SOUTHWEST FISHERIES CENTER

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OCTOBER 1989

REPORT OF THE ELEVENTH NORTH PACIFIC ALBACORE WORKSHOP

May 18-19, 1989

La Jolla, California, U.S.A.

By

Norman Bartoo and Yoh Watanabe

ADMINISTRATIVE REPORT LJ-89-24

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1. **INTRODUCTION**

The Eleventh North Pacific Albacore Workshop was held at the Southwest Fisheries Center (SWFC) of the National Marine Fisheries Service (NMFS) in La Jolla, California. The workshop spanned two days, May 24 and 25, 1989. Mr. John Carr, Deputy Director of the SWFC, greeted the participants and presented opening remarks. Mr. Carr noted that the last workshop was held in 1987, and that developments have occurred in the different fisheries. He emphasized that the workshop was informal and strictly scientific in purpose.

The workshop series was begun in 1974 by agreement between the Far Seas Fisheries Research Laboratory (FSFRL), Shimizu, and the SWFC. The Pacific Biological Station (PBS), Canada, later joined the agreement. The Eleventh Workshop had 29 participants from six countries (Appendix 1). Dr. Norman Bartoo served as the chair- person for the meeting. Mr. David Holts served as secretary and rapporteur. An agenda (Appendix 2) was selected. A total of 19 working papers (designated WP-1, WP-2, etc. (Appendix 3)) were presented at the workshop. The papers dealt with data, fishery descriptions, assessment of the albacore stock, stock and population definition, and environmental effects as related to albacore distribution.

2. **REVIEW OF RECENT FISHERIES**

The workshop participants described the recent years fisheries using information in the working papers and presentations.

a. Canadian Fishery. The Canadian fishery has been reduced in recent years. In 1988, the total catch was 85 mt. The peak of the Canadian fishery occurred in 1972 (Table 1) and the fishery declined to landings generally below 100 mt since 1984. The principal reason for the low catches has been poor availability of albacore in Canadian waters, coupled with good salmon catches and high salmon prices, which attracted vessels into the salmon fishery. Very good albacore catch rates, or very poor salmon catch rates, would be needed to bring effort back into the Canadian albacore fishery. Approximately 60% of the Canadian albacore catch is landed in Canada and 40% in the U.S. Canadian catch-effort data is included in the U.S. data.

b. Japanese Fishery. Information on the recent years' Japanese fishery, as well as the forecast for the 1989 summer pole-and-line fishery, was presented. The 1988-1989 fisheries were reviewed in WP-2. Catches in the Japanese fisheries were lower than in previous years. The pole-and-line fishery, which had shown a decline in catch to 16,000 mt and 19,000 mt in 1986 and 1987 respectively. In 1988, only 7,000 mt were caught by the pole-and-line fleet, recording the lowest catch in modern history. The Japanese longline fleet catches continue at the 15,000 mt level, typical of recent years. Drift gillnet (Ome-Ami) catches were about 9,700 mt in 1986, 7,600 mt in 1987 and less than 5,000 mt in 1988. Table 2 shows the number of Japanese pole-and-line vessels by size category in the fleet since 1961. In 1987, the number of large (200+ gross ton) boats declined to 89, of which 60 were active. The decline in vessels is due to economic forces; despite high prices for albacore, catch rates were low enough to make fishing unprofitable for many.

A FSFRL forecast for the 1989 summer albacore pole-and-line fishery was discussed (WP-1). Expectations for the summer season are about the same as for last year, i.e. low catches. This is due to the very low abundance of age 5 fish which is a key age class for the fishery. Additionally, ages 3 and 4 appears to be reduced in abundance. To date, pole-and-line catches are only 500 mt; quite low, bearing out the forecast.

