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(Noumea, New Caledonia, 1 – 5 August 1988)

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Status of tuna resources and research in New Zealand - 1988

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Summary

This paper summarizes tuna catch and effort data collected in the New Zealand Exclusive Economic Zone (EEZ) for the 1987 calendar year and tuna research conducted in New Zealand since the Eighteenth Regional Technical Meeting on Fisheries.

New Zealand tuna catches

Domestic fisheries: Catch and effort in 1987 are shown in Tables 1 and 3, respectively, while Table 4 summarizes catch for the period 1974-1987. A total of 5840 tonnes of tuna were caught in 1987, 89% of which was skipjack, 10% albacore and the remaining 1% mainly southern bluefin.

A small scale pelagic longline fishery has been developing since 1986 and this has resulted in increased catches of yellowfin and the first recorded commercial catches of bigeye (102 kg) in New Zealand. Skipjack catch (5174 tonnes) remained close to the industry highpoint reached in 1986 (5214 tonnes) but landings of albacore and southern bluefin both declined. Albacore catches (609 tonnes) were considerably less than 1986 landings (2200 tonnes), probably because of poor weather and low sea surface temperatures on traditional fishing grounds along the west coast of the South Island. Similar conditions may also explain the 40% decline in the southern bluefin catch, from 83 tonnes in 1986 to 50 tonnes. Although 1987 catch figures are still provisional, industry representatives expect the albacore catch in 1987 to approach 1200-1300 tonnes, a reduction in catch from 1986 of 40-45%.

The number of boats fishing in 1987 increased in the albacore and yellowfin fisheries compared with 1986 levels (up 32% and 257% respectively), remained about the same in the skipjack fishery but declined by 60% in the southern bluefin fishery.

Foreign fisheries: Two foreign longline fisheries operate in the New Zealand EEZ. The 'southern' fishery consists of Japanese vessels targeting for southern bluefin along the east coast from January to September. The 'northern' fishery comprises Japanese and Korean vessels fishing in the northern part of the zone for albacore and yellowfin. Japanese vessels in the northern fishery work from January to September and over the last three years have come to dominate the fishery, while Koreans usually fish from April to September.

The 1987 catch and effort of the longline fisheries are shown in Tables 1 and 2 ,respectively. Table 5 details the change in catch rate of albacore, yellowfin and bigeye (in number of tuna per 1000 hooks) from 1980-1987. In 1987 the two fisheries had a combined catch of 3808 tonnes, comprising 43% southern bluefin, 38% albacore, 15% bigeye and 4% yellowfin. This catch was up 24% from 1986. Effort in both fisheries also increased from 1986 levels. In the southern fishery the number of vessels increased by 15%, the number of sets increased by 27% and the number of hooks set increased by 1%. The respective percentage increases in effort in the northern fishery were 60% (boats), 40% (sets) and 4% (hooks).

Changes in foreign longline fisheries management: Big game fishers in the Northland region of New Zealand have attributed a decline in their catches of striped marlin since 1984 to tuna longline bycatch of billfish. Intense lobbying by recreational fishers in 1987 resulted in the placement of a temporary, seasonal moratorium on foreign longlining in the Auckland Fisheries Management Area (Figure 1). The ban is in effect from 1987 to 1990 for the period 1 October to 31 May of each year. In addition, longliners fishing in the area between June and October must release all billfish caught and tag those that are still alive. The moratorium should have little effect on the southern bluefin catch of the southern fishery, which is seldom in the area before 1 June, but will seriously restrict the activity of Japanese vessels in the northern fishery for at least half of their season. Korean vessels will be only slightly affected.

Albacore research

Albacore research in the New Zealand region is part of a cooperative programme between scientists in New Zealand (FRC and the Department of Scientific and Industrial Research), U.S.A. (National Marine Fisheries Service in La Jolla and Honolulu), New Caledonia (Office de la Recherche Scientifique et Technique Otre Mer, Noumea) and the South Pacific Commission. The joint purpose is to improve our knowledge of

the distribution, biology and ecology of the South Pacific albacore resource in order to rationally develop the surface troll fishery. Summaries of present FRC studies on albacore are given below.

