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## **EXPLORATORY FISHING FOR TUNAS AND TUNA TAGGING IN THE MARQUESAS, TUAMOTU, SOCIETY, PITCAIRN, AND GAMBIER ISLANDS**

**by**

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## INTRODUCTION

The Marquesas Islands are located in the Pacific Ocean at about 9° south latitude and 140° west longitude (Figure 1). It has been demonstrated by tagging (Anonymous, 1980b) that skipjack tuna, Katsuwonus pelamis, which occur in the northeastern Pacific Ocean have migrated to the Hawaiian Islands and Christmas Island in the central Pacific and also to the area between the Marshall and Mariana islands in the western Pacific. Schaefer (1963) and Rothschild (1965) have hypothesized that, since there is apparently considerable skipjack spawning in the central Pacific Ocean, but relatively little in the eastern Pacific Ocean (Matsumoto, 1966), most of the skipjack of the northeastern Pacific Ocean are the result of spawning in the central Pacific Ocean and are destined to return there for spawning, provided they do not die during adolescence. Although large numbers of skipjack have been tagged in the southeastern Pacific Ocean (Fink and Bayliff, 1970), none has been recaptured in the central Pacific Ocean. This could be due, however, to the fact that the skipjack fisheries of the south central and southwestern Pacific Ocean were of low intensity during the period when most of the tagging took place (late 1950's and early 1960's). At present the fisheries of the south central Pacific Ocean are still of low intensity, but those of the southwestern Pacific Ocean have increased considerably in recent years. It seems that one of the best ways to determine more about the relationships of the skipjack of the south central and southeastern Pacific Ocean is to tag skipjack, particularly small ones, in the vicinity of the Marquesas Islands. These islands are roughly 3,500 miles from the west coast of South America, where one of the most important skipjack fisheries of the eastern Pacific Ocean takes place. In addition, they are roughly 2,000 miles from the Hawaiian Islands, 2,500 miles from New Zealand, and 4,000 miles from Papua New Guinea, where other major skipjack fisheries occur.

The Tuamotu, Society, Pitcairn, and Gambier islands, though the first two are not as close to the principal fishing areas of the eastern Pacific Ocean as are the Marquesas Islands, and the last two are small and isolated, are of interest for the same reasons that the Marquesas Islands are of interest, and thus skipjack should be tagged in those islands for the same reason that they should be tagged in the Marquesas Islands. Tagged skipjack released off Australia, Fiji, New Zealand, Tonga, the Wallis and Futuna islands, and Western Samoa have been recaptured in the Society Islands (Anonymous, 1980d; Kearney, 1980; Gillett, 1981).

The U.S. Fish and Wildlife Service (FWS) (now the U.S. National Marine Fisheries Service) tagged about 4,600 skipjack and a few yellowfin tuna, Thunnus albacares, in the vicinity of the Marquesas Islands during the late 1950's (Brock and Marr, 1960), but none was recovered. Since that time, however, the fishery of the eastern Pacific Ocean has expanded much further offshore and that of the southwestern Pacific Ocean has increased considerably in intensity, making the probability of recapture of tagged fish much greater. Accordingly, in spite of the negative results obtained by the FWS, it was considered worthwhile to tag skipjack near the Marquesas Islands again and also to tag them near the other island groups. In addition, samples of blood and hard parts were collected in that area for genetic and other biological studies, which should provide useful information on the stock compositions of yellowfin and skipjack in the Pacific Ocean. Also, data on length composition and stomach contents of tunas were collected, and samples of small organisms concentrated at the surface at night under lights were gathered.

The organizations which participated in the Marquesas Islands tagging and other scientific activities were the Inter-American Tropical Tuna Commission (IATTC), the South Pacific Commission (SPC), the Centre National pour l'Exploitation des Oceans (CNEXO), the Office de la Recherche Scientifique et Technique Outre-Mer (ORSTOM), the Service de la Peche de la Polynesie Francaise (SPPF), and the Service de l'Economie Rural (SER). In addition, one scientist from the Department of Primary Industry (DPI) of Papua New Guinea participated in the field work.

The vessel employed for the first phase of the work was the Tainui, a baitboat used for research by the CNEXO and the SPPF. It had a crew of nine, including the captain. It is 21.3 m (70.0 feet) long, 6.8 m (22.5 feet) wide, and 3.0 m (9.8 feet) deep, and has a speed of about 9.5 knots at 1,850 RPM. It has four bait wells of about 10 cubic m (2,642 gallons) each, but only two of them were used for that purpose. There was a single fishing rack at the stern of the vessel. For the second phase the Mary K., a San Diego-based baitboat chartered by the IATTC, was used. It had a crew of eight, including the captain. Its specifications are as follows: registered length, 68.2 feet (20.8 m); beam, 22.3 feet (6.8 m); depth, 8.6 feet (2.6 m); engine, General Motors V12-71 (360 horsepower); cruising speed, 8 knots at 1,600 RPM; fuel capacity, 13,500 gallons (51,100 l); bait capacity, 1,000 scoops (8 pounds or 3.6 kg each). The Cornucopia, a Honolulu-based combination baitboat-troller chartered

by the IATTC, was used for the third phase of the work. It had a crew of four to six, including the captain. Its specifications are as follows: registered length, 51.5 feet (15.7 m); beam, 17.5 feet (5.3 m); depth, 8.8 feet (2.7 m); engine, 3-cylinder Enterprise (190 horsepower); cruising speed, about 7 knots; fuel capacity, 2,000 gallons (7,571 l) in the fuel tanks and 2,600 gallons (9,842 l) in the bait wells; bait wells, two. For the fourth phase the Tokyo-based baitboat Hatsutori Maru No. 5, under long-term charter to the SPC, was chartered jointly by the IATTC and the SPC. It had a crew of 22, including the captain. Its specifications are as follows: registered length, 39.80 m (130.6 feet); beam, 7.30 m (24.0 feet); depth, 3.15 m (10.3 feet); engine, Hanshin Nainenki GLU32; cruising speed, 11.5 knots, fuel capacity, 141 cubic m (37,249 gallons); bait wells, seven.

The names of the captains of the vessels, and of the scientific personnel and observers, are listed in Appendix Table 1.

#### TUNA RESEARCH AND EXPLORATORY FISHING CONDUCTED IN THE AREA BY OTHER ORGANIZATIONS

The tuna research and exploratory fishing which has been conducted in French Polynesia and the Pitcairn Islands is summarized in Table 1.

During 1949-1955 three baitboats, the Hawaiian Tuna, the Challenger, and the Paramount, fished for brief periods in the Marquesas Islands (Royce, 1954; Austin, 1962).

During 1954-1960 the FWS conducted extensive oceanographic and biological studies and exploratory fishing in the Marquesas Islands. The research vessel Charles H. Gilbert visited these islands seven times, the research vessel Hugh M. Smith visited them four times, and the research vessel John R. Manning and the chartered baitboat Cape Falcon each visited them once. In addition, these vessels also visited the Society and Tuamotu islands. The results of this work are summarized in numerous publications listed in the References section of this report.

During 1964-1972 the Marquesas Islands were visited six times by large U.S.-based purse seiners which caught a total of 245 short tons (222 metric tons) of skipjack and 55 short tons (50 metric tons) of yellowfin. No other information is available on the results of these trips. In 1974 the large U.S.-based purse seiner Sea Treasure fished briefly in the Marquesas and Society islands, catching 17.5 short tons (16.9 metric tons) of fish, mostly skipjack

(Anonymous, no date).

During 1972-1976 four baitboats, the Moetu II, based in French Polynesia, the Anela, based in Hawaii, the Redonda, based in California, and the Sasaya Maru No. 1, based in Japan, conducted exploratory fishing in the Marquesas, Tuamotu, Society, and Austral islands (Doumenge, 1973; Uchida, 1975; Anonymous, 1978f).

During 1976 and 1977 the baitboat Tainui conducted some exploratory fishing in the Tuamotu and Society islands independently of the IATTC (Anonymous, 1978f).

In 1978 and 1979 the Japanese baitboat Hatsutori Maru, chartered by the SPC, conducted scientific studies and exploratory fishing in the Marquesas, Tuamotu, and Society islands (Kearney, Hallier, and Gillett, 1979).

As far as can be determined, previous to 1980 no tuna research or exploratory fishing had been conducted in the Pitcairn or Gambier islands.

#### BAITFISH

##### Methods of catching and handling the bait

Because bait is relatively scarce around small islands, several of the vessels have brought bait from the eastern Pacific Ocean. The Challenger, Paramount, and Cape Falcon (Table 1) all brought anchovetas, Cetengraulis mysticetus, from the eastern Pacific. It was intended to do the same thing on the Mary K. Unfortunately, however, no anchovetas could be found off Baja California or Central Mexico as far south as Banderas Bay, so northern anchovies, Engraulis mordax, plus a few California sardines, Sardinops sagax caeruleus, caught on January 26-28, 1978, had to be substituted. These species normally occur in water of about 60° to 65°F (15.6° to 18.8°C), but often survive in water considerably warmer than that in the bait wells of fishing vessels. On February 7 the Mary K. left Puerto Vallarta, Mexico, with about 825 scoops (2,994 kg) of anchovies and 8 scoops, (29 kg) of sardines in its wells. On the morning of February 22, when the vessel arrived at the Marquesas Islands, there were about 400 scoops (1,452 kg) left alive, and by the next morning there were only about 200 scoops (726 kg) left. On March 1 about 25 scoops (91 kg) of emaciated anchovies remained.

Cultured bait has also been used. The SPPF culturing facilities on Rangiroa, Tuamotu Islands, furnished the following quantities of aua or milkfish, Chanos chanos, to various vessels: Tainui, 33 buckets (33 kg); Mary



K., 125 scoops (454 kg); Cornucopia (through the Tainui), 7 buckets (25 kg); Hatsutori Maru, 344 buckets (516 kg); Hatsutori Maru No. 5, 956 buckets (1,434 kg). Also, the Mary K. received about 10 scoops (36 kg) of mollies, Poecilia mexicana, from the CNEXO facility at Vairoa, Tahiti, Society Islands, and the Hatsutori Maru got 355 buckets (532 kg) of mollies there. (The buckets used on the Tainui each contained about 1 kg of fish, those used on the Hatsutori Maru and Hatsutori Maru No. 5 each contained about 1.5 kg of fish, and those used on the Cornucopia and the FWS boats each contained about 8 pounds (3.6 kg) of fish. The scoops used on the Mary K. also each contained about 8 pounds of fish.)