A brief discussion of the south Pacific gillnet fishery was made. Currently, about 30 to 40 vessels are fishing in the south Pacific, increasing about 10 vessels per year.

c. Korean Fisheries. No scientists from Korea were present to describe the Korean fisheries. In general, the participants were not aware of any significant changes in the Korean fisheries for north Pacific albacore.

d. Taiwan Fisheries. The Taiwan fisheries (WP-3) for albacore in the Pacific are concentrated in the south Pacific. Taiwan's catches from the north Pacific are mostly from drift gillnets. In 1988, an estimated 11,000 mt of albacore was taken with 14,629 fishing days. Estimates of catch and effort for previous years are being worked on.

e. U. S. Fisheries. The U.S. fisheries for recent years were summarized in several working papers (WP-4,5,6). The north Pacific catch continues to be low. In 1987, only about 3,000 mt were caught. This improved a bit in 1988 with a reported catch of about 4,900 mt. The fisheries were distributed along the northern coast. In recent years, considerable effort has been diverted from the U.S. north Pacific fishery into the south Pacific fishery.

3. UPDATE OF STATISTICS

The workshop updated the various data tables using data from the working papers. The question of how to estimate Korean catches was discussed. The decision was made to use FAO statistics, partitioning them north and south based on available Korean catch-effort sample data.

Japanese catches from different gillnet fisheries were also reviewed. Estimates by directed and non-directed fisheries are shown in Table 4.

4. DISCUSSION OF STOCK CONDITION

The participants reviewed several working papers which dealt with aspects of the stock condition.

Estimates of maximum average sustainable yield (MSY) from the north Pacific albacore stock were presented in WP-9. The analysis was based on the generalized production model. Inputs to the model were catch and a version of standardized effort. The range of MSY estimates produced - 94,000 mt, 106,000 mt and 200,000 mt (for m=2.0, 1.0 and 0.0 respectively) - differed from previous MSY estimates of 86,000 mt, 87,000 mt and 136,000 mt (for m=2.0, 1.0 and 0.0 respectively) although the lower end of the ranges are relatively close. The participants noted that total catch was not used in the new analysis and that the effort standardization used may have shifted the points. It is possible that the age structure of the catch has shifted since the mid-1970's, violating a basic assumption of the model which will affect estimates of MSY.

Basic trends in catch-per-effort (CPUE) were examined in different working papers (Table 3). WP-11 examined total effort versus standardized effort in all major fisheries. The conclusion reached was that major surface fisheries, the pole-and-line and the troll fisheries, show strong declines in CPUE over the last decade. However, the longline fishery does not show the decline nearly as pronounced. The CPUE in the entire longline fishery for 1988, as reported by WP-9, is the lowest reported since 1962 and is about 40% lower than the 1981 - 1987 average.

WP-12 examined the effort standardization method used for the U.S. troll fishery data. Up to the current time, the effort standardization was based on an analysis of variance with stratification for area, time and vessel size class (fishing power). The trend in CPUE using this method showed a sharp decline in CPUE over the 1970's with a recovery since then.

The examination showed that the vessel size stratification was not needed because area and vessel size were linked. Additionally, the examination showed that the method for pooling the CPUE values from the various time-area strata was inappropriate particularly when vessels aggregate in good fishing areas. A better pooling method is the "Honma method". When effort was standardized with the Honma method, the CPUE trend for the U.S. troll fishery shows a rapid decline from the early 1970's through 1980, and a stable or slightly declining trend from 1980 through the present.

Two working papers, WP-13 and WP-14, addressed year class structures in the fishery. The Japanese longline and pole-and-line fisheries both track year-classes or cohorts through the fisheries. Data from 1985 through 1989 suggests that the abundance of small fish may be low and decreasing relative to previous years. It appears that two successive year classes, ages 3 and 4 in the summer of 1989, may be of very low abundance - something never previously seen. If this is true, low catches of age 3 fish in the U.S. troll fishery and low catches of age 4 fish in the summer Japanese pole-and-line fishery are expected in 1989. The longline fishery for adults should see a decrease in these two cohorts in the near future.

Also, the abundance of age 5 fish is very low. Because the Japanese summer pole-and-line fishery depends on this age group too, this is another reason for expecting a poor season for this fishery.

WP-13 presented an abundance index by age for fish taken in the longline fishery for 1986 through 1989 (the 1988-1989 winter fishery). The data shows that the proportion of young fish, in the catch is declining and, hence, the abundance of young fish, ages 3, 4 and 5 in 1989, may be at an all-time low.