Catch rate in relation to oceanographic conditions: Since the last technical meeting, 288 hours of fishing have been completed during three research cruises, with coincident measurements of temperature and salinity made during most of this time. The final of three cruises along the Subtropical Convergence Zone to the east of New Zealand was completed in 1988, and the data is currently being analysed. In June-July of 1987 and 1988 we carried out hydrographic surveys of the Japanese southern bluefin longlining grounds off East Cape, North Island to determine the vertical structure of the water column as it relates to longline catches of albacore. This data is also under analysis.

Tagging: During the 1987/88 South Pacific albacore trolling season a total of 645 albacore were tagged and injected with tetracycline by FRC personnel in the New Zealand EEZ and 447 were tagged by U.S. vessels in the central South Pacific. A further 1247 tags were distributed to U.S. trollers; most of these are believed to have been used. Table 6 summarizes the albacore tagging effort in the South Pacific from 1986-1988, while Table 7 and Figure 1 show the tag returns to date. All three returns have been from asian longliners.

We will continue tagging in February-March 1989 with a four week cruise planned to coincide with the commercial troll fishery for albacore on the west coast, South Island.

Parasites: Albacore samples have been examined from New Zealand vessels and Japanese longliners operating in the New Zealand EEZ, from the 1986 and 1987 cruises of NOAA RV Townsend Cromwell, the ORSTOM RV Coriolis, from the Coral Sea (courtesy of ORSTOM, Noumea), from New South Wales (courtesy of the Fisheries Research Institute, Cronulla) and from the waters surrounding the Kingdom of Tonga (courtesy of the Ministry of Agriculture, Food and Fisheries, Nuku'alofa). Numbers and localities of albacore examined are shown in Table 8.

Despite the relatively small sample size and variation in parasite counts between individual albacore, it is apparent that:

1. The size of albacore caught around New Zealand by surface trolling is significantly smaller than for albacore caught by the same method in the central South Pacific.
2. There were no detectable differences in parasite incidence or intensity with sex.
3. Parasite data from albacore of 50-70cm fork length suggest differences which may be due to host movement.

The largest group of the 24 parasites tentatively identified

from albacore to date are the didymozoid trematodes, a group considered tropical in origin (Lester et al. 1985). More analyses have to be done but we believe that the parasite and associated host length data so far collected support an hypothesis that the albacore migrate to New Zealand from the tropics and then move to the east along the Subtropical Convergence Zone.

A paper describing the South Pacific distribution of the coccidean parasite Goussia auxidis in the liver of albacore has been completed.

Feeding: A paper has been completed on the occurrence of Peruvian jack mackerel (Trachurus murphyi) in the Subtropical Convergence Zone of the central South Pacific and its role as food of albacore. A summary of the study is included in Murray et al. (1987).

Age and growth: Age estimation methods for albacore have used several, different hardparts (e.g. scales, fin spines, otoliths) with varying success. At present the only banding sequence that has been validated is that of daily increments on otoliths of North Pacific albacore (Laurs et al. 1985). This method is time consuming and the otoliths are often difficult to read. As an alternative, we are looking at the rings that are laid down on the centra of caudal vertebrae. These rings are visible to the naked eye but are accentuated with alizarin red stain. To date 800 vertebrae from 400 fish have been stained and preserved. Vertebrae 35 and 36 have been used because they are easily identifiable, being the posterior two vertebrae with bony protrusions of the keel. Counting of the rings will take place later this year. A selection of otoliths from the 400 fish will be read by NMFS staff at La Jolla to see if the ages determined from vertebrae and otoliths correspond.