Visual baitfish surveys were made at beaches where baitfish might occur by walking along the beaches, traveling along them in a skiff with an outboard engine, or swimming at the surface and looking downward through a face mask. Local residents were also asked if baitfish were present.

Fish were caught in the daytime by beach seining. The methods are described by June (1951) and Hester (1973). The net used on the Tainui was 150 m (82.0 fathoms) long, 3.3 m (1.8 fathoms) deep, and constructed of 6-mm (0.24-inch) stretched mesh netting. The net used in the Marquesas Islands by the Mary K. and the Cornucopia was 50 fathoms (91.4 m) long, 3 fathoms (5.5 m) deep, and constructed of 1/2-inch (12.7-mm) stretched mesh netting. The net used by the Mary K. in the Society Islands was 35 fathoms (64.0 m) long, 5 feet (1.5 m) deep, and made of 1/2-inch (12.7-mm) stretched mesh netting. The net used by the Hatsutori Maru No. 5 was 148 m (80.9 fathoms) long and 7 m (3.8 fathoms) deep with an 80- by 2-m (43.7- by 1.1 fathom) extension on one end. None of the nets had a bag. Fishing was also conducted in the Society Islands using the nets of the Mary K. and the Tainui together. On these occasions the nets were placed end to end (but with the ends overlapping) and used in the same manner as a single net.

Beach seining is usually practical only when the bottom is free, or nearly free, of rocks and coral and the depth of the water is less than the depth of the net. Also, it is not possible to use a beach seine in the surf area if the surf is greater than about 1 to 2 feet (0.3 to 0.6 m). If the water is clear it is easier to see the fish, but it appears that it is also easier for the fish to see the net and avoid it. When the weather is rainy the sardines in Taiohae Bay seem to migrate from the beaches to the deeper water within the bay. It is believed that under such circumstances they could be caught during the day with a lampara net (described below).

The night fishing by the Hatsutori Maru No. 5 was conducted with a bouki-ami net, which is similar to the lift net described by June (1951) and Hester (1973). It consists essentially of a large rectangle of netting stacked on the starboard sponson of the boat. Lights are used at several points on the vessel and in a skiff tied to its stern. If fish are observed around the lights the net is set from the side of the boat with the aid of long bamboo poles. Weights on ropes keep the inboard side submerged. Then, by moving and/or dimming or extinguishing the lights in sequence, the fish are lured to the starboard side of the boat inside the net. Finally the net is hauled to the surface and the fish are transferred to the boat. This usually took place twice each night, at about 11 p.m. and 4 a.m. This technique is much more effective when there is little or no moonlight. The water must be relatively calm, and there must be little or no current. The depth must be at least 23 m (12.6 fathoms) so that the net does not touch the bottom, but less than 40 m (21.9 fathoms) to enable retrieval of the anchor. Large, predatory fish seem to learn quickly that bait fish can be found near the lights, so they come to the lights too and tend to chase the baitfish away. Consequently it is not advisable to fish for bait at night in the same location for more than about three or four consecutive nights unless few or no predatory fish are present. The catches with this net seemed to be better when the weather was rainy.

A lampara net was used by the Mary K. for night fishing. This is somewhat similar to a beach seine, but it has a deep bag, and it is employed in water so deep that its lead line does not reach the bottom. Fish swimming near the surface are surrounded, entrapped in the bag, and then transferred to the bait wells of the vessel. The Mary K.'s net was 16 fathoms (48 m) deep with 50-fathom (91-m) wings and 1/2-inch (12.7-mm) stretched mesh netting in the bag.

The sardine- and anchovy-like fish used for bait are all relatively delicate, and must be handled carefully. When they are transferred from the net to the large bait wells or from the large bait wells to the chumming wells they must be transported in buckets of water, rather than in scoops, as is the practice in the eastern Pacific Ocean.

### Results

The principal bait species caught in the Marquesas Islands is the Marquesan sardine, Sardinella marquesensis. In addition, ka'oa or goatfish, Upeneus vittatus, hoho'e or flagtail, Kuhlia marginata, mullets, Crenimugil crenilabis, Mugil cephalus, and Neomyxus chaptali, and etu'e or scad, Selar crumenophthalmus

have been used. The species caught during the baitfishing operations of Cruise 5004 are listed in Table 2.

Royce (1954) reports that the Hawaiian Tuna had difficulty finding bait in the Marquesas Islands during July 1949, but that either the Hawaiian Tuna or the Challenger caught more than 1,000 scoops (3,629 kg) of bait, presumably Marquesan sardines, at Hiva Oa. This must have been in March (see Table 1).

The occurrences of Marquesan sardines reported for the FWS cruises (Royce, 1954; Austin, 1957; Wilson and Rinkel, 1957; Wilson, Nakamura, and Yoshida, 1958; Yoshida, 1960; Sprague, 1961) are summarized in Table 3. Those for the IATTC cruises are listed in detail in Appendix Tables 2-5 and summarized in Table 4. In Tables 3 and 4 Taipi Vai, Haka Paa, Hooumi, Hanga Haa, and Haka Puuae are all included with Controleur Bay, Hakau and Hakatea are included with Tai Oa Bay, and Taahuka (Tahauku) is included with Vipihae (Taaoa) Bay. Different names are used for the same locations on different charts, and the spellings of the same names vary from chart to chart. The locations listed in the FWS reports which do not appear above or in the two tables are probably variant spellings of locations which are listed. Marquesan sardines were caught at Nuku Hiva, Hiva Oa, Tahuata, and Ua Huku by the FWS, but only at Nuku Hiva and Ua Huka by the IATTC. This is somewhat surprising, as large catches were reported at Hiva Oa by Royce (1954) and Tahuata by Sprague (1961). There are no records of fishing for bait during July or August, except for Royce's (1954) report that the Hawaiian Tuna had difficulty finding bait during July. The only locations where sardines can be consistently caught appear to be Taoihae, Controleur, and possibly Anaho and Tai Oa Bays, all on Nuku Hiva.

In the Tuamotu Islands the principal bait species is the sprat, Spratelloides gracilis. This and the other species caught in the Tuamotu Islands on Cruise 5004 are listed in Table 2. Previous to that cruise the only record of baitfish being caught in the Tuamotu Islands is that of Kearney, Hallier, and Gillett (1979); they reported the capture of 670 buckets (1,005 kg) of sprats in Rangiroa, Apataki, and Fakarava atolls in 1978 and 1979.

In the Society Islands Yoshida (1960) reported that 42 buckets (152 kg) of Tahitian sardines, Sardinella melanosticta and 20 buckets (73 kg) of Tahitian nehu, Stolephorus sp., were caught at Tahiti in 1959, and Sprague (1961) stated that 30 buckets of mullets, Mugil spp., and goatfish, Upeneus sp., were caught there in 1960. Kearney, Hallier, and Gillett (1979) reported catching Spratelloides gracilis at Huahine, Moorea, Tahaa, and Tahiti, Selar

crumenophthalmus at Moorea, Tahaa, and Tahiti, Sardinella melanura at Moorea and Tahaa, Stolephorus indicus at Huahine, Moorea, Tahaa, and Tahiti, S. buccaneeri at Bora Bora, Huahine, and Tahaa, Albula vulpes, Mulloidichthys samoensis, Chanos chanos, and Mugilidae at Bora Bora, Bregmaceros and Priacanthus sp. at Tahaa, Myctophidae at Huahine, Moorea, and Tahiti, Siganidae at Moorea and Tahiti, and Holocentridae at Huahine, Moorea, and Tahaa. On IATTC Cruise 5002 ouma or goatfish, Mulloidichthys samoensis, were caught at Bora Bora and Tahaa, auoa or mullet, Neomyxus chaptali, at Bora Bora, Maupiti, and Tahaa, sardines or sprats, Sardinella gibbosa, S. melanura, or Spratelloides atrofasciatus, at Tahaa, nape or mullet, Mugil vaigiensis, at Maupiti, and ava or milkfish, Chanos chanos, and ioio or bonefish, Albula vulpes, at Bora Bora.

#### Quality of the various species as bait

Marquesan sardines, milkfish, and ouma, are the best bait species, as they are lively, remain close to the surface, and tend to remain close to the boat. Milkfish and ouma are hardy, but Marquesan sardines are quite fragile, and thus must be handled with great care. Sprats, Spratelloides atrofasciatus and S. gracilis, are good as bait, although the latter sometimes die extremely quickly in the bait wells. Sardinella gibbosa and/or S. melanura could not be kept alive in the bait wells. Ka'oa are fair as bait. They tend to descend far beneath the surface, taking the tunas with them. The tendency to sound can be decreased somewhat by inflicting damage to the fish before they are thrown overboard. The flagtails and mullets were too big to be satisfactory as bait, and the mollies used on the Mary K. were so small (about 1.5 to 2 cm, or less than 1 inch) that they tended to go through the strainers of the bait wells.

#### Biology of the Marquesan sardine

Nakamura and Wilson (1970) give a detailed account of the life history of the Marquesan sardine, including meristic characters, habitat, food and feeding, associated fauna, predation, behavior, parasites, fecundity, maturity and spawning, size and sex composition, and abundance. They stated that the fishing operations conducted in Taiohae Bay in 1957 and 1958 reduced the estimated population from 1,200 to 32 buckets (4,354 to 116 kg). The catches per unit of effort of sardines seemed to decrease with time in the various bays of Nuku Hiva during the IATTC-SPC survey of 1979-1980, but it is not certain that the populations were significantly reduced because fishing was conducted for only a short period. Also, as noted previously, large predatory fish seem to learn that baitfish accumulate around the lights, so they also congregate around the

lights, driving the baitfish away and decreasing the catches per unit of effort.