Based on the indicators discussed above, and new data available at the workshop, the participants felt that the condition of the north Pacific albacore stock is possibly poorer than previously described. The combination of declining CPUE and effort, since the high catch period of the 1970's, in fisheries which monitor young fish, the unknown but possibly high mortalities from directed and non-directed gillnet fisheries, and the apparently missing or much decreased year-classes, suggests that the stock may be experiencing reduced recruitment. Under these circumstances, the current MSY estimates may not be applicable. This description is considerably different than previous workshop conclusions, and is only one view.

Participants noted that environmental events such as the 1983 El Niño, may have contributed to the trends. They suggested that further analyses be executed which incorporates alternative causal factors in order to more precisely determine the stock condition. Further, they noted that any look at the stock condition should be a joint study because of the difficulty in dealing with different data sets where a thorough knowledge of the data is needed.

5. BIOLOGICAL ANALYSES

Two working papers were discussed which dealt with stock/population definition.

There is increasing evidence that the north Pacific albacore population is not as homogeneous as once thought. Results of tagging studies indicate that possibly two or more sub-groups of fish contribute to the albacore population in the north Pacific. Although these sub-groups are not believed to be genetically distinct from each other, they have different characteristics such as spawning area and environmental preferences that affect early development. These conditions result in sub-groups that perhaps have different migratory patterns which, in part, affect modal sizes (at least within the U.S. fishery), growth rates, and peak spawning periods (WP-15).

Tag return data for approximately 1,700 recaptured albacore (30,000 released) indicate north Pacific albacore exhibit two different migration patterns. Pre-adult fish (less than 5 years old) from the northern most group migrate between the eastern and western north Pacific resulting in an exchange of fish between the U.S. troll fishery in coastal waters north of 40° N, the Japanese pole-and-line and gill net fisheries, and Asian longline fisheries west of 180°. Pre-adult fish belonging to the southern subgroup move between the eastern and central north Pacific resulting in an exchange between the U.S. troll fishery south of 40° N and a portion of the Asian longline fisheries to the west.

This tagging information also indicates an unexpected high proportion of albacore recovered relatively close to the original release location after one or two seasons at liberty. Nearly 50% of the fish tagged and released in the coastal U.S. waters were recovered less than 150 nm from where originally tagged. It is assumed that these fish moved into the central or western Pacific after being tagged. This suggests that north Pacific albacore exhibit navigational ability by returning to the same area visited in the past.

Length-frequency data from these tagging efforts also indicated that the subgroup north of 40° N had a significantly slower growth rate than that of the southern sub-group. This difference was consistent with length-frequency distributions from albacore caught north and south of 38° N. Growth estimates based on otolith daily increment counts were consistent with these differing growth rates.

Evidence was given in WP-15 that spawning occurs year-round but the two groups have different peak spawning periods, with the northern group spawning in summer and the southern group peaking in the fall and winter.

Further evidence supporting the two stock hypothesis was presented in WP-16. This study indicated that differences in the tag return rate suggested non-homogenous mixing and that more than one identifiable group was supporting the north Pacific fisheries. The first of two patterns to emerge is that albacore caught and tagged off the U.S. west coast represent two or more stocks that intermingle as juveniles, but eventually segregate. This would explain differences in relative return rates in the U.S. fishery. The second pattern results from a relatively higher tag return rate in the U.S. southern area than observed in the U.S. northern area. The inference being that the northern area had a greater dilution of non-tagged fish and that albacore tagged in the southern area did not mix with the sub-group supporting the northern U.S. troll fishery or the Japanese longline fishery.

6. OCEANOGRAPHIC AND ENVIRONMENTAL EFFECTS

The relationship of albacore to a broad spectrum of oceanic conditions was examined in this session. Availability of albacore in the north Pacific has long been associated with a favored range of sea surface temperatures (SST), thermal structure, major oceanic fronts and to localized effects from physical oceanic conditions. Although the presence of albacore most often occurs within a favorable set of conditions, they do not guarantee the presence of albacore. Temperature ranges differ in the various fisheries depending on the gear type, fishing area, and season (WP -17). Other oceanographic features such as oceanic fronts with their complicated thermal and salinity structure (WP-19), and the occurrence of localized oceanic phenomena (WP-18) have direct influence on the availability and vulnerability of albacore.

