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JANUARY 1992

REPORT OF THE TWELFTH NORTH PACIFIC ALBACORE WORKSHOP, SHIMIZU, JAPAN JULY 23-25, 1991

by

Sachiko Tsuji, Hideki Nakano and Norman Bartoo

ADMINISTRATIVE REPORT LJ-92-04

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July 23-25, 1991

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INTRODUCTION

The Twelfth North Pacific Albacore Workshop was held at the National Research Institute of Far Seas Fisheries (NRIFSF) in Shimizu, Japan. Dr. Jun Ito, the director of the NRIFSF, welcomed the participants and presented the opening remarks. Dr. Ito noted the history and importance of the workshop series and expressed his wish for a productive meeting. Dr. Izadore Barrett of the Southwest Fisheries Science Center thanked Dr. Ito for hosting the workshop. Dr. Barrett noted there was a long history of science and friendship between the two laboratories that has resulted in sharing data, publications and research, and he looked forward to positive results from the workshop.

The workshop had 34 participants, 8 from the U.S. and 28 from Japan, including 2 interpreters (Appendix 1). For the first time the Institute of Oceanography, National Taiwan University, was invited to the workshop as a member, but unfortunately could not provide a participant. Canada also was unable to be represented. Dr. Keisuke Okada was elected chairman, and Drs. Norm Bartoo, Hideki Nakano and Sachiko Tsuji served as rapporteurs. The draft agenda (Appendix 2) was adopted, and 19 working papers (Appendix 3) were scheduled for review under agenda items, "Review of current fisheries and data," "Albacore biology, ecology and oceanography" and "Status of albacore populations".

REVIEW OF RECENT FISHERIES

Canadian Fishery

The Canadian troll fishery in 1990 was modest, with landings totaling 305 mt (Table 1). The few vessels participating in the fishery fished among the U.S. fleet as described in the U.S. fishery section.

Taiwanese Fishery

Taiwan has two albacore fisheries in the North Pacific. The longline fishery has been operating since 1964. The driftnet fishery was begun in the early 1980s; however, most data for this fishery are missing. Most recent catch data were sent to the workshop via FAX from Dr. H. C. Liu of the National Taiwan University, but must be verified prior to inclusion in the official catch statistics.

U.S. Fishery

The U.S. albacore fishery (WP-4, 5, 6 and 7) was poor in 1990. Catches totaled 2,846 mt and were close to the lowest on record. The bulk of the catch was taken by troll gear, with baitboats, gillnets, purse seine and sport gears contributing minor amounts. The fishery expended approximately 5,250 vessel days fishing for an aggregate average CPUE of 36 fish/day. The fishery developed offshore, north of Hawaii, and moved to the Pacific Northwest. Few fish were caught south of San Francisco. The number of vessels participating in the 1990 fishery was 450+, down from 2000+ in the 1970s and 900+ in the 1980s.

The sizes of fish caught in 1990 were atypical of the U.S. catch of previous decades. Notably underrepresented in the composite, weighted length frequency were fish in the 52 cm size mode, as has been the case in the last few years. Sampling of the U.S. fishery increased significantly in 1990 with coverage rates approaching 60%.

Japanese Fishery

Japanese albacore fisheries were reviewed in WP-17. Albacore was caught by both the surface fisheries, including pole-and-line, purse seine and driftnet, and the longline fishery. Surface fisheries caught 2- to 5-year-old fish and the longline fishery caught fish older than 3 years in the feeding area, north of 25°N, and fish older than 5 years in the spawning area, south of 25°N.

Total catch during the 1980s declined to 36,000-66,000 mt from the higher level of 41,000-104,000 mt during the 1970s. This decline reflected the decline of the pole-and-line catch which was a major part of albacore yield during the 1970s.

Catch of the pole-and-line fishery dropped from a high of 85,000 mt in 1976 to 6,000 mt in 1988 and recovered slightly to 12,500 mt in 1990. The number of vessels operating in distant waters also dropped to 59 in 1989 from approximately 200 in 1980. Recent declines in albacore wholesale prices, especially relative to prices for skipjack, resulted in a reduction of albacore-targeted effort by the pole-and-line fishery. Two- to 3-year-old fish appeared again in the 1990 and 1991 catches after several years' disappearance from catch (WP-11, 12 and 13).