This species has been introduced to Hawaii for use as bait there (Murphy, 1963).

## TUNAS

### Fishing methods

Fishing has been conducted by live-bait methods, trolling, purse seining, and longlining (Table 1). Longlining was conducted on Cruises 30 and 38 of the Charles H. Gilbert and Cruise 34 of the John R. Manning. Neither the purse seining nor the longlining results are discussed in this report, as the purse-seine data are mostly proprietary and the longline data have been analyzed by Yoshida (1967).

The methods of live-bait fishing and trolling are discussed by Godsil (1938), Cleaver and Shimada (1950), Scofield (1956), Muramatsu (1960), and Yoshida (1966b). The vessels were of several types. The Sasaya Maru No. 1, the Hatsutori Maru, and the Hatsutori Maru No. 5 were Japanese baitboats, the Challenger, Paramount, Cape Falcon, Redonda, and Mary K. were U.S. west coast-based baitboats, the Hawaiian Tuna and Anela were U.S. Hawaii-based baitboats, the Tainui was an Australian baitboat used for exploratory fishing, the Charles H. Gilbert, Hugh M. Smith, and John R. Manning were research vessels, the Cornucopia was a troller modified for live-bait fishing, and the Moetu II was a French Polynesia-based baitboat.

The results obtained on the research cruises cannot be considered indicative of the results which would be obtained by vessels fishing commercially. When the fish were being tagged, which was often the case, the fishermen had to work more slowly than would have been the case otherwise. Also, in some cases, attempts were made to fish for tunas in as many parts as possible of an island group, rather than concentrating the effort in a few areas where the catches per unit of effort were greatest. In addition, due to interest in fishes other than tunas, the Tainui fished part of the time in areas where tunas were not likely to be caught.

### Areas of operation

The tracks for Cruises 5001, 5002, and 5004 are shown in Figures 1, 2, and 3. No track is shown for Cruise 5003, as the Cornucopia fished almost entirely on the leeward (west) side of Nuku Hiva. The tracks for the FWS cruises are shown by Austin (1957), Wilson and Rinkel (1957), Wilson, Nakamura, and Yoshida

(1958), and Yoshida (1960). Daily records of the areas of operation for Cruises 5001-5004 are shown in Appendix Tables 6-12. Similar records for the FWS cruises are given by Austin (1957), Wilson and Rinkel (1957), Wilson, Nakamura, and Yoshida (1958), and Yoshida (1960) and for the 1978-1979 SPC cruise by Kearney, Hallier, and Gillett (1979).

### Results

Data on the numbers and types of schools sighted and the numbers of fish caught and tagged each day for Cruises 5001-5004 are given in Appendix Tables 6-12. Similar data for the FWS cruises are given by Austin (1957), Wilson and Rinkel (1957), Wilson, Nakamura, and Yoshida (1958), and Yoshida (1960) and for the 1978-1979 SPC cruise by Kearney, Hallier, and Gillett (1979).

When a vessel is in a fishing area with bait in its bait wells it can be searching for schools of fish, pursuing a school which has been sighted, throwing bait near a school, drifting (for example, at night, while undergoing repairs, or during a period when experience has shown that the fish do not bite well), or running without searching for schools of fish (for example, to another area where fishing is expected to be better than in the area from which the vessel has just departed). Searching time is generally considered to be the best measure of fishing effort for calculating indices of abundance of pelagic fish (numbers of schools, numbers of fish, or weight of fish per unit of time) (Gulland, 1968; Pella, 1969). The fishing effort was measured in various ways on the various cruises, as shown in Tables 5-9.

Schools of fish which are present may or may not be sighted. If they are sighted bait may or may not be thrown near them ("schools chummed"), depending upon whether the boat is able to approach them closely enough, whether the fish are of catchable size, etc. If bait is thrown near them the fish may or may not bite ("schools fished"). The numbers of schools sighted by the different vessels if they fished in the same area-time strata would not be expected to be the same due to the fact that the vessels were not equal from the standpoint of speed, height of the bridge, stability, number of persons looking for fish at any given time, skill of the persons looking for fish, etc. Also, the portions of the schools sighted which were chummed would differ, the faster boats presumably being able to get close to greater portions of the schools sighted. Finally, the portions of the schools chummed which could be induced to bite would probably differ due to the differences in the speed and maneuverability of the boats, the skill and persistence of their captains, the amount and

effectiveness of the bait thrown, etc. The numbers of schools sighted, chummed, and fished were not recorded for all the cruises, but those that were are listed in Tables 5-9. Data on the sizes and compositions of the schools are given in Tables 10-13.

The most obvious factor affecting the numbers of fish caught is the number of lines (baitfishing or trolling) fished. The Japanese vessels employed the largest numbers of baitfishing lines and the Cornucopia probably employed the least. Most of the vessels probably used two trolling lines most of the time, but the Cornucopia used considerably more during the period of February 6-21, 1979 (Appendix Table 9). In addition, the way that the lines are fished affects the catch. For example, the faster boats should encounter more fish, but the fish drop off the trolling lines more often on faster boats than on slower ones. Data on the catches of fish are shown in Tables 5-9.

The relative abundance of tunas in different months of the year in the various areas is of interest. In the Society Islands the catches of skipjack tend to be lower during July-September, and those of yellowfin tend to be lower during June-November (Brun and Klawe, 1968). It is not known whether these lower catches are the result of lower abundance of fish or some other factor, such as bad weather. Skipjack are said to be more abundant in the Marquesas Islands during the southern summer (Anonymous, 1957b and 1958f; Wilson and Austin, 1957 and 1958; Austin, 1958), and most of the work there has been conducted during that time of year. The last columns of Tables 5 and 10 give data on the numbers of fish caught per day and the numbers of schools of fish sighted per hour of fishing during different months of the year, respectively. It should be borne in mind that the results obtained by dissimilar boats are not comparable, and those obtained by the same or similar boats in different months are only very crudely comparable, for reasons discussed above. In Table 5 five of the nine values for fish caught per day for February and March of 1956-1960 are greater than 100 and four are less than 100. For the other months only one of the eight values is greater than 100. The data in this table for Cruise 5003 include six different months, but the numbers of fish caught per day fluctuate so erratically that no conclusions can be drawn. The data in Table 10 for Cruise 5003 appear to be more meaningful. The numbers of schools sighted per hour of fishing were greatest in January and February and least in May. These results all tend to agree with the contention that skipjack are most abundant in the Marquesas Islands in the southern summer. However, the lack of

comparability of the data should again be emphasized, and it should be pointed out that there are no data for July and August and few data for May-June and September-November. The data in Tables 6 and 11 are insufficient to form the basis for any speculation regarding the relative abundance of tunas in the Tuamotu Islands in different months.

The relative commercial fishing potential of the areas surveyed can be evaluated by comparing the results obtained by the same boats or similar boats fishing in the same way in the areas in question and in other areas. The only data suitable for this purpose are those collected by the SPC's Skipjack Survey and Assessment Programme, which are the result of nearly 3 years of fishing by two similar chartered Japanese vessels. These results are published in a series of Interim Reports, including the papers by Kearney, Hallier, and Gillett (1979), Gillett and Kearney (1980), and Kearney and Gillett (1980) listed in the References section. These data are summarized in Table 14. The numbers in the Reference column of this table correspond to the numbers of the Interim Reports from which the data were obtained.

Two indices of commercial fishing potential were selected, numbers of schools sighted per hour of fishing and numbers of fish tagged per hour of fishing. Each of these indices, if other information is not considered concurrently, has severe deficiencies. The first does not take into account the species compositions or sizes of the schools or the relative ease with which the fish could be caught, and the second does not take into account whether the vessel had sufficient bait, or any at all, the size of the fish, or the portion of the fish caught which were tagged. When both indices are examined together considerably more insight regarding the relative commercial fishing potential of skipjack and yellowfin in the various areas is possible. It appears from these data that the commercial fishing potential is somewhat better than average in the Marquesas Islands and about average in the Tuamotu Islands and the Society Islands. Two factors which affect the results in the areas considered in this study are immediately apparent. First, the Marquesas Islands surveys were conducted only during December and January, which is thought to be the time of year when fishing is best in that area (Anonymous, 1957b and 1958f; Wilson and Austin, 1957 and 1958; Austin, 1958). Second, a considerable portion of the time in the Tuamotu Islands during 1980 was spent in poor fishing areas while traveling to and from the Pitcairn and Gambier islands. If fishing had been conducted only in the northwestern Tuamotu Islands the results there would have



been much better. Further analysis of the results in the various areas is not appropriate in this report, as the data were collected by the SPC, and are to be analyzed in detail by that organization.

Most of the schools seen in French Polynesia were associated with birds, but occasionally, especially on calm days, breezing or boiling schools were seen. These schools were usually fast moving, and tended to change direction suddenly. In the Marquesas Islands fishing tended to be better in the afternoon, particularly after about 3:00 p.m., than in the morning. Near Pitcairn Island the bird aggregations were scattered, so the schools were located by trolling beneath the birds until a jig strike was obtained. Then chumming was commenced; after the fish had begun to bite they continued to do so for some time even if chumming was stopped.

Both Japanese-made lures of the type used by California-based baitboats and Hawaii-made lures of the type used by the Hawaii-based fleet were used on the Cornucopia. The latter, which were smaller, were more effective for skipjack in the Marquesas Islands. The Japanese-made lures used on the Hatsutori Maru No. 5 were different from those used on the Cornucopia, and there is no information available to determine how they compare with the two types used on that vessel.

Several other species of fish were caught by trolling in the Marquesas Islands. These are listed in Table 15. Reef fish are often poisonous in the Marquesas Islands, and the residents of the Gambier Islands state that even some pelagic fish are poisonous in that area.