White muscle oil content: This project continued in 1987 with the analysis of fillets taken from 34 large, longline caught albacore. The fish ranged in length from 80-101 cm (mean 93 cm) and had oil contents of 0.9-15.2% by weight (mean 6.7%). These results agree with the trend of increasing oil content with increasing fish length found by Vlieg and Murray (1988) in troll caught New Zealand albacore samples. During the 1988 observer trips on Japanese longliners (described below) a further 50 albacore fillets were collected for comparison with the 1987 samples.

Other tuna research

Longline observer programme: FRC placed personnel on Japanese southern bluefin longliners in June-July of 1987 and 1988 to collect biological samples from large tunas for projects described in this paper, observe longlining techniques and fishing strategies, monitor the catch and validate the catch

information recorded in New Zealand logbooks. Results from the 1987 trips are detailed in Michael et al. (1987). A report on the 1988 cruise is in preparation. For both years we found that catches of southern bluefin, bigeye and butterfly tunas and swordfish over 20-25kg were accurately recorded but catches of albacore were often under reported by 25-50%.

Tuna bibliography: A bibliography of scientific papers, reports and popular articles on tuna fisheries and research in New Zealand from 1960-1985 has recently been published (Bailey 1988). Although it has been compiled primarily for New Zealand fisheries scientists and managers, the inclusion of articles on fishing technology, marketing and economics should make it of use to most people interested in the tuna industry. A supplement of papers for 1986-1988 is included with the bibliography.

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Table 1. 1987 tuna catches by domestic vessels and foreign longliners in New Zealand waters. (+ = less than 0.5 tonnes)

Species	Domestic (tonnes)*	Southern longline (No. of fish)	Northern longline (No. of fish)	Total foreign longline (tonnes)
Albacore	609	39117	103562	1426
Bigeye	+	9961	6072	587
Skipjack	5174	0	0	0
Southern bluefin	50	21817	31	1624
Yellowfin	7	2882	4299	161
Northern bluefin	0	134	19	10
Totals	5840	73911	113983	3808

* domestic figures are provisional pending processing of fishing returns filed after the due date.

Table 2. Fishing effort summary for foreign longline vessels in New Zealand waters in 1987.

	Southern longline	Northern longline
No. of vessels	38	24
No. of sets	4999	1135
Average no. of hooks per set	2933	2994

Table 3. Fishing effort summary for New Zealand domestic tuna fisheries in 1987.

Species	No. of vessels
Albacore	143
Skipjack	41
Southern bluefin	8
Yellowfin	25
Bigeye	1

Table 4. New Zealand domestic tuna landings (tonnes) for 1974 to 1987. Data from Murray et al. (1987) and Table 1.

Species	1974	1975	1976	1977	1978	1979	1980
Albacore	898	646	25	621	1686	814	1468
Bigeye	0	0	0	0	0	0	0
Skipjack	659	1159	291	1657	2841	3129	2717
So. bluefin	4	0	0	5	10	5	130
No. bluefin	0	0	0	0	0	0	0
Yellowfin	1	1	1	1	1	1	1
Total Tuna	1562	1806	317	2284	4538	3949	4316

Species	1981	1982	1983	1984	1985	1986	1987
Albacore	2085	2434	718	2279	2527	2200	609
Bigeye	0	0	0	0	0	0	0
Skipjack	3221	3723	3911	3865	1075	5214	5174
So. bluefin	173	208	112	96	90	83	50
No. bluefin	0	0	0	0	0	0	0
Yellowfin	1	2	0	2	1	2	7
Total Tuna	5480	6367	4741	6242	3693	7499	5840

Table 5. Catch per 1000 hooks of albacore, bigeye and yellowfin tuna in the Northern and Southern longline fisheries in New Zealand waters since 1980. Data from Murray et al. (1987) and Tables 1 and 2.