Purse seine catch for 1989 was 2,521 mt, about double the catches of 1987 and 1988. Purse seiners accounted for 6.4% of the total Japanese albacore catch. Eighty vessels operated in 1989, a 10% decline from 87 vessels in 1988. No difference was observed in catches by fishing areas between 1988 and 1989 (WP-18).

Japanese large-mesh driftnet and squid driftnet fisheries were started in 1972 and 1978, respectively. The target species of the large-mesh driftnet were billfishes until about 1980, and then albacore thereafter. The squid driftnet fishery also takes albacore as a bycatch. An observer program in 1990 revealed that albacore caught by squid driftnets ranged from 40-90 cm in fork length, comparable to the size range taken in the pole-and-line and troll fisheries. Total albacore catches by driftnets ranged from 6,700 to 12,500 mt in the 1980s and was 7,437 mt in 1989. CPUE for driftnets increased until 1981 and then stayed constant with declining effort (WP-15).

The longline fishery showed stable catches around 10,000 to 29,000 mt since 1952. Catches of albacore during the 1980s stayed in the range of 13,000 to 18,000 mt. The number of longliners operating in distant waters stayed constant. The number of vessels operating in the coastal longline fishery decreased but the catch increased, which partly reflects an improvement in techniques, including the use of monofilament longline. Coastal longliners caught albacore smaller than 60 cm in 1990 and 1991, a size class that had not been observed in the catch for several years (WP-12).

STATISTICS

The workshop reviewed statistics contained in the various working papers and submissions and updated the catch and catch-per-effort data (Tables 1 and 2).

Table 1 presents the total catch estimates by fishery. The entries in this table are the official albacore statistics of the cooperating countries. New additions to the catch table include data from Taiwan's deep-sea longline fishery and updated statistics for Japanese and Taiwanese driftnet fisheries. Still unavailable are complete statistics on Korean albacore catches, from both longline and driftnet fisheries. Additional data are also needed on albacore catches in the Hawaiian longline fishery.

For stock assessment purposes it is essential to have estimates of the total mortality caused by the fishing fleets. Considerable progress has been made to improve estimates of total fishing mortality by estimating unreported losses. These factors must be used to adjust the nominal catch statistics given in Table 1 prior to stock assessments. WP-15 estimated dropout and discard rates of driftnet fisheries. Dropout rates observed during net retrieval were 22.4% and 7.3% for squid driftnets in the North Pacific and large-mesh driftnets in the South Pacific, respectively. Estimates of discard rates in the Japanese squid driftnet fishery averaged 55% in the 1988-1990 fishing seasons. In the U.S. troll fishery, observer data indicate that about 16-21% of the albacore hooked are not landed, resulting in an unknown unreported mortality. Additional observations on all of these unreported losses are being collected. Information on unreported mortality in longline fisheries due to shark or mammal depredation may be available in research vessel records.

BIOLOGICAL AND OCEANOGRAPHIC OBSERVATION

The results of an observer program which operated in 1990 to quantify the interaction between the driftnet fisheries and the U.S. troll fishery were presented (WP-3). Observers on 6 troll vessels inspected over 19,000 albacore for visible signs of net scars, fresh or healed. A total 12.4% of the fish inspected showed net marks. These fish were apparently 'tagged' in the mid-Pacific. Approximately 5.2% of the marks were healed, apparently marked during the previous season. The proportion of marks declined with distance from the driftnet fishing area.

The rate of loss of albacore following a jig strike while trolling was estimated using data from 3,459 jig strikes. The average loss rate was estimated twice with mean loss rates of 16.1% and 20.9%. A 95% confidence interval on the latter estimate is 17.5% to 24.2%. Additional biological sampling was undertaken.

The 1991 U.S. albacore fishery forecast was reviewed in WP-8. The forecast was distributed in early June.