#### Anchored rafts

Three rafts were anchored in open water for the purpose of attracting tunas to them. Each raft was 6 feet long by 4 feet wide (1.8 by 1.2 m) and constructed of 2- by 6-inch (5- by 15-cm) and 4- by 4-inch (10- by 10-cm) fir. Inserts of polyurethane gave it additional buoyancy. A 6-foot (1.8 m) steel pipe passed through the middle of it, supported by guy wires, with a flashing light and a radar reflector on one end and a weight on the other. Several pieces of used purse-seine netting hung from the bottom to a depth of about 10 fathoms (18 m). A concrete block and a steel anchor were used to anchor each raft. The raft and the anchors were connected, with swivels to prevent kinking, by 1/4-inch (0.635 cm) steel cable, and 3/8-inch and 1/2-inch (0.9525-cm and 1.27-cm) polypropylene rope.

The locations and depths of the rafts were as follows: 7°51.2'S-140°01.5'W 26 fathoms (48 m); 9°25.6'S-140°08.3'W, 42 fathoms (77 m);

8°50.5'S-140°17.5'W, 437 fathoms (799 m). The first raft was placed in the water on December 31, 1978. It was not revisited to see if it had attracted any fish. The second raft was anchored on January 5, 1979. The next day small fish were seen around the raft, and crabs were clinging to the netting which was suspended from it. It was revisited on February 8 and 9. On February 8, a flock of birds was feeding near the raft, and a 20-ton school of large yellowfin with porpoises was seen nearby. Eight yellowfin were caught on jiglines near the raft. On February 9, five more yellowfin were caught on jiglines near the raft. The site was revisited on April 2, but the raft had disappeared. Local residents reported that it had been last seen about 2 weeks previously. During the time that the raft was in place many small local boats fished in its vicinity, presumably with at least some success. The third raft was placed in the water on January 9, 1979. It was revisited on January 16 and 21. On January 16 there was a large flock of birds near it, and a 1 1/2-ton school of skipjack was sighted a short distance from it; 42 fish were caught from this school. On January 21 four or five mahimahi were seen around the raft, and one was caught on a jigline. Three large yellowfin schools were sighted within 1 mile of the raft. The site was revisited on February 15 and 19, but the raft had disappeared.

#### Life history studies of tunas

Thong (1972) studied the gonads of yellowfin, bigeye, albacore, Thunnus alalunga, dogtooth, and skipjack tunas, and wahoo collected in French Polynesia. Yoshida (1966a) examined the gonads of skipjack collected in the Marquesas and Tuamotu islands to determine the size at first spawning, spawning season, frequency of spawning, fecundity, feasibility of using the gonad index as an index of maturity, and relation of sexual development to schooling behavior. Nakamura and Matsumoto (1967) collected larvae of yellowfin, albacore, bigeye, skipjack, kakakawa, and frigate tuna in the Marquesas Islands. Yoshida (1967) investigated the distribution and abundance of longline-caught yellowfin, bigeye, albacore, and skipjack tuna in the Marquesas Islands and adjacent areas. Nakamura (1965) studied the food and feeding habits of skipjack in the Marquesas and Tuamotu islands. Conand and Argue (1980) analyzed the incidence of juvenile skipjack in the stomachs of tunas in the Marquesas, Tuamotu, and Society islands. The SPC has gathered large amounts of data on maturity, food, lengths and weights, and incidence of parasites in tunas in the Marquesas, Tuamotu, Society, Pitcairn, and Gambier islands, and this information is currently being

analyzed by that organization. In addition, it has collected samples of blood and parasites for analysis by other organizations. The IATTC has collected samples of otoliths of tunas for growth studies in the Marquesas, Tuamotu, Society, Pitcairn, and Gambier islands.

Length-frequency data for skipjack are shown in Figures 4 through 25 and for yellowfin in Figures 26 through 39. The equivalent lengths in inches and weights in kilograms and pounds are listed in Appendix Table 13. The data for 1957-1959 were obtained from Austin (1957), Wilson and Rinkel (1957), Wilson, Nakamura, and Yoshida (1958), and Yoshida (1960). Except for 93 fish sampled on Cruise 5002 in April 1978, the Society Islands skipjack data are from Josse et al. (1979), Chabanne and Marcille (1980) and James (1980). The Society Islands yellowfin data for 1979 and August 1980 are from Chabanne and Marcille (1980) and James (1980). The remainder of the data, collected on Cruises 5001-5004, include the lengths of the fish which were tagged and those which were retained for biological studies of various sorts. The fish sampled by the FWS, the IATTC, and the SPC were measured on flat tagging cradles or measuring boards, whereas those of Josse et al. (1979), Chabanne and Marcille (1980), and James (1980) were measured with flexible tapes along the contour of the body (but in all cases from the tip of the snout to the fork of the tail). Thus the measurements are not strictly comparable, but this is of no consequence in the discussion that follows. In the Marquesas and Tuamotu islands, in most cases, there are one or two length modes of skipjack, a principal one at roughly 50 cm and a less prominent one, sometimes absent, at roughly 70 cm. The principal exceptions are the fish caught in the Marquesas Islands in January 1959 (Figure 6) and those caught in the Tuamotu Islands in February 1980 (Figure 14). In the latter case a smaller mode (about 44 cm) was more heavily represented in the fish caught on February 12 and a larger mode (about 53 cm) was more heavily represented in the fish caught on February 10, 11, and 13. A mode of about 53 cm was also found in the Tuamotu Islands in December 1978-January 1979 (Kearney, Hallier, and Gillett, 1979). In the Society Islands there are three modes in many cases, and in some instances the modes in successive months seem to be indicative of the growth of the fish. The lengths of the yellowfin tended to be much more scattered. This is not surprising, in view of the fact that most of the yellowfin were caught incidentally to skipjack during pole-and-line operations and by trolling. The yellowfin caught in the Tuamotu Islands, the Pitcairn Islands, and between the Pitcairn and Gambier islands in February 1980

(Figures 32, 35, and 36) all exhibited two modes, one at about 50 cm and the other between 70 and 80 cm.

Approximately 4,600 skipjack and a few yellowfin were tagged and released by the FWS in the Marquesas and Tuamotu islands during 1957-1958 (Brock and Marr, 1960). None of these has been returned. The numbers of fish tagged and released during 1977-1980 are listed in Table 16 and in Appendix Tables 6, 8, 9, and 12.

The recaptures (except for those from the 1978-1979 SPC cruise) are listed in Appendix Table 14. Only four skipjack and one yellowfin released in French Polynesia and one yellowfin released at Pitcairn Island have been recaptured outside those areas. This is somewhat surprising, in view of the fact that there is considerable interchange of skipjack among island groups in the western Pacific, and a number of fish have traveled from various island groups to the Society Islands (Anonymous, 1980d; Kearney, 1980; Gillett, 1981).

#### CONCLUSIONS

There has been a considerable amount of exploratory fishing in French Polynesia, particularly the Marquesas Islands (Table 1) but, because the types of vessels and the objectives of the cruises have varied so much, the results obtained on different cruises are not readily comparable in most cases. Also, little work has been done during the southern winter.

There is a modest commercial fishery for skipjack in the Society Islands (Van Campen, 1953; Brun and Klawe, 1968; Doumenge, 1973; Chabanne and Marcille, 1980; James, 1980). The fishermen go out each day in small, fast boats to look for surface schools of skipjack. When they find a school they follow it and attempt to catch the fish with poles, lines, and hooks with pearl-shell lures. No bait is employed, either for chumming or on the hooks. During the 1954-1967 period the annual landings at the Papeete, Tahiti, market ranged from 181 to 731 metric tons of skipjack and 41 to 126 metric tons of yellowfin (Brun and Klawe, 1968), but Kearney, Hallier, and Gillett (1979) report that in more recent years the total annual catches of skipjack have normally amounted to 1,500 to 2,000 metric tons. This fishery is subsidized by the French government (Gillett, 1981). If there were sufficient markets for the fish, and subsidies were received from the French government, the same type of fishery could probably be carried out in the Marquesas and Tuamotu islands, at least during part of the year.

There is apparently not enough bait to support substantial bait fisheries in the Marquesas, Tuamotu, or Society islands. The natural bait supply at Nuku Hiva and the milkfish ponds at Rangiroa probably could not supply a vessel the size of the Charles H. Gilbert or the Hatsutori Maru No. 5 on a year-round basis, but there might be enough for one or more smaller boats. These smaller boats probably could not sell all their catches locally, nor could they transport them to Tahiti (at least from the Marquesas Islands), so such a fishery would not be practical unless there were sufficient freezers where the fish could be unloaded and enough freezer vessels to transport the frozen fish at intervals to Tahiti or some other transshipping or processing center. It is possible, however, that more and larger milkfish ponds could be constructed, in which case it might be feasible for large vessels to fish for periods of several weeks or months and then return to Tahiti with their catches or for more elaborate shore facilities to be built to support larger local fleets.

Purse seining might be difficult in the Society Islands due to possible conflicts with the local fishermen, and also in the Tuamotu Islands because of the many coral reefs. These problems would probably be much less in the Marquesas Islands. Several large U.S.-based purse seiners have fished in the Marquesas Islands during the 1964-1974 period (Table 1) with relatively little success. However, there is considerable interest in purse seining for skipjack in the western Pacific, and innovations in gear and fishing techniques are being made which are making it easier to catch skipjack in areas where the thermocline is deep, as is the case in the Marquesas Islands. It is thus possible that in the near future it will be economically feasible to purse seine for skipjack in the Marquesas Islands and transport the fish to Tahiti or elsewhere for transshipment or processing.

Since only a few skipjack tagged and released in the Marquesas Islands have been returned after recapture elsewhere, it is probably safe to assume that a fishery in the Marquesas Islands would not reduce the catches of skipjack significantly in any other area by taking fish that would migrate to other areas and be caught there. It is possible, however, that a reduction in the population of spawners in the Marquesas Islands would reduce the recruitment of skipjack in other areas.