Fishery	Species	1980	1981	1982	1983	1984	1985	1986	1987
Southern	Albacore	0.76	1.89	2.97	3.10	3.07	2.77	2.80	2.67
	Bigeye	0.23	0.33	0.56	0.77	1.19	0.94	1.08	0.68
	Yellowfin	0.01	0.09	0.09	0.04	0.16	0.06	0.16	0.20
Northern	Albacore	-	25.09	20.15	38.75	26.66	29.53	31.04	30.69
	Bigeye	-	2.74	2.30	0.80	0.69	1.70	1.87	1.80
	Yellowfin	-	1.18	1.02	0.61	0.45	1.70	0.86	1.27

Table 6. Albacore tagging in the South Pacific 1986 - 1988.

Releases in New Zealand waters:			
RV Kaharoa	Nov-Dec 1986	West Coast North Island (Reef Pt to North Taranaki Bight)	138
	Feb 1987	East Coast North Island (Madden Banks)	178
	Jan 1988	" " " " " "	211
	Feb 1988	West Coast North Island (North Taranaki Bight)	370
	Feb-Mar 1988	Chatham Rise	45
Commercial trollers (2)	Jan-Feb 1987	West Coast South Island (Westport to Hokitika)	70
(1)	Feb 1988	East Coast North Island (Cape Runaway)	19
			1031
Releases in Australian waters:			
Big game trollers	Summer 1987	South east coast (exact area unknown at present)	500
Releases in the central South Pacific:			
RV Townsend Cromwell	Feb 1986	37° - 40°S, 153° - 146°W	21
	Jan-Feb 1987	36° - 40°S, 165° - 149°W	425
RV Coriolis	Feb-Mar 1987	38° - 41°S, 138° - 127°W	190
Commercial trollers (2)	Feb-Mar 1986	38° - 41°S, 155° - 140°W	702
(7)	Jan-Apr 1987	36° - 40°S, 155° - 145°W	456
(39)	Dec 1987-Apr 1988	38° - 40°S, 165° - 155°W	447*
			2241
Total releases of tagged albacore			3772

* A further 1247 tags were distributed to trollers in the central South Pacific fishery in 1988.