The Japanese albacore forecast for the 1991 summer season, presented in WP-11, was distributed at the end of March. This forecast was based on size frequency and CPUE of the longline fishery operating before the pole-and-line fishing seasons, as well as the previous season's pole-and-line fishery. Through the end of June, pole-and-line and purse seine fisheries caught around 4,500 mt and 3,200 mt albacore, respectively (WP-12). Though a slight increase of total catch was forecast for the 1991 summer season, serious declines in albacore wholesale prices resulted in reduced fishing effort, and the 1991 season was expected to end with a decrease in catch.

An ongoing project to examine the migration mechanism of albacore was presented in WP-19. This study put special emphasis on relationship between fish migration and environmental factors, including temperature, salinity, water current, etc.

A new adjustment, averaging CPUEs of strata, was introduced to the U.S. troll fishery and the Japanese pole-and-line fishery. This adjustment was made to reduce the bias caused by the concentration of effort into small, favorable time and strata. The trend in nominal CPUE was upward but the trend for stratified CPUE was level or slightly downward. It was shown that increasing concentration of effort in the high abundance areas would induce an increasing positive bias in both CPUE calculations (WP-2,10).

STATUS OF ALBACORE POPULATION

The participants reviewed several CPUEs for various fisheries presented in working papers with special attention to the effectiveness of each as a population indicator.

The CPUE for the North American troll fishery was presented in WP-7. The CPUE series used shows a downward trend in CPUE in the 1961 to 1975 period. In 1976, CPUE declined about 30% and has remained relatively level since, but with increasing year-to-year variation. The methodology used to estimate the CPUE values (WP-10) tends to slightly underestimate the declining trend. There is considerable year-to-year variation in the data. Currently the fishery is realizing an average CPUE of 36 fish per day fished. The highest recorded average CPUE values were about 95 fish per day fished in 1962 and 1963.

For the pole-and-line fishery, nominal CPUEs were presented in WP-1 and 14. Both CPUEs showed a period of high values through 1976 and a shift to a lower sustained level (about 30% lower) since then. Pole-and-line CPUEs of 1979-1988 were adjusted by taking the average of CPUEs in small strata and comparing that to the nominal one (WP-2). The adjusted CPUE stayed constant, while the nominal CPUE showed an upward trend with large year to year fluctuation during the same period. As a reference of pole-and-line CPUE, Figure 4 of WP-14 was adopted to examine the trend of a long time series, and Figure 2 of WP-2 adopted for the trend in recent years.

A CPUE series for large-mesh driftnet was presented in WP-15. This index shows an upward trend; however it is considered unreliable for monitoring the stock because the driftnet fishery operates only in the first half of the year and has changed its target species.

A nominal CPUE series for Japanese purse seine was presented for the first time (WP-18).

Longline standardized CPUE was calculated separately for spawning and feeding areas (WP-14). In feeding areas, high CPUE was observed during the 1960s but CPUE dropped in the early 1970s and remained relatively constant after that. CPUE in spawning areas stayed constant except during mid 1950s when very low CPUE was observed. Since 1970, three lower peaks, at 1971, 1977 and after 1987, and one high peak at 1982 were observed for CPUE in spawning areas. General Linear Models (GLM) were also applied to standardize longline CPUE for 1974-1989 and were compared to the results from the Honma method (WP-16). CPUE obtained from both methods showed almost the same stable trend with a peak at 1981. The difference in year with peak CPUE between WP-14 and WP-16 was explained by difference of definition of fishing year.

Information about the US longline fishery in Hawaii became available for the first time and its CPUE was presented in WP-9. No further discussion was made because data were still preliminary and were of a limited time series.

The workshop concluded that the trend in young fish was best represented by the U.S. troll and the Japanese pole-and-line surface fisheries. The trend in adult abundance is best represented by the Japanese longline fishery. It appears that the trend in adult stock was relatively stable during the 1966 to 1986 period. Since 1986, the trend has been downward, declining as much as 30%. The trend in young fish abundance since 1977 has been relatively stable, but at a level 1/3 lower than before 1977. It was pointed out that the decline in the abundance level of young fish in 1977 was not due to the development of driftnet fisheries, which had an almost negligible catch at that time. Young albacore first recruit to the pole-and-line and driftnet fisheries, and then proceed to the troll fishery in the Eastern Pacific. This timing may be the cause of reduced catches in the troll fishery in the 1980s.

