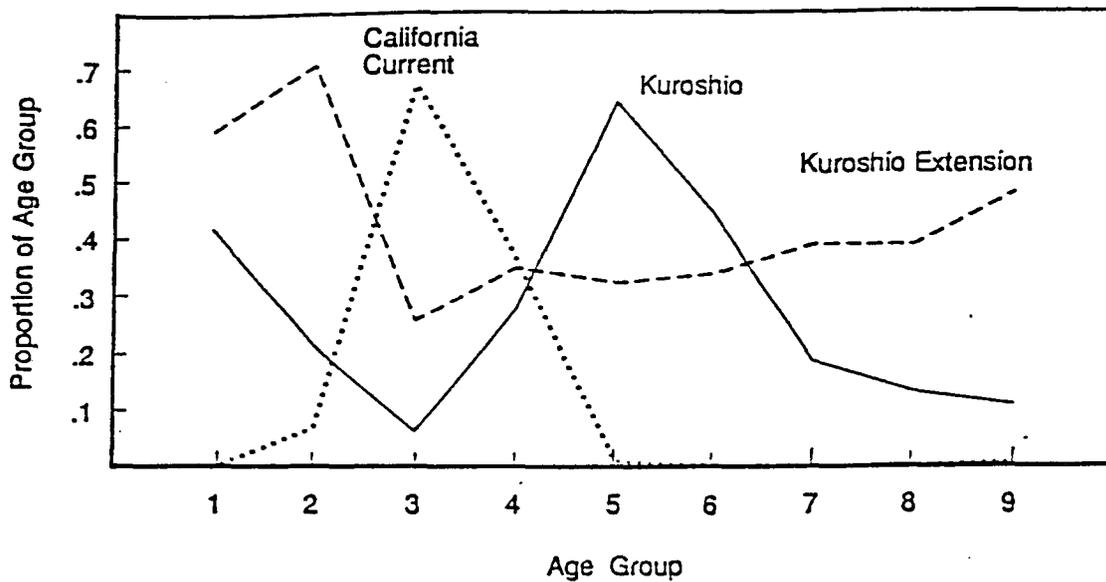


Figure 2. Proportion of age groups of albacore caught in three areas in the North Pacific. (Source: Parrish, et al.)

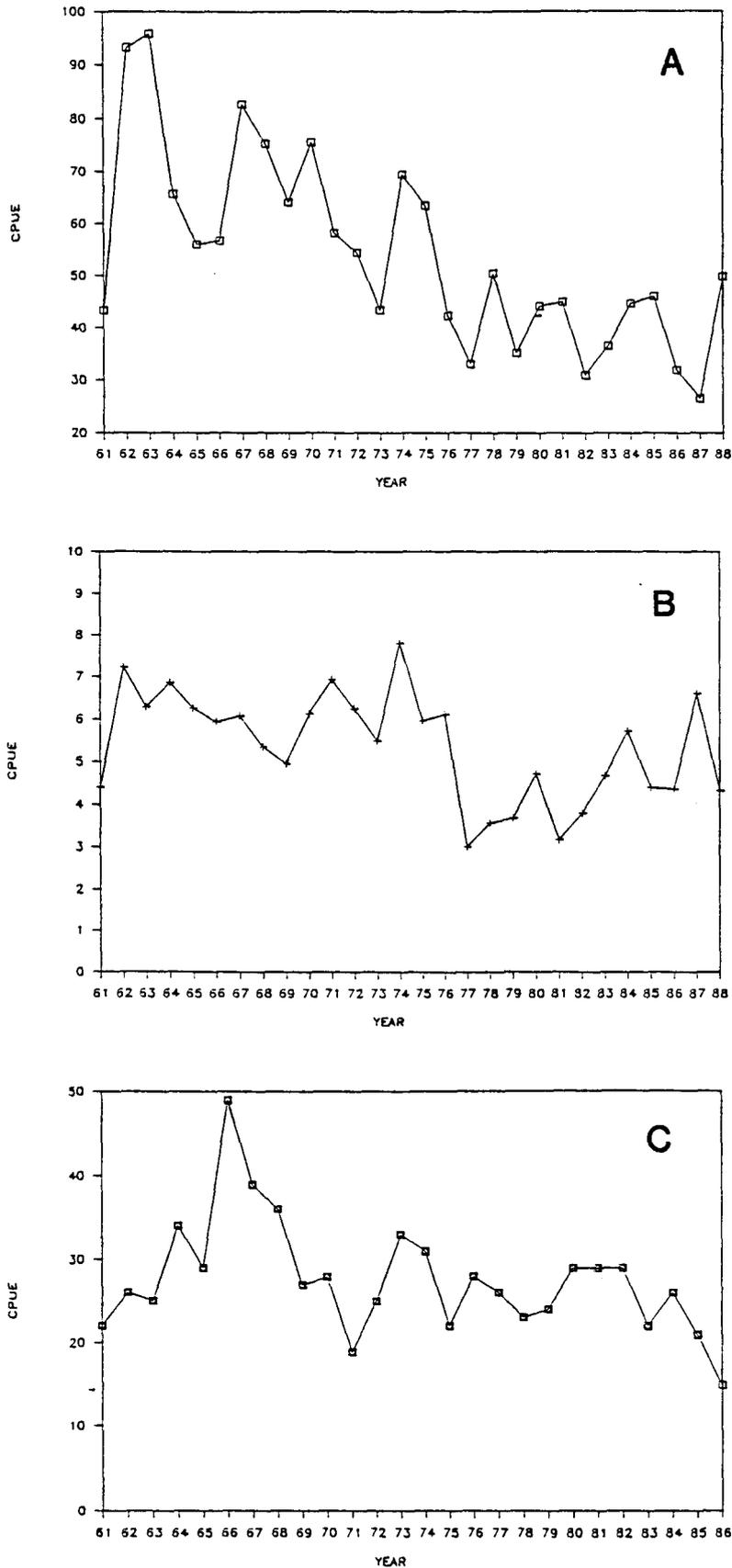


Figure 3. Indices of abundance for North Pacific albacore. A. Standardized catch (numbers) per day's fishing for the North American jig fishery. B. Standardized catch (MT) per day's fishing for the Japanese pole-and-line fishery. C. Standardized catch (numbers) per 10,000 hooks for the Japanese longline fishery.