Data collected over the period 1971 - 1984 were used to determine that the best albacore catches west of 130° W occurred in water 17.8° - 18.9° C (64° - 66° F). Catches east of 130° W were more favorable in the cooler, 15.6° - 16.1° C (60° - 61° F) range. The depth of the thermocline showed an important relationship with the troll catch. The thermocline depth of 50 - 125m provided the best catch relationship (WP-17). Sonic tracking studies indicate albacore spend a great amount of time in the thermocline. A thermocline depth greater than this may not allow the opportunity for trolled jigs to attract these deep swimming fish. Shallow thermoclines are indicative of calm seas or intense local warming and are generally ephemeral thus not allowing the opportunity for any sustained fishing pressure. The strength of thermocline was not found to influence vulnerability.

Local oceanographic conditions, weather far at sea or near shore, can have a profound effect on albacore availability to a particular locality and fishery (WP-18). A plume of cool, high pigment content water develops southward from Point Conception, California each year. In 1982, this plum served to block the migration of albacore into the Southern

California Bight, thereby causing a low availability of albacore to both the U.S. commercial and recreational fisheries. In 1984, the southward extent of this plume was restricted and helped to funnel albacore movement into the Bight. This resulted in a high availability of albacore and good catches in both fisheries.

Long term averages for both catch and oceanographic characteristics show that albacore are found to aggregate at major ocean fronts and at coastal upwelling fronts. During the winter months albacore start appearing in the vicinity of the Subtropical Front. This is a region of deep surface mixing and albacore are taken by a deep longline fishery. Spring warming produces a shallow mixed surface layer in which temperatures advance to the north and across the Transition Zone. Albacore remain in this temperature band and become vulnerable to surface fisheries as it moves east across the Pacific. Some albacore make long migrations within the Transition Zone in the late spring, and aggregations are generally found about the Subtropical and Subarctic Fronts. During summer, the surface warming extends northward from the Subarctic Front and into the north American coastal region. As favorable conditions break down in the fall albacore retreat to the south and west.

A model to predict the availability of albacore in any of nine defined regions of the eastern north Pacific has indicated positive results. It is critical to this kind of analysis that data be collected over long periods of time and that it be available for ongoing research. The model requires and is dependent on the collection of vast quantities of climatological data and fishing logbooks, etc. to predict albacore catches in any of the nine specific regions. The model indicates very good conformation in near shore regions where the data quality is good. It was less predictive offshore because there is a sparsity of available data.

7. RECOMMENDATIONS

Throughout the workshop, the participants noted shortcomings in data and analysis which need to be corrected to clarify the condition of the albacore resource.

a. Data. It appears that data are unreported for several segments of the fishery. Data for Taiwan's gillnet catches in 1988 are available. Compilation of data for previous years is underway and should be continued and made available. Length frequencies for the various fisheries should be made available.

Data for Korea's total catch are reported to the FAO but not broken down by fishery. Korea's albacore catch by fishery and area should be reported. Catch-effort statistics for the Korean drift gillnet fishery are needed.

b. Analysis. The recent results of the condition of the albacore population makes it necessary that the analysis be reviewed in-depth and the population be assessed under various hypothesis. Care should be taken to include sources of significant mortality which may not be reported as landings (i.e., discards, dropouts, etc.). The workshop suggested that a joint study be initiated because of data interpretation problems. A meeting is planned by the FAO for November to organize stock assessment efforts for Pacific species, including north Pacific albacore. This meeting will be used to organize a joint study.

Migration studies have the potential to explain recruitment pathways from spawning sites to the fishing areas for the different subgroups. Collaborative studies on migration should be undertaken.

Sources of significant fishing mortality which are not measured by catches (landings) should be investigated. In particular, dropouts from the various gillnet fisheries should be measured.