At the 11th North Pacific Albacore Workshop, concern was expressed about apparent weak year classes, age 3 and 4 in the summer of 1989, observed in the Japanese pole-and-line and coastal longline catches. The current data and evidence indicate that this did not reflect the actual change of year class strength. The age classes not observed in the pole-and-line and coastal longline fisheries were caught by the driftnet fishery in 1989 and also recruited to pole-and-line fishery one year later in levels comparable to the other year classes.

FACTORS AFFECTING CPUE

The workshop devoted considerable time to discussing CPUE and its relationship to population abundance. CPUE can be affected by many factors which may systematically change its relationship to abundance and can in some cases result in erroneous trends.

An example of this was presented in WP-10, which demonstrated the effect on CPUE of an increasing ability of fishermen to concentrate effort in areas with higher than average abundance. It was shown that such a development could be recognized by a divergence between the trend lines of CPUE calculated by two different methods, the pooled method and the semi-stratified method.

The workshop noted that factors affecting CPUE can be grouped into 2 general areas: those causing real changes in the population and those causing changes in catchability or availability. Factors affecting the population were furthermore divided into the response of the population to fishing pressure and the response of the population to changes in the environment. Factors affecting catchability and availability were divided into those inducing changes in the fish behavior and those inducing changes in fleet behavior. The following table was collectively filled out by the workshop:

real population change		change in catchability	
fishing pressure	environment	fish behavior	fleet behavior
driftnet development genetic selection increasing F	El Nino long-term cycles pollution predators prey	migratory pattern aggregation biting behavior schooling behavior	extent of fishing grounds gear change change in target species response to management economic factors

RECOMMENDATIONS

The discussions during the workshop brought out a number of suggestions and the need for both statistics and research. These are summarized below.

Statistics:

- To complete the data series of Taiwanese driftnet fishery and Korean driftnet and longline fisheries.
- To complete the data series for the Hawaiian longline fishery.

Research:

- To describe the detailed history of each major fishery.
- To apply direct analysis, such as GLM, to the surface fishery and the whole time series of the longline fishery.
- To prepare a juvenile abundance index time series to monitor recruitment to the stock.
- To examine catch by age or size time series for each major fishery.
- To model the effects of different factors on CPUE (see Section 6).
- To examine the effects of environmental factors on CPUE.
- To do intensive tagging to address various problems noted throughout the workshop.

ADJOURNMENT

The participants all thanked to Dr. Okada for the success of the workshop. A one page summary (Appendix 4) was prepared and agreed upon. The final report will be prepared and reviewed by correspondence. The next meeting will be held in 1993 at a time and place to agreed upon.

Table 1. Catches of North Pacific albacore in metric tons by fisheries, 1952-1990.