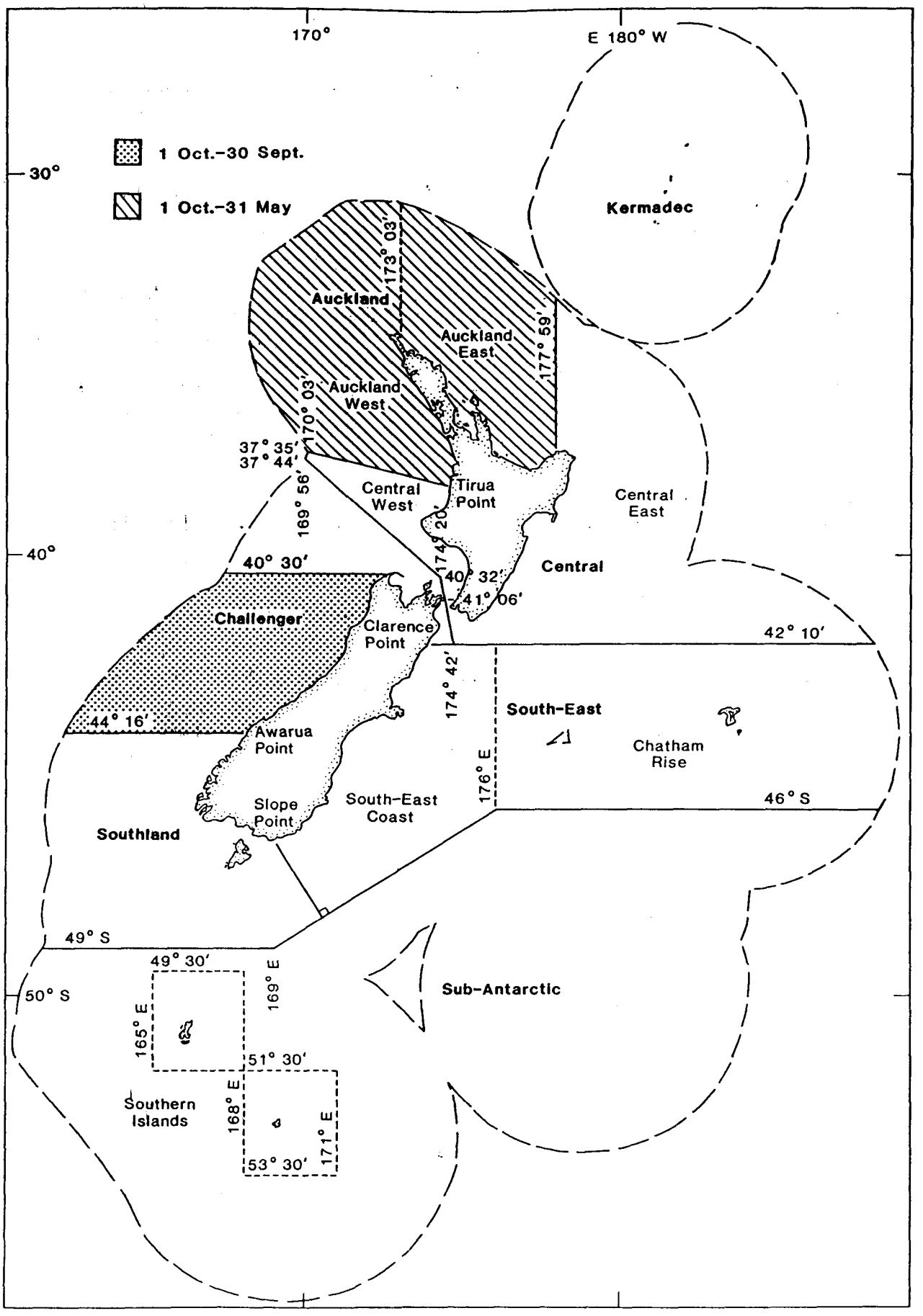
Table 7. Recoveries of tagged albacore in the South Pacific (as of August 1988)

See Fig. 2.	Release Information				Recovery Information						
	Date	Lat.	Long.	Size (cm)	Date	Lat.	Long.	Size (cm)	Days free	Distance covered (nmi)	Mean nmi/ day
a	9 Mar 1986	40°20'S,	145°50'W	78	16 Apr 1987	38°23'S,	133°45'W	86	404	570	1.4
b	27 Feb 1987	40°39'S,	177°00'E	76	13 Aug 1987	30°40'S,	171°45'E	80	199	730	3.7
c	28 Feb 1987	39°43'S,	151°04'W	64	27 Apr 1987	38°23'S,	145°38'W	?	59	260	4.4

Table 8. Numbers and localities of albacore examined for parasites.

Cruise No.	Fishing method	No. albacore examined	Locality
MAFFish RV Kaharoa (New Zealand)			
K05/85	trolling	18	West Coast South Island
K07/85	"	29	East Coast North Island
K18/85	"	9	North Cape North Island
K03/86	"	35	Chatham Rise
K05/86	"	24	North Cape-Norfolk Island
K14/86	"	16	West Coast North Island
K04/87	"	15	Chatham Rise
K12/87	longline	53	East Cape North Island
NOAA RV Townsend Cromwell (U.S.A)			
TC8601	trolling	46	Central South Pacific
TC8701	"	37	"
ORSTOM RV Coriolis (France)			
Prosgermon87	trolling	51	Central South Pacific
Others			
1986	longline	10	Coral Sea
1987	"	15	Kingdom of Tonga
"	trolling	26	New South Wales
Total examined		384	

Figure 1. Fisheries Management Areas in the New Zealand EEZ, showing areas closed to foreign licensed longline vessels.