8. ADJOURNMENT

The participants noted that with the increased concern about the condition of the north Pacific albacore stock, a special meeting to coordinate assessing the stock should be held and results circulated before the next meeting (approximately two years). The upcoming FAO consultative meeting to assess the condition of Pacific tuna stocks may serve this purpose. The time and place of the 12th North Pacific Albacore Workshop will be determined by correspondence.

Norm Bartoo and Yoh Watanabe were assigned to prepare the workshop report.

Table 1. Catches of North Pacific albacore in metric tons by fisheries, 1952-1988[1].

	JAPAN					TAIWAN			KOREA			UNITED STATES					CANADA	
YEAR	POLE AND LINE	LONG-LINE	GILL NET	OTHER GEAR	TOTAL	LONG-LINE	GILL NET	TOTAL	LONG-LINE	GILL NET	TOTAL	POLE AND LINE	TROLL	SPORT	GILL NET	TOTAL	TROLL	GRAND TOTAL
1952	41,786	26,687		237	68,710								23,843	1,373		25,216	71	93,997
1953	32,921	27,777		132	60,830								15,740	171		15,911	5	76,746
1954	28,069	20,958		38	49,065								12,246	147		12,393		61,458
1955	24,236	16,277		136	40,649								13,264	577		13,841		54,490
1956	42,810	14,341		57	57,208								18,751	482		19,233	17	76,458
1957	49,500	21,053		151	70,704								21,165	304		21,469	8	92,181
1958	22,175	18,432		124	40,731								14,855	48		14,903	74	55,708
1959	14,252	15,802		67	30,121								20,990	0		20,990	212	51,323
1960	25,156	17,369		76	42,601								20,100	557		20,657	5	63,263
1961	18,636	17,437		268	36,341							2,837	12,061	1,355		16,253	4	52,598
1962	8,729	15,764		191	24,684							1,085	19,760	1,681		22,526	1	47,211
1963	26,420	13,464		218	40,102							2,432	25,147	1,161		28,740	5	68,847
1964	23,858	15,458		319	39,635	26		26				3,411	18,392	824		22,627	3	62,291
1965	41,491	13,701		121	55,313	16		16				417	16,545	731		17,693	15	73,037
1966	22,830	25,050		585	48,465	16		16				1,600	15,342	588		17,530	44	66,055
1967	30,481	28,869		520	59,870	17		17				4,113	17,826	707		22,646	161	82,694
1968	16,597	23,961		1,109	41,667	15		15				4,906	20,444	951		26,301	1,028	69,011
1969	32,107	18,006		1,480	51,593	21		21				2,996	18,839	358		22,193	1,365	75,172
1970	24,376	15,372		956	40,704	23		23				4,416	21,041	822		26,279	354	67,360
1971	53,198	11,035		1,262	65,495	24		24				2,071	20,537	1,175		23,783	1,587	90,889
1972	60,762	12,649	1	921	74,333	25		25				3,750	23,608	637		27,995	3,558	105,911
1973	69,811	16,059	39	1,883	87,792	35		35				2,236	15,667	84		17,987	1,270	107,084
1974	73,576	13,053	224	1,065	87,918	40		40				4,777	20,187	94		25,058	1,207	114,223
1975	52,157	10,060	166	402	62,785	28		28	319		319	3,243	18,975	640		22,858	101	86,091
1976	85,336	15,896	1,070	1,394	103,696	37		37	971		971	2,700	15,932	713		19,345	252	124,301
1977	31,934	15,737	688	1,039	49,398	61		61	65		65	1,497	10,005	537		12,039	53	61,616
1978	59,877	13,061	4,029	3,209	80,176	53		53	174		174	950	16,682	810		18,442	23	98,868
1979	44,662	14,249	2,856	1,280	63,047	81		81	27		27	303	6,801	74		7,178	521	70,854
1980	46,743	14,743	2,986	1,516	65,988				15		15	382	7,574	168		8,124	212	74,339
1981	27,426	18,020	10,348	959	56,753				600		600	748	12,694	195		13,637	200	71,190
1982	29,615	16,762	12,511	1,054	59,942				1,070		1,070	425	6,661	257		7,343	104	68,459
1983	21,098	15,103	6,884	471	43,556				1,233		1,233	607	9,512	87		10,206	225	55,220
1984	26,015	15,111	10,569	3,898	55,593				2,708		2,708	1,030	9,378	1,427		15,563	50	73,914
1985	20,714	14,320	13,132	1,940	50,106				5,447		5,447	1,498	6,431	1,176	2	9,109	56	64,718
1986	16,096	12,945	9,749	2,192	40,982							432	4,708	196	3	5,339	30	46,351
1987	19,091	14,642	7,617	1,394	42,744							158	2,766	74	5	3,003	104	45,851
1988	7,000				12,000		11,000	11,000				598	4,212	64	15	4,889	85	27,974