	Japan						Taiwan			Korea			USA					Unit: Metric ton	
Year	Pole & line	Long-line	Drift-net	Purse seine	Others	Sub total	Long-line	Drift-net	Sub total	Long-line	Drift-net	Pole & line	Troll	Drift-net	Purse seine	Sport	Sub total	Canada Troll	Grand Total
1952	41,786	26,687	-	154	237	68,864	-	-	-	-	-	-	23,843	-	-	1,373	25,216	71	94,151
1953	32,921	27,777	-	38	132	60,868	-	-	-	-	-	-	15,740	-	-	171	15,911	5	76,784
1954	28,069	20,958	-	23	38	49,088	-	-	-	-	-	-	12,246	-	-	147	12,393		61,481
1955	24,236	16,277	-	8	136	40,657	-	-	-	-	-	-	13,264	-	-	577	13,841		54,498
1956	42,810	14,341	-		57	57,208	-	-	-	-	-	-	18,751	-	-	482	19,233	17	76,458
1957	49,500	21,053	-	83	151	70,787	-	-	-	-	-	-	21,165	-	-	304	21,469	8	92,264
1958	22,175	18,432	-	8	124	40,739	-	-	-	-	-	-	14,855	-	-	48	14,903	74	55,716
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	-	7	268	36,348	-	-	-	-	-	2,837	12,061	-	-	1,355	16,253	4	52,605
1962	8,729	15,764	-	53	191	24,737	-	-	-	-	-	1,085	19,760	-	-	1,681	22,526	1	47,264
1963	26,420	13,464	-	59	218	40,161	-	-	-	-	-	2,432	25,147	-	-	1,161	28,740	5	68,906
1964	23,858	15,458	-	128	319	39,763	26	-	26	-	-	3,411	18,392	-	-	824	22,627	3	62,419
1965	41,491	13,701	-	11	121	55,324	261	-	261	-	-	417	16,545	-	-	731	17,693	15	73,293
1966	22,830	25,050	-	111	585	48,576	271	-	271	-	-	1,600	15,342	-	-	588	17,530	44	66,421
1967	30,481	28,869	-	89	520	59,959	638	-	638	-	-	4,113	17,826	-	-	707	22,646	161	83,404
1968	16,597	23,961	-	267	1109	41,934	698	-	698	-	-	4,906	20,444	-	-	951	26,301	1,028	69,961
1969	32,107	18,006	-	521	1480	52,114	634	-	634	-	-	2,996	18,839	-	-	358	22,193	1,365	76,306
1970	24,376	15,372	-	317	794	40,859	1,516	-	1,516	-	-	4,416	21,041	-	-	822	26,279	354	69,008
1971	53,198	11,035	-	902	367	65,502	1,759	-	1,759	-	-	2,071	20,537	-	-	1,175	23,783	1,587	92,631
1972	60,762	12,649	1	277	646	74,335	3,091	-	3,091	-	-	3,750	23,608	-	-	637	27,995	3,558	108,979
1973	69,811	16,059	39	1,353	533	87,795	129	-	129	-	-	2,236	15,667	-	-	84	17,987	1,270	107,181
1974	73,576	13,053	224	161	959	87,973	570	-	570	-	-	4,777	20,187	-	-	94	25,058	1,207	114,808
1975	52,157	10,060	166	159	254	62,796	1,494	-	1,494	319	-	3,243	18,975	-	-	640	22,858	101	87,568
1976	85,336	15,896	1,070	1,109	285	103,696	1,251	-	1,251	971	-	2,700	15,932	-	-	713	19,345	252	125,515
1977	31,934	15,737	688	669	379	49,407	873	-	873	65	-	1,497	10,005	-	-	537	12,039	53	62,437
1978	59,877	13,061	4,029	1,115	2097	80,179	284	-	284	174	-	950	16,682	-	-	810	18,442	23	99,102
1979	44,662	14,249	2,856	125	1158	63,050	187	-	187	27	-	303	6,801	-	-	74	7,178	521	70,963
1980	46,743	14,743	2,986	329	1209	66,010	318	-	318	15	-	382	7,574	-	-	168	8,124	212	74,679
1981	27,426	18,020	10,348	252	904	56,950	339	-	339	600	-	748	12,694	-	-	195	13,637	200	71,726
1982	29,615	16,762	12,511	561	732	60,181	559	-	559	1,070	-	425	6,661	-	-	257	7,343	104	69,257
1983	21,098	15,103	6,852	350	125	43,528	520	-	520	1,233	-	607	9,512	-	-	87	10,206	225	55,712
1984	26,015	15,111	8,988	3,380	518	54,012	471	-	471	1,041	-	1,030	9,378	-	3,728	1,427	15,563	50	71,137
1985	20,714	14,320	11,204	1,533	407	48,178	109	-	109	2,169	-	1,498	6,431	2	-	1,176	9,107	56	59,619
1986	16,096	12,945	7,813	1,542	650	39,046	-	-	-	-	-	432	4,708	3	-	196	5,339	30	44,415
1987	19,091	14,642	6,698	1,205	189	41,825	-	7,700	7,700	-	-	158	2,766	5	-	74	3,003	104	52,632
1988	6,216	13,904	9,074	1,208	177	30,579	38	11,366	11,404	-	-	598	4,212	15	-	64	4,889	155	47,027
1989	8,629	12,899	7,437	2,521	1421	32,907	504	4,200	4,704	-	-	54	1,860	4	-	160	2,078	200	39,889
1990	12,500			2,315		14,815				-	-	115	2,603	29	71	24	2,842	305	17,962