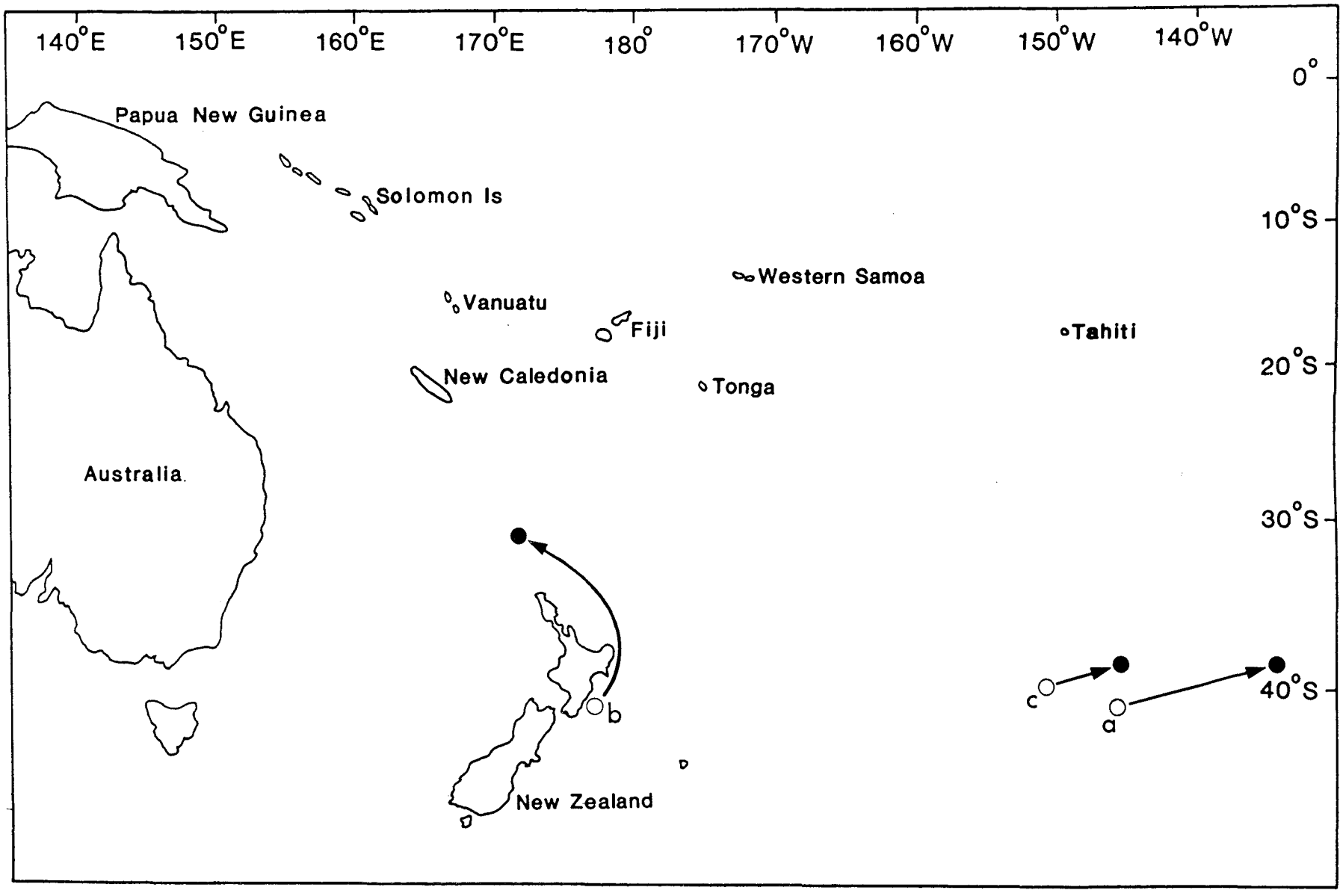


Figure 2. Release ○ and recapture ● sites of albacore tagged in the South Pacific, 1986–1988.