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#### REFERENCES

- Anonymous. 1954. Tuna and live bait plentiful near Marquesas Islands--"Charles H. Gilbert" (Cruise 15). *Comm. Fish. Rev.*, 16 (6): 16-17.
- Anonymous. 1956. Exploratory fishing around Marquesas Islands by M/V "Charles H. Gilbert" (Cruise 30). *Comm. Fish. Rev.*, 18 (11): 47-48.
- Anonymous. 1957a. POFI activities. *Pan Amer. Fisherman*, 11 (9): 16.
- Anonymous. 1957b. Pacific Oceanic Fisheries Investigations. *Pan Amer. Fisherman*, 11 (11): 14-15.
- Anonymous. 1957c. Summer tuna fishery and bait potentialities of Marquesas and Tuamotu Islands. *Comm. Fish. Rev.*, 19 (4): 23-24.
- Anonymous. 1958a. Marquesas Islands area surveyed for surface tuna schools and live bait (M/V Charles H. Gilbert Cruise 35). *Comm. Fish. Rev.*, 20 (2): 37-38.
- Anonymous. 1958b. Skipjack tuna and live-bait sardines found abundant in Marquesas (M/V Hugh M. Smith Cruise 42). *Comm. Fish. Rev.*, 20 (4): 34-35.
- Anonymous. 1958c. Enumeration and sampling of tuna schools in the Marquesas Islands area (M/V Charles H. Gilbert Cruise 38). *Comm. Fish. Rev.*, 20 (6): 40-42.

- Anonymous. 1958d. Survey of Marquesas Islands for tuna resources continued (M/V Hugh M. Smith Cruise 43). Comm. Fish. Rev., 20 (7): 42-44.
- Anonymous. 1958e. New ocean current and tunas in the Marquesas surveyed (M/V Hugh M. Smith Cruise 45). Comm. Fish. Rev., 20 (8): 44-46.
- Anonymous. 1958f. Pacific Oceanic Fishery Investigations: annual report for fiscal year 1958. Comm. Fish. Rev., 20 (9): 56-61.
- Anonymous. 1959. Tuna resources survey in Marquesas and Tuamotu islands area ended (M/V Charles H. Gilbert Cruise 43). Comm. Fish. Rev., 21 (5): 32.
- Anonymous. 1960. Fishery research vessel "Charles H. Gilbert" on 50th voyage. Comm. Fish. Rev., 22 (12): 28-29.
- Anonymous. 1961. Skipjack tuna blood samples aid in distribution studies. Comm. Fish. Rev., 23 (2): 17-18.
- Anonymous. 1963. Skipjack--a world resource. U.S. Bur. Comm. Fish., Circ., 165: 28 pp.
- Anonymous. 1972. Bird flock sightings by National Marine Fisheries Service vessels, Honolulu Laboratory, between October 1950 and May 1972. U.S. Nat. Mar. Fish. Serv.: 5 pp.
- Anonymous. 1973. Scientists at Honolulu laboratory research tuna baitfish problem in Hawaii. Tuna Newsletter (U.S. Nat. Mar. Fish. Serv., La Jolla), 12: 1-2.
- Anonymous. 1978a. Report on tuna tagging activities in the Marquesas Islands, September-November 1977. Inter-Amer. Trop. Tuna Comm.: 15 pp.
- Anonymous. 1978b. Report on tuna tagging activities in the Marquesas, Tuamotu, and Society islands, February-April 1978. Inter-Amer. Trop. Tuna Comm.: 18 pp.
- Anonymous. 1978c. Compte-rendu d'activite de la campagne de peche effectuee par le "TAINUI" du lundi 19 septembre au 16 novembre 1977 au profit de l'IATTC aux TUAMOTU et Iles MARQUISES. Centre National pour l'Exploitation des Oceans, Delegation du CNEXO pour l'Ocean Pacifique: 20, 4, 10 pp.
- Anonymous. 1978d. Compte-rendu sur la mission de marquage de thonides entreprise par le MARY K aux Iles Marquises au profit de l'IATTC du 22 fevrier au 19 mars 1978. Centre National pour l'Exploitation des Oceans, Delegation du CNEXO pour l'Ocean Pacifique: 3, 9, 4, 6, 2, 6 pp.

- Anonymous. 1978e. Compte-rendu sur la mission de marquage de thonides entreprise par le MARY K aux Iles sous le Vent au profit de l'IATTC du 25 mars au 12 avril 1978. Centre National pour l'Exploitation des Oceans, Delegation du CNEOX pour l'Ocean Pacifique: 20 pp.
- Anonymous. 1978f. Naviere experimental Tainui fiches resultats annees 1976 et 1977. Service de la Peche and Centre National pour l'Exploitation des Oceans, OP/1/PE-78.005: 57 pp.
- Anonymous. 1979. Report on tuna tagging activities in the Marquesas Islands, December 1978-May 1979. Inter-Amer. Trop. Tuna Comm.: 11 pp.
- Anonymous. 1980a. Report on tuna tagging activities in the Marquesas, Pitcairn, Gambier, and Tuamotu islands, December 1979-February 1980. Inter-Amer. Trop. Tuna Comm.: 18 pp.
- Anonymous. 1980b. Inter-American Tropical Tuna Commission, Annual Report, 1979: 227 pp.
- Anonymous. 1980c. Australian tuna sets distance record. Austral. Fish., 39 (7): 20.
- Anonymous. 1980d. Migratory behavior of skipjack and yellowfin in the western and central Pacific: a preliminary summary of tagging results of the skipjack survey and assessment programme. South Pacif. Comm., Regional Tech. Meeting Fish, 12, Working Paper 18: 8 pp.
- Anonymous. no date. Sea Treasure cruise October 15-December 10, 1974. Living Marine Resources, Inc.: 29 pp.
- Austin, Thomas S. 1957. Summary, oceanographic and fishery data, Marquesas Islands area, August-September, 1956 (EQUAPAC). U.S. Fish. Wild. Serv., Spec. Sci. Rep. Fish., 217: 186 pp.
- Austin, Thomas S. 1958. Seasonal variations in the oceanographic and the marine biological features in the waters of French Oceania (Marquesas). Hawaiian Acad. Sci., Proc., 33: 20-21.
- Austin, Thomas S. 1962. Report on tuna surveys in the Marquesas Islands. U.S. Bur. Comm. Fish.: 10 pp.
- Bagnis, Raymond, Philippe Mazellier, Jack Bennett, and Erwin Christian. 1972. Fishes of Polynesia. Les Editions du Pacifique, Papeete, Tahiti: 368 pp.
- Baldwin, Wayne J. 1977. A review on the use of live baitfishes to capture skipjack tuna, Katsuwonus pelamis, in the tropical Pacific Ocean with emphasis on their behavior, survival, and availability. U.S. Nat. Mar. Fish. Serv., Circ., 408: 8-35.



- Boely, T., F. Conand, and J. Muiyard. 1980. L'appat vivant dans le Pacifique tropical centre et ouest. ORSTOM, Noumea, Rapp. Sci. Tech., 7: 37 pp.
- Brock, V. E., and J. C. Marr. 1960. Honolulu Biological Laboratory--past (1949-1958), present (1959), and future (1960- ). U.S. Bur. Comm. Fish., Circ., 83: ii, 62 pp.
- Brun, Michel, and Witold L. Klawe. 1968. Landings of skipjack and yellowfin tuna at Papeete market (Tahiti). Comm. Fish. Rev., 30 (4): 62-65.
- Chabanne, Jacques, and Jacques Marcille. 1980. La peche bonitiere en Polynesie Francaise en 1979. ORSTOM, Papeete, Section Ocean., 1980-13: 56 pp.
- Cleaver, Fred C., and Bell M. Shimada. Japanese skipjack (Katsuwonus pelamis) fishing methods. Comm. Fish. Rev., 12 (11): 1-27.
- Conand, Francois, and A. W. Argue. 1980. Preliminary observations on juvenile skipjack from the stomachs of adult skipjack caught by pole-and-line gear. South Pacif. Comm., Reg. Tech. Meeting Fish., 12: 21 pp.
- Doumenge, F. 1973. The development of tuna and skipjack fishing in French Polynesia and experience in live-bait techniques. South Pacif. Islands Fish. Newsletter, 10: 27-30.
- Fink, Bernard D., and William H. Bayliff. 1970. Migrations of yellowfin and skipjack tuna in the eastern Pacific Ocean as determined by tagging experiments, 1952-1964. Inter-Amer. Trop. Tuna Comm., Bull., 15 (1): 1-227.
- Fourmanoir, P., J. M. Griessinger, and Y. Plessis. 1974. Faune ichtyologique des Gambier. Cahiers du Pacifique, 18: 543-578.
- Gillett, Robert D. 1981. personal communication.
- Gillett, R. D., and R. E. Kearney. 1980. Second interim report of the activities of the skipjack survey and assessment programme in the waters of French Polynesia. South Pacif. Comm., Skipjack Survey and Assessment Programme, Preliminary Country Report, 21: 22 pp.
- Godsil, H. C. 1938. The high seas tuna fishery of California. Calif. Dept. Fish Game, Fish Bull., 97: 185 pp.
- Gulland, J. A. 1968. Report on the population dynamics of the Peruvian anchoveta. FAO, Fish. Tech. Pap., 72: v, 29 pp.
- Hester, Frank J. 1973. Some considerations of the problems associated with the use of live bait for catching tunas in the tropical Pacific Ocean. Mar. Fish. Rev., 36 (5): 1-12.
- Hida, Thomas S., and Robert A. Morris. 1963. Preliminary report on the Marquesan sardine, Harengula vittata, in Hawaii. Pacif. Science, 17 (4): 431-437.