[1] THE FOLLOWING NOTES APPLY TO DATA IN THIS TABLE:

- Figures for 1987-88 are preliminary. U.S. jig catches (1984-88) include gillnet.
- Japanese longline catches for 1952-60 exclude minor amounts taken by vessels under 20 tons. Longline catches in weight are estimated by multiplying annual number of fish caught by average weight statistics.
- Japanese pole-and-line catches include fish caught by research vessels.
- Japanese longline catches from 1958-68 were readjusted in 1988.
- U.S. troll catches from 1952-60 include fish caught by baitboats, from 1961-85 include fish landed in Hawaii.
- U.S. total for 1984 includes 3,728 mt caught by purse seines.
- Japan gillnet catches include south Pacific catches.
- Korean longline catches calculated from FAO statistics and Korean catch/effort data.
- Korean and Taiwan gillnet catches are missing or incomplete.

Table 2. Number of Japanese pole-and-line vessels by size, 1961-1987

Year	Total	Size of vessel (gross tons)					
		<20	20	20-50	50-100	100-200	200<
1961	5,523	477	5,046	141	132	178	26
1962	4,460	451	4,009	186	111	126	28
1963	6,533	492	6,041	240	111	112	29
1964	4,361	532	3,829	291	103	106	32
1965	4,226	572	3,654	298	91	148	35
1966	4,191	571	3,620	299	71	167	34
1967	4,114	564	3,550	296	54	173	41
1968	3,231	561	2,670	276	60	170	55
1969	4,008	533	3,475	248	71	158(2)	56(3)
1970	3,666	518	3,148	220	91	143(3)	64(3)
1971	3,684	516	3,168	165	133	132(3)	86(3)
1972	4,156	560	3,596	131	162	119(3)	148(3)
1973	3,587	589	2,998	93	211(1)	83(3)	202(3)
1974	3,941	716	3,225	136	269	84	227
1975	3,344	696	2,648	95	283	39	279
1976	3,754	653	3,101	51	318	17	267
1977	4,010	662	3,348	40	348	14	260
1978	3,680	645	3,035	26	358	10	251
1979	4,105	625	3,480	14	370	13	228
1980	3,804	572	3,232	14	350	10	198
1981	3,612	548	3,064	10	353	6	179
1982	3,484	473	3,011	10	320	6	137
1983	3,452	431	3,021	11	296	9	115
1984	3,298	394	2,904	8	271	10	105
1985	3,108	354	2,754	8	242	9	95
1986	2,783	328	2,455	6	222	9	91
1987	2,718	314	2,404	6	207	12	89

Table 3. CPUE statistics for major North Pacific albacore fisheries, 1961-1988.

Year	Japan pole-and-line (mt/day)	United States troll (no./day)	Japan longline (no./100 hooks effective effort)
1961	4.40	69.17	0.22
1962	7.22	124.59	0.26
1963	6.29	132.09	0.25
1964	6.86	97.61	0.34
1965	6.26	89.07	0.29
1966	5.94	90.45	0.49
1967	6.09	126.83	0.39
1968	5.34	135.23	0.36
1969	4.95	112.57	0.27
1970	6.13	127.39	0.28
1971	6.94	96.68	0.19
1972	6.25	61.08	0.25
1973	5.49	82.89	0.33
1974	7.81	105.17	0.31
1975	5.98	99.81	0.22
1976	6.13	69.22	0.28
1977	3.01	59.90	0.26
1978	3.58	86.80	0.23
1979	3.70	45.41	0.24
1980	4.72	36.78	0.29
1981	3.15	80.11	0.29
1982	3.82	62.00	0.29
1983	4.68	88.00	0.22
1984	5.73	82.00	0.26
1985	4.41	82.00	0.21
1986	4.37	117.00	0.15
1987	6.61	70.00	-
1988	4.34	117.00	-

Table 4. Albacore catch (in mt) by various Japanese Pacific gillnet fisheries.