THE FOLLOWING NOTES APPLY TO DATA IN THIS TABLE

1) Figure for 1990 is preliminary. U.S. jig catches (1984-88) include gillnet.
2) Japanese longline catches for 1952-60 exclude amount taken by vessels under 20 tons. Longline catches in weight are estimated by multiplying annual number of fish caught by average weight ststistics.
3) Japanese pole-and-line catches include fish caught by research vessels.
4) Japanese longline catches from 1958-68 were readjusted in 1988.
5) U.S. troll catches from 1952-60 include fish caught by baitboats, from 1961-85 include fish landed Hawaii.
6) Korean longline catches calculated from FAO statistics and Korean catch/effort data.
7) Korean gillnet catches are missing.
8) Taiwanese gillnet catches are personal communication from Institute of Oceanography, National Taiwan University.

Table 2. Selected CPUE series for North Pacific albacore by fisheries, 1961-1989. Working papers only carry the figures of CPUE series and these original data for plots were provided by authors after the meeting.

Year	Jpn. Longline (N/100 hooks)		Jpn. Pole-and-Line (mt/day)	US troll	Large-mesh driftnet (N/day)	Jpn. Purse seine (mt/set)
	Feeding Area	Spawning Area				
1961	0.621	0.110	4.40	42.80	-	-
1962	0.562	0.117	7.22	94.23	-	-
1963	0.438	0.178	6.29	96.27	-	-
1964	0.791	0.196	6.86	64.40	-	-
1965	0.698	0.243	6.26	58.34	-	-
1966	1.176	0.303	5.94	57.19	-	-
1967	1.070	0.280	6.09	81.97	-	-
1968	0.925	0.280	5.34	71.49	-	-
1969	0.652	0.324	4.95	65.03	-	-
1970	0.575	0.248	6.13	77.06	-	-
1971	0.432	0.198	6.94	62.61	-	-
1972	0.458	0.269	6.25	56.30	-	-
1973	0.575	0.236	5.49	50.77	-	-
1974	0.514	0.324	7.81	70.68	-	-
1975	0.417	0.243	5.98	64.30	-	-
1976	0.561	0.263	6.13	42.52	-	-
1977	0.610	0.174	3.01	36.28	5.76	-
1978	0.532	0.195	3.58	51.46	43.63	-
1979	0.541	0.224	3.70	37.12	46.22	-
1980	0.531	0.272	4.72	42.30	44.00	-
1981	0.568	0.308	3.15	47.25	148.39	-
1982	0.547	0.391	3.82	30.53	163.89	-
1983	0.495	0.319	4.68	36.99	113.90	0.09
1984	0.491	0.241	5.73	47.28	162.67	0.80
1985	0.446	0.237	4.41	49.18	198.75	0.39
1986	0.361	0.259	4.37	33.53	119.46	0.26
1987	0.396	0.174	6.61	28.00	126.37	0.30
1988	0.365	0.157	4.34	54.10	294.12	0.39
1989	0.374	0.128	-	29.22	-	0.62
1990	-	-	-	35.96	-	-

Appendix 1

LIST OF PARTICIPANTS

United States

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Misao Honma	Data Service Center Co. Ltd.
Ms. Nomura Ms. Fujita	Interpreters

Appendix 2

AGENDA

1. Opening of the meeting

2. Selection of chairperson

3. Adoption of agenda

4. Rapporteurs nomination

5. Review of current fisheries and data

    a. Canadian fisheries
    b. Taiwanese fisheries
    c. U.S. fisheries
    d. Japanese fisheries
    e. Exchange of up-to-date data