- James, Pierre. 1980. Note sur la peche bonitiere a Uturoa (Raiatea) Aout 1980. ORSTOM, Papeete, Notes Doc. Ocean., 1980/24: 17 pp.
- Josse, E., J. C. Le Guen, R. Kearney, A. Lewis, A. Smith, L. Marec, and P. K. Tomlinson. 1979. Growth of skipjack. South Pacif. Comm., Occas. Pap., 11: 83 pp.
- June, Fred C. 1951. Preliminary fisheries survey of the Hawaiian-Line islands area. Part III--The live-bait skipjack fishery of the Hawaiian Islands. Comm. Fish. Rev., 13 (2): 1-18.
- Kearney, R. E. 1980. Skipjack survey and assessment programme annual report for the year ending 31 December 1979. South Pacif. Comm.: 18 pp.
- Kearney, R. E., and R. D. Gillett. 1980. Interim report of the activities of the skipjack survey and assessment programme in the waters of the Pitcairn Islands. South Pacif. Comm., Skipjack Survey and Assessment Programme, Preliminary Country Report, 22: 9 pp.
- Kearney, R. E., J. P. Hallier, and R. D. Gillett. 1979. Interim report of the activities of the skipjack survey and assessment programme in the waters of French Polynesia. South Pacif. Comm., Skipjack Survey and Assessment Programme, Preliminary Country Report, 14: 21 pp.
- Lavondes, Henri, and John E. Randall. 1978. Les nomes de poissons Marquisiens. Mus. Homme, Soc. Ocean., Jour., 34 (60): 79-112.
- Matsumoto, Walter M. 1966. Distribution and abundance of tuna larvae in the Pacific Ocean. In Manar, Thomas A. (editor), Hawaii, Governor's Conf. Central Pacif. Fish. Resources, Proc.: 221-230.
- Munro, Ian S. R. 1967. The Fishes of New Guinea. Department of Agriculture, Stock and Fisheries, Port Moresby, New Guinea: xxvii, 651 pp.
- Muramatsu, Shogo. 1960. Pole and line fishing: deck design and equipment. In Traung, Jan-Olof (editor), Fishing Boats of the World: 2, Fishing News (Books) Ltd., London: 84-93.
- Murphy, Garth I. 1963. Introduction of the Marquesan sardine, Harengula vittata (Cuvier and Valenciennes), to Hawaiian waters. Pacif. Science, 14 (2): 185-187.
- Nakamura, Eugene L. 1965. Food and feeding habits of skipjack tuna (Katsuwonus pelamis) from the Marquesas and Tuamotu Islands. Amer. Fish. Soc., Trans., 94 (3): 236-242.
- Nakamura, Eugene L., and Walter M. Matsumoto. 1967. Distribution of larval

- tunas in Marquesan waters. U.S. Bur. Comm. Fish., Fish. Bull., 66 (1): 1-12.
- Nakamura, Eugene L., and James H. Uchiyama. 1966. Length-weight relations of Pacific tunas. In Manar, Thomas A. (editor), Hawaii, Governor's Conf. Cent. Pacif. Fish. Resources, Proc.: 197-201.
- Nakamura, Eugene L., and Robert C. Wilson. 1970. The biology of the Marquesan sardine, Sardinella marquesensis. Pacif. Science, 24 (3): 359-376.
- Pella, Jerome J. 1969. A stochastic model for purse seining in a two-species fishery. Jour. Theor. Biol., 22 (2): 209-226.
- Plessis, Y. B., and L. A. Mauge. 1978. Ichthyologie des Iles Marquises. Cahiers du Pacifique, 21: 215-235.
- Rothschild, Brian J. 1965. Hypotheses on the origin of exploited skipjack tuna (Katsuwonus pelamis) in the eastern and central Pacific ocean. U.S. Fish Wild. Serv., Spec. Sci. Rep. Fish., 512: iii, 20 pp.
- Rothschild, Brian J., and Richard N. Uchida. 1968. The tuna resources of the oceanic regions of the Pacific Ocean. Univ. Wash. Publ. Fish., New Series, 4: 19-51.
- Royce, William F. 1954. Tuna bait survey. Pan Amer. Fisherman, 9 (1): 10-11, 24.
- Schaefer, Milner B. 1955. Morphometric comparison of yellowfin tuna from southeast Polynesia, Central America, and Hawaii. Inter-Amer. Trop. Tuna Comm., Bull., 1 (4): 89-136.
- Schaefer, Milner, B. 1963. Report on the investigations of the Inter-American Tropical Tuna Commission for the year 1962. Inter-Amer. Trop. Tuna Comm., Ann. Rep., 1962: 35-149.
- Scofield, W. L. 1956. Trolling gear in California. Calif. Dept. Fish Game, Fish Bull., 103: 45 pp.
- Sprague, Lucian M. 1961. Narrative report, Charles H. Gilbert, Cruise 50. U.S. Bur. Comm. Fish., Biol. Lab., Honolulu, unpublished: 20 pp.
- Thong, Lam Hoai. 1972. Gonades de quelques grands pelagiques Polynesiens. Univ. Rennes, Trav. Lab. Biol. Halieutique, 6: 85-131.
- Uchida, Richard N. 1975. Recent development in fisheries for skipjack tuna, Katsuwonus pelamis, in the central and western Pacific and the Indian Ocean. FAO, Fish. Tech. Pap., 144: 1-59.
- Van Campen, Wilvan G. 1953. Tuna fishing at Tahiti. Comm. Fish. Rev., 15 (10): 1-4.

- Waldron, Kenneth D. 1964. Fish schools and bird flocks in the central Pacific Ocean, 1950-1961. U.S. Bur. Comm. Fish., Spec. Sci. Rep. Fish., 464: iv, 20 pp.
- Wilson, Robert C., and Thomas S. Austin. 1957. U.S. Fish and Wildlife Service task force in the Marquesas. Pan Amer. Fisherman, 11 (12): 6-7, 14.
- Wilson, Robert C., and Thomas S. Austin. 1959. Tuna season in the Marquesas. Pacif. Fisherman, 57 (1): 29, 31.
- Wilson, Robert C., Eugene L. Nakamura, and Howard O. Yoshida. 1958. Marquesas area fishery and environmental data, October 1957-June 1958. U.S. Fish. Wild. Serv., Spec. Sci. Rep. Fish., 283: 105 pp.
- Wilson, Robert C., and Murice O. Rinkel. 1957. Marquesas area oceanographic and fishery data, January-March 1957. U.S. Fish. Wild. Serv., Spec. Sci. Rep. Fish., 238: 136 pp.
- Yoshida, Howard O. 1960. Marquesas area fishery and environmental data, January-March 1959. U.S. Bur. Comm. Fish., Spec. Sci. Rep. Fish., 348: 37 pp.
- Yoshida, Howard O. 1966a. Skipjack tuna spawning in the Marquesas Islands and Tuamotu Archipelago. U.S. Fish. Wild. Serv., Fish. Bull., 65 (2): 479-488.
- Yoshida, Howard O. 1966b. Tuna fishing vessels, gear, and techniques in the Pacific Ocean. In Manar, Thomas A. (editor), Hawaii, Governor's Conf., Central Pacif. Fish. Resources, Proc.: 67-89.
- Yoshida, Howard O. 1967. Longline fishing for deep-swimming tunas in the Marquesas Islands and adjacent areas. U.S. Bur. Comm. Fish., Spec. Sci. Rep. Fish., 546: iii, 10 pp.

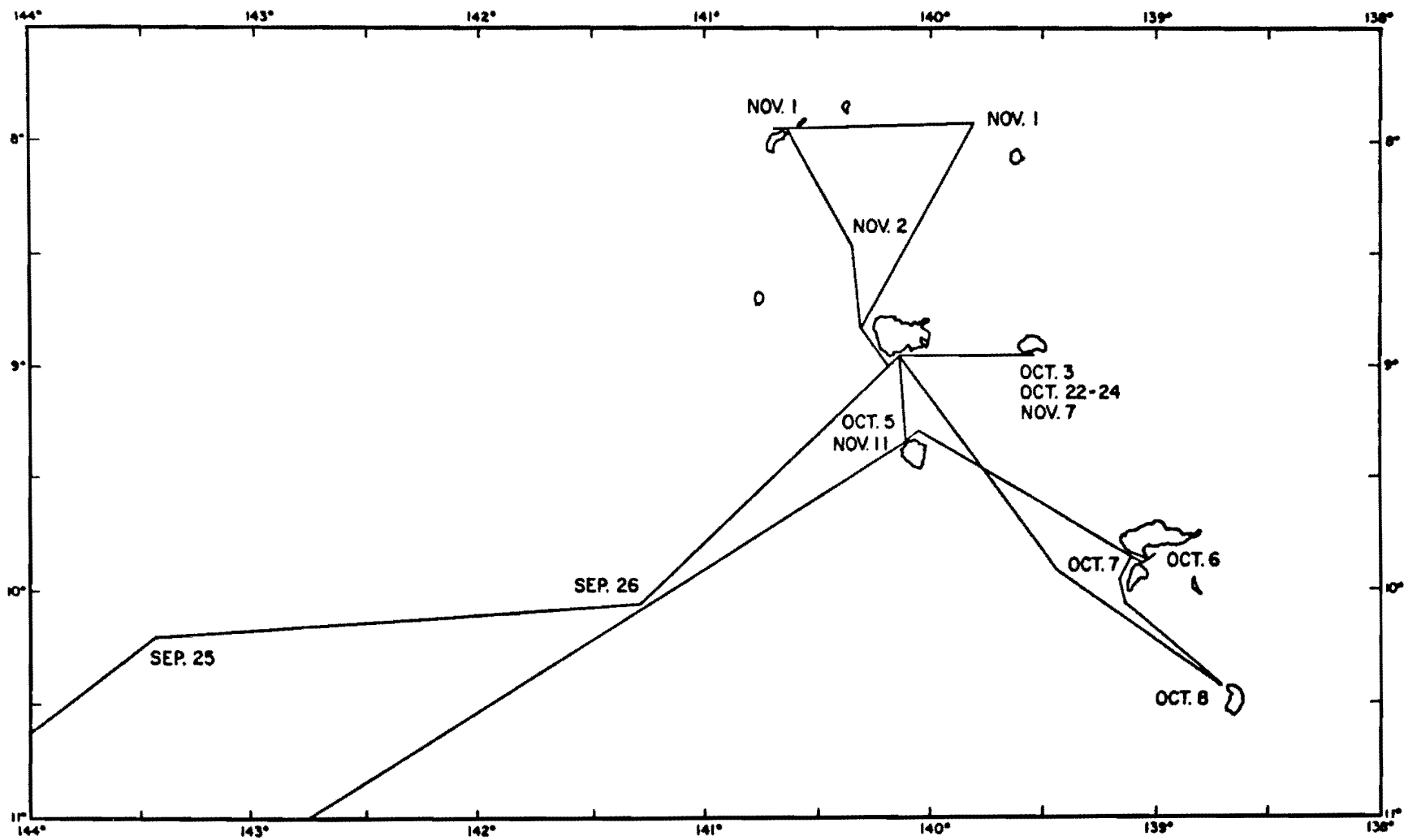


FIGURE 1. Cruise track of the Tainui, September 25–November 11, 1977.