Year	North Pacific						South Pacific
	Squid gillnet		Other gillnet		Total		
	Official[1]	Unofficial[2]	Official[1]	Unofficial[2,3]	Official[1]	Unofficial[2]	Total[4]
1972			1		1		
1973			39	(220)	39		
1974			224	(587)	224		
1975			166	(780)	166		
1976			1070	(2168)	1070		
1977			688	(2558)	688		
1978	N/A		4029	(6582)	4029		
1979	N/A		2856	(5388)	2856		
1980	N/A		2986	(6049)	2986		
1981	N/A		10348	16825	10348		
1982	N/A		12511	17217	12511		
1983	1207		5677	8307	6844		
1984	3180	3576	7389	10776	10569	14352	1563
1985	3338	7305	9794	12894	13132	20199	1905
1986	2387	2401	7362	7269	9749	9670	1919
1987	2680		4937		7617		587
1988	-						4790
1989							10000

[1] Official statistics from year book of production statistics for fisheries and aquaculture by Statistics and Survey Division, Ministry of Agriculture, Forestry and Fishery.

[2] Unofficial statistics from internal report of Offshore Fisheries Division, Fisheries Agency.

[3] Values in parentheses are total catch of all tunas, including albacore.

[4] Preliminary estimates.

Appendix 1. Participants list

NAME	AFFILIATION
	Canada
Dan Ware (Dr.)	Dept. of Fisheries & Oceans, Nanaimo, British Columbia
	Japan
Yasuyuki Horio	Research Division, Fisheries Agency of Japan, Tokyo
Yoh Watanabe (Dr.) Hideo Kono (Dr.)	Far Seas Fisheries Research Lab, Shimizu
	United States
David W. Au (Dr.) Izadore Barrett (Dr.) Norman Bartoo (Dr.) Ken Bliss Al Coan Ron Dotson Mark Hess Dave Holts Pierre Kleiber (Dr.) R. Michael Laurs (Dr.) Ron Lynn Tony Majors Wesley Parks (Dr.) Bob Nishimoto Gary T. Sakagawa (Dr.)	National Marine Fisheries Service, Southwest Fisheries Center, La Jolla, CA
George Boehlert (Dr.) Chris Boggs (Dr.) Jerry Wetherall (Dr.)	National Marine Fisheries Service, Southwest Fisheries Center, Honolulu, HI
Roy Mendelsson (Dr.) Richard Parrish (Dr.)	National Marine Fisheries Service, Southwest Fisheries Center, Pacific Fisheries Environmental Group, Monterey, CA
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NAME	AFFILIATION
	Senegal
Alain Fonteneau (Dr.)	ORSTOM, Dakar
	Taiwan
Hsi-Chiang Liu (Dr.)	National Taiwan University, Taipei
	New Caledonia
John Hampton	South Pacific Commission, Noumea

Appendix 2. Agenda

Thursday, May 18 (9:00 a.m.)

1. Introduction and greeting by Center Director
   Introductions
   Housekeeping, lunches, etc.

2. Review of recent years' fisheries
   Canada (Review of the recent Canadian fishery)

   Japan (Forecast of albacore pole-and-line fishery in 1989 summer; A review of current Japanese north pacific albacore fisheries in 1989; Preliminary report of albacore catch by Japanese gillnet fishery operated in South Pacific)

   Korea

   Taiwan

   United States (Summaries of 1986, 1987 and 1988 fisheries)

   Others

3. Update of data table(s).

   Albacore directed fisheries
   - Troll
   - Pole-and-line
   - Longline
   - Large-mesh gillnets

   Other fisheries producing significant albacore mortality
   - Squid gillnets
   - Other

4. Discussion on stock condition

   Production model results (A stock assessment by generalized production model, 1961-1986)

   CPUE trends (Review of routine for standardizing fishing effort for albacore in the United States jig fleet;
   Discussion of decline in CPUE in the North Pacific surface albacore fisheries: Is this why effort has declined?)