6. Albacore biology, ecology and oceanography

    a. Tagging
    b. Aging
    c. Oceanography
    d. Stock structure
    e. Others

7. Status of albacore populations

8. Future research

9. Other matters

10. Review of draft report

11. Future arrangement

12. Adjournment

LIST OF WORKING PAPERS

WP-1.	Au, D.W.	North Pacific albacore fishery -- deciphering the changes.
WP-2.	Kleiber, P. and H.Nakano	Analysis of catch per effort in the Japanese pole-and-line albacore fishery.
WP-3.	Bartoo, N., D.Holts and C.Brown	Report on the 1990 cooperative North Pacific albacore observer project.
WP-4.	Wash. Dept. of Fish.	Review of the Washington albacore fishery.
WP-5.	Hreha, L.H.	The Oregon albacore fishery.
WP-6.	Larson, M.L.	Status of the albacore fishery in California, 1980-1989.
WP-7.	Rensink, G.M. and F.R.Miller	Summary of the 1990 North Pacific albacore fisheries data.
WP-8.	Southwest Fisheries Science Center	1991 albacore tuna forecast.
WP-9.	Wetherall, J.A. and D.R.Hawn	Trends in the North Pacific albacore spawning stock: The Hawaii longline fishery data.
WP-10.	Kleiber, P. and C.Perrin	Catch per effort and stock status in the United States North Pacific albacore fishery: Re-appraisal of both.
WP-11.	Warashina, Y. and T.Tanaka	Forecast for albacore pole-and-line fishery in summer 1991.
WP-12.	Tanaka, T. and Y.Warashina	Japanese pole-and-line and purse seine albacore fisheries and length composition, 1991 (Interim report).
WP-13.	Tanaka, T. and Y.Warashina	The albacore fishing grounds and length composition of Japanese pole-and-line fisheries, 1986-1990.
WP-14.	Watanabe, Y., H.Nakano, and K.Uosaki	Stock status of albacore in the North Pacific.

WP-15.	Watanabe, Y., H.Nakano and K.Uosaki	North Pacific albacore catch of Japanese driftnet fisheries.
WP-16.	Nakano, H. and K.Uosaki	Preliminary report of the Japanese longline albacore CPUE trend by GLM model.
WP-17.	Watanabe, Y. and Y.Nishikawa	Review of Japanese albacore fisheries in North Pacific.
WP-18.	Asano, M.	Progress of albacore catch in purse-seine fishery in the waters around Japan.
WP-19.	Kimura, S. and T.Sugimoto	Migration mechanism of albacore on north Pacific Ocean and environmental factors which are related to the fluctuation of migration. (Introduction of new project).

SUMMARY OF THE 12th NORTH PACIFIC ALBACORE WORKSHOP

The 12th North Pacific Albacore Workshop was held at the National Research Institute of Far Seas Fisheries (NRIFSF), Shimizu, Japan, July 23-25, 1991. Thirty-four scientists from Japan and the United States met to review recent data and research, and to evaluate the condition of the north Pacific albacore stock. The Workshop is the most recent in a series which began in 1975 and includes the NRIFSF; Southwest Fisheries Science Center, La Jolla, California; Pacific Biological Station, Nanaimo, British Columbia and the Institute of Oceanography, National Taiwan University, Taipei, Taiwan, as members.

North Pacific albacore are caught in several fisheries including the Japanese pole-and-line, longline and driftnet fisheries; the United States and Canadian troll fisheries; and the Taiwanese and Korean longline and driftnet fisheries. Annual catches of North Pacific albacore peaked in the early 1970s in excess of 100,000 mt. Since then total annual catches have continued to decline to near 40,000 mt in the most recent years. The declines in catches have been predominantly in the Japanese pole-and-line and the U.S. troll fisheries. Over the same period the Japanese and Taiwanese longline catches have remained relatively constant. Increases in catch have been recorded for the driftnet fleets of Korea, Taiwan and Japan. Catches by the Japanese purse seine fleet have also shown modest increases.

The Workshop examined catch per fishing effort series as indicators of the abundance of various segments of the population. The trend in young fish abundance was best reflected by the surface fisheries, and the trend in adult abundance was best represented by the longline fisheries. Catch per fishing effort in both the U.S. troll fishery and the Japanese pole-and-line fishery is currently stable and about 30% lower than that before 1977. Catch per fishing effort in the Japanese longline fishery is relatively flat, declining slowly in recent years.

The workshop produced a series of recommendations for research and analysis to determine more clearly the status of the stock and the effects of the various fisheries on the stock.

A written report detailing the Workshop's discussions and conclusions is being prepared, and will be made available to the public.

Shimizu, JAPAN.
July 25, 1991