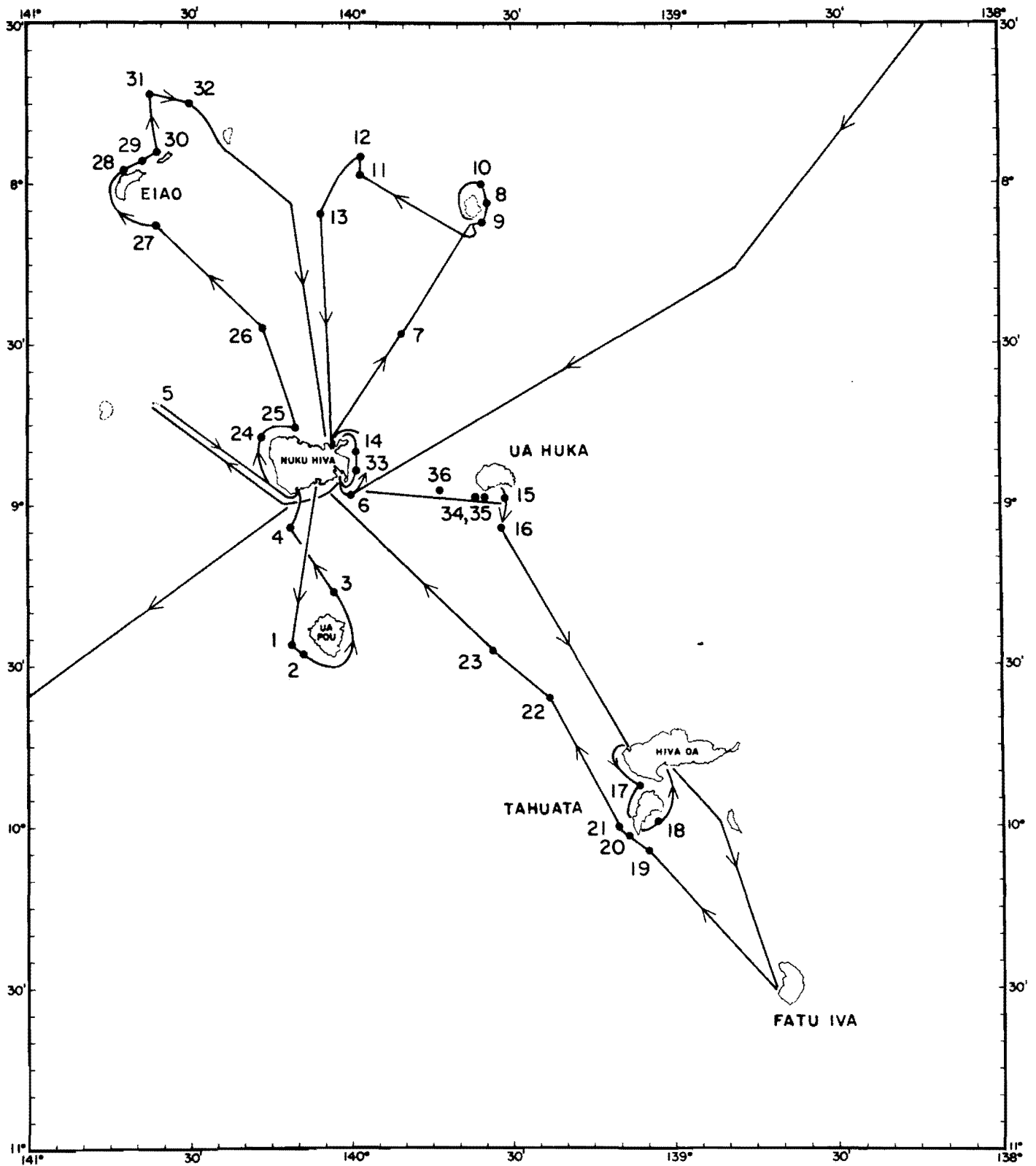


FIGURE 2a. Cruise track of the Mary K., February 21-March 15, 1978 (modified from Anonymous, 1978b). The numbers do not refer to dates; they were added merely to assist the reader in following the chronology of the work.

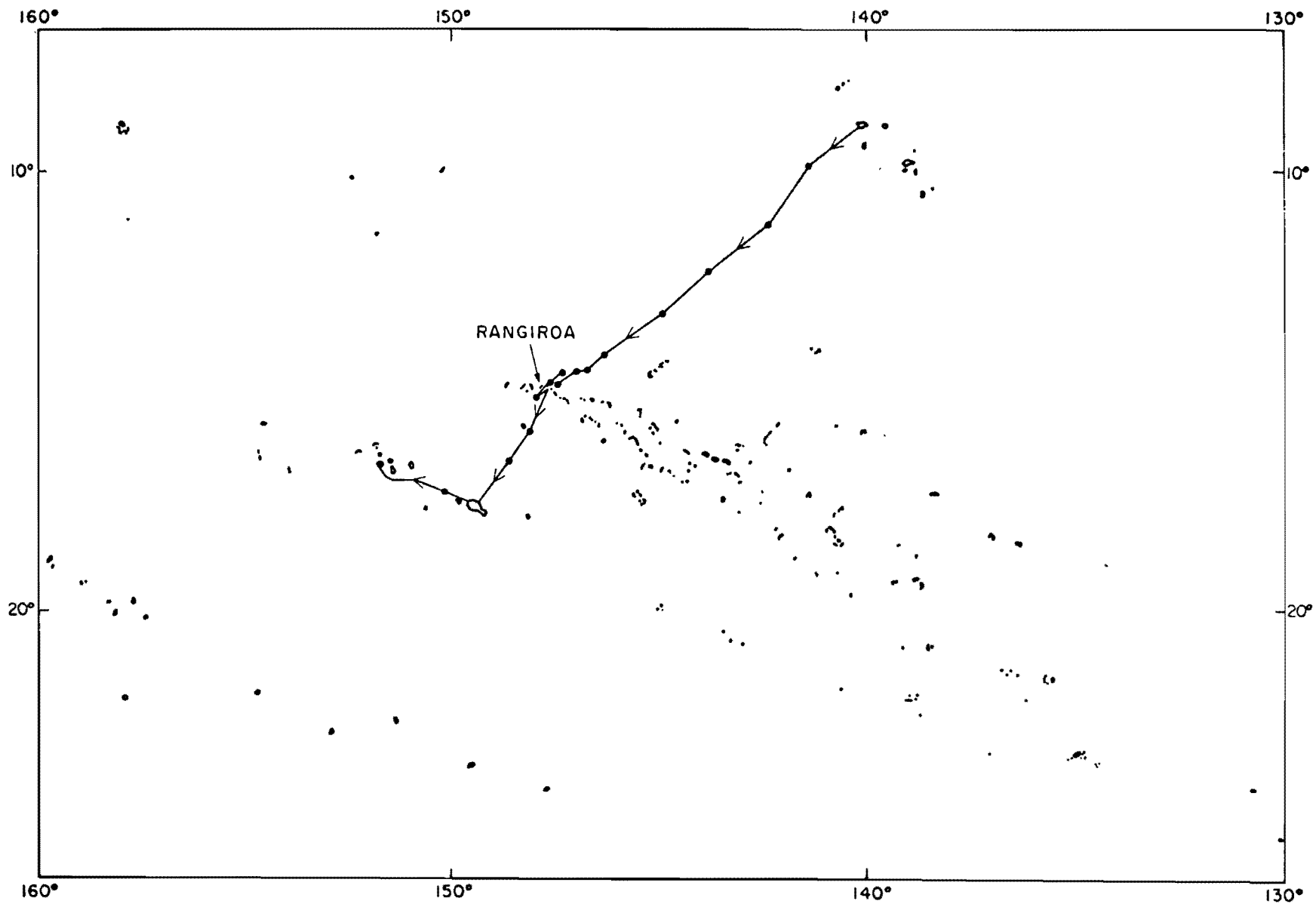


FIGURE 2b. Cruise track of the Mary K., March 15-26, 1978.