   Size based analysis (Change of yearclass structure of Japanese albacore catches judged from their size composition;

Some aspects on size composition of albacore caught by three different gears in the North Pacific.

Conclusions?

5. Biological analyses.

Stock/Population definition (A review of evidence suggesting stock heterogeneity in the North Pacific albacore population)

Friday, May 19 (9:00 a.m.)

6. Oceanographic and environmental effects.

Eastern Pacific (Relationships between vertical ocean thermal structure and albacore vulnerability;
Relationships between ocean plume structure off Pt. Conception, CA and the migration and availability of albacore tuna in the Southern California Bight;
1000 points of light (albacore?))

Transition zone (North Pacific albacore in relation to transition zone oceanography)

7. Data exchange; Future meetings; Adjournment.

Appendix 3. List of working papers.

WP-1. Warashina, Y., M. Honma, and Y. Watanabe. 1989. Forecast for albacore pole-and-line fishery for summer 1989.

WP-2. Nishikawa, Y., Y. Watanabe, and H. Nakano. 1989. A review of present Japanese North Pacific albacore fisheries, 1988-1989.

WP-3. Liu, Hsi-Chiang and Chien-Chung Hsu. 1989. North Pacific tuna fisheries in Taiwan.

WP-4. Majors, A.P. and F.R. Miller. 1987. Summary of the 1986 north Pacific albacore fishery data. Southwest Fisheries Center Admin Report No. LJ-87-12.

WP-5. Majors, A.P., C.H. Perrin and F.R. Miller. 1988. Summary of the 1987 north and south Pacific albacore fisheries data. Southwest Fisheries Center Admin Report No. LJ-88-21.

WP-6. Majors, A.P., and A. Coan. 1989. The 1988 U.S. Pacific albacore fisheries.

WP-7. Coan, A. 1989. Current status of north Pacific albacore data on SWFC data bases.

WP-8. Coan, A. 1989. Comparison of FAO catch (mt) reports to table 1 entries.

WP-9. Shiohama, T. 1989. A brief stock assessment of north Pacific albacore by generalized production model, 1961-1986.

WP-10. Ware, D.M. 1989. Status of the Canadian albacore tuna fishery.

WP-11. Parrish, R.H., N. Bartoo, S. Herrick, P. Kleiber, R.M. Laurs, and J. Wetherall. 1989. Albacore management information document. NOAA Technical Memorandum NMFS, NOAA-TM-NMFS-SWFC-126.

WP-12. Kleiber, P., and C.H. Perrin. 1989. Review of routine procedure for standardizing fishing effort in the United States north Pacific albacore fleet.

WP-13. Warashina, Y. and M. Honma. 1989. Change in year-class structure of Japanese albacore catches judged by their size composition.

WP-14. Watanabe, Y., Y. Nishikawa, and H. Nakano. 1989. Some aspects on size composition of albacore caught by three different gears in the north Pacific.

WP-15. Laurs, R.M. and R. Nishimoto. 1989. A review of evidence suggesting stock heterogeneity in north Pacific albacore.

WP-16. Wetherall, J.A. and M.Y.Y. Yong. 1989. Evidence of north Pacific albacore stock heterogeneity from tag return patterns.

WP-17. Dotson, R.C., R.J. Lynn, and R.M. Laurs. 1989. Relationship of albacore vulnerability to ocean thermal structure.

WP-18. Laurs, R.M., M. Hess and J. Svejkovsky. 1989. Relationships between ocean plume structure off Pt. Conception, California and the migration and availability of albacore tuna in the southern California bight.

WP-19. Lynn, R.J. and R.M. Laurs. 1989. North Pacific albacore in relation to transition zone oceanography.