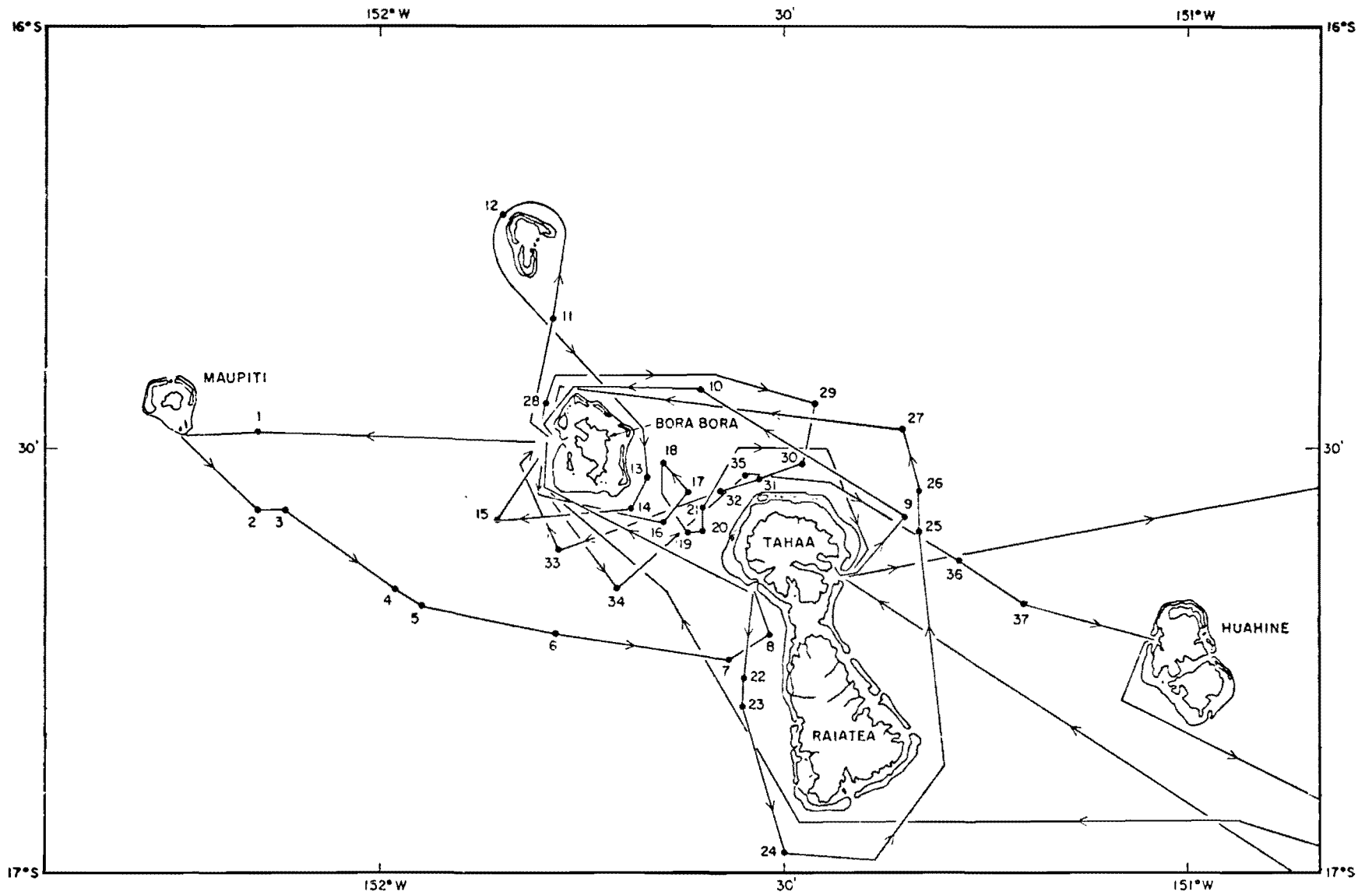


FIGURE 2c. Cruise track of the *Mary K.*, March 26–April 16, 1978 (modified from Anonymous, 1978b). The numbers do not refer to dates; they were added merely to assist the reader in following the chronology of the work.



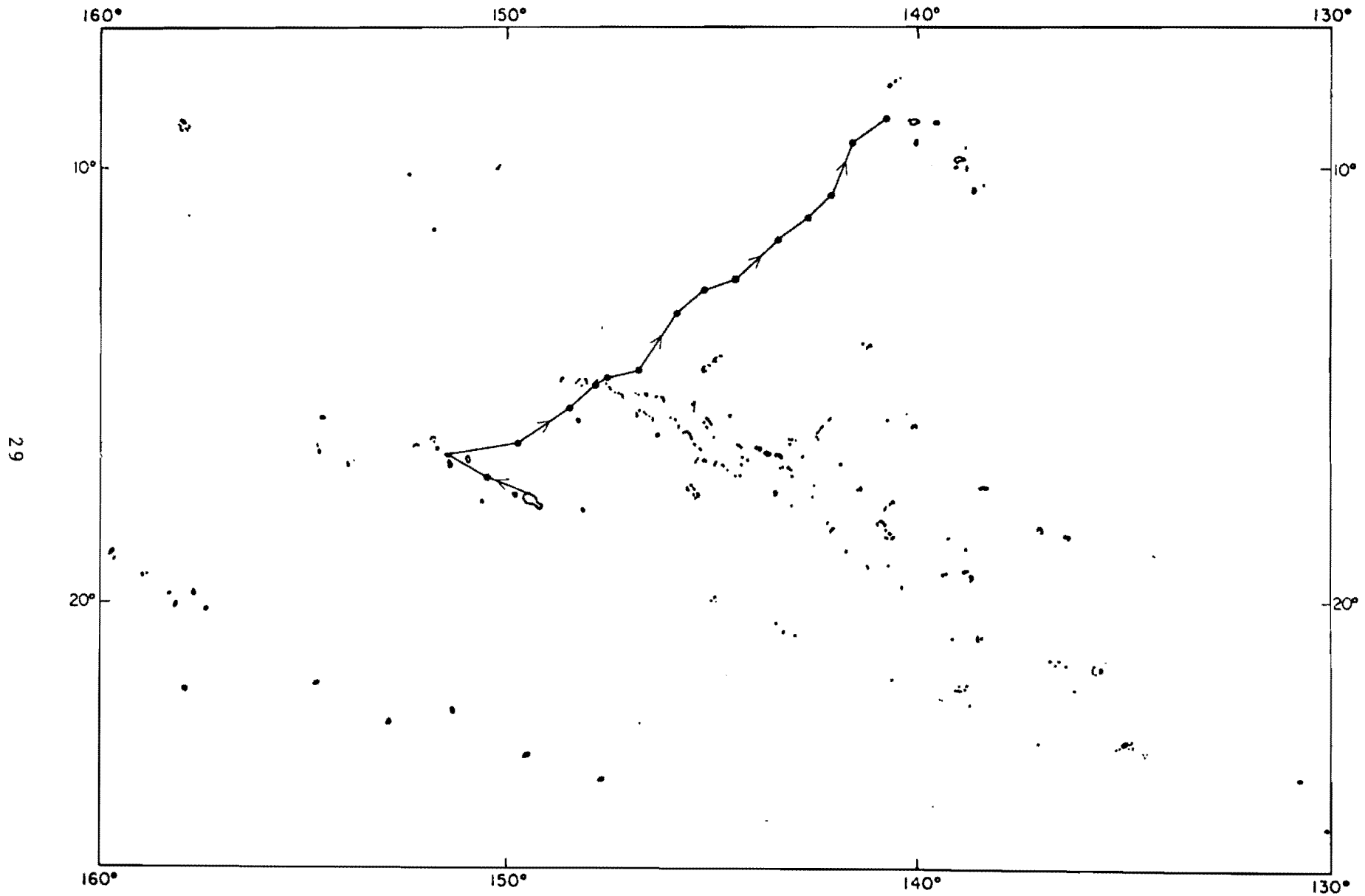


FIGURE 2d. Cruise track of the Mary K., April 15-22, 1978.

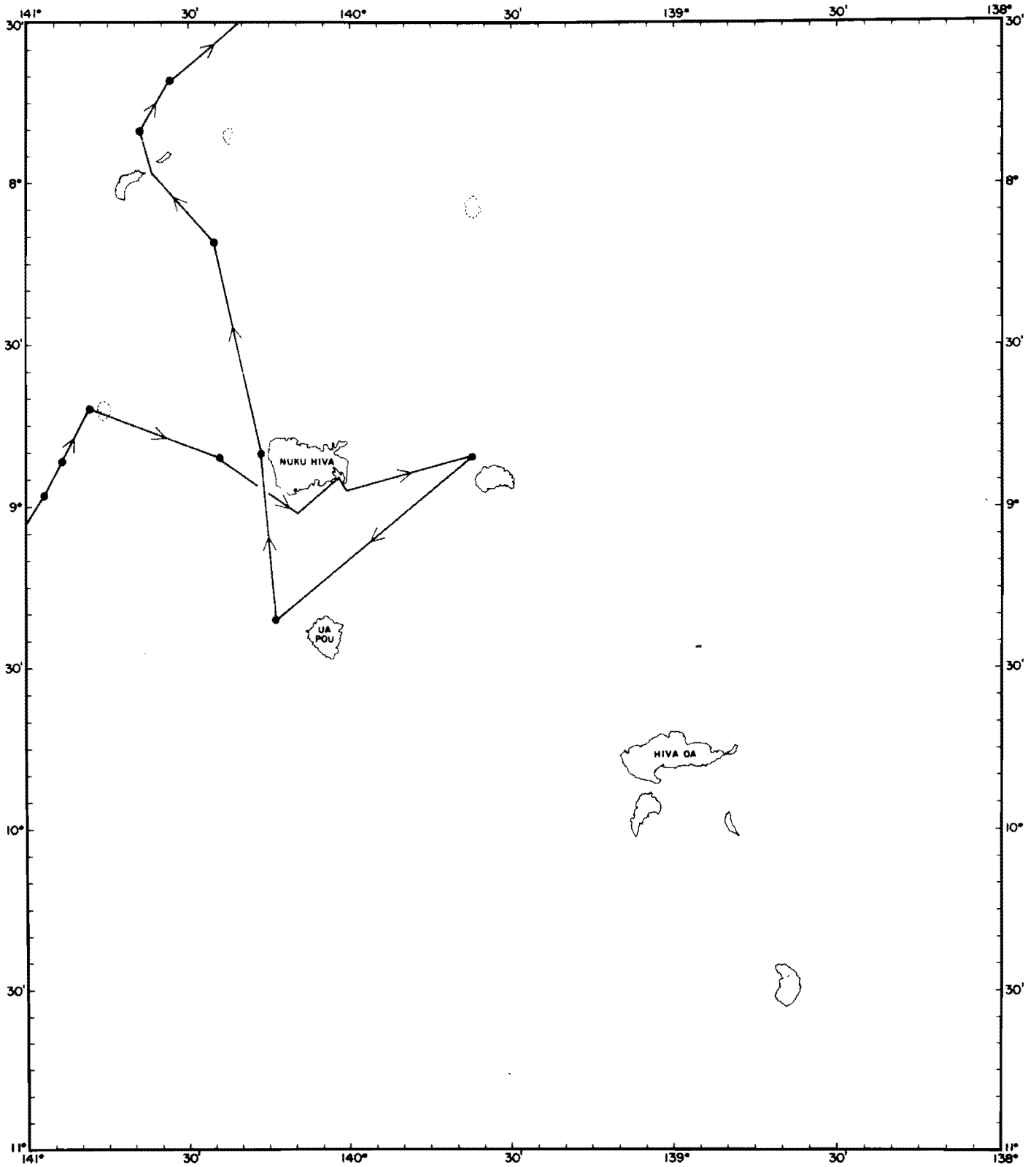


FIGURE 2e. Cruise track of the *Mary K.*, April 22-27, 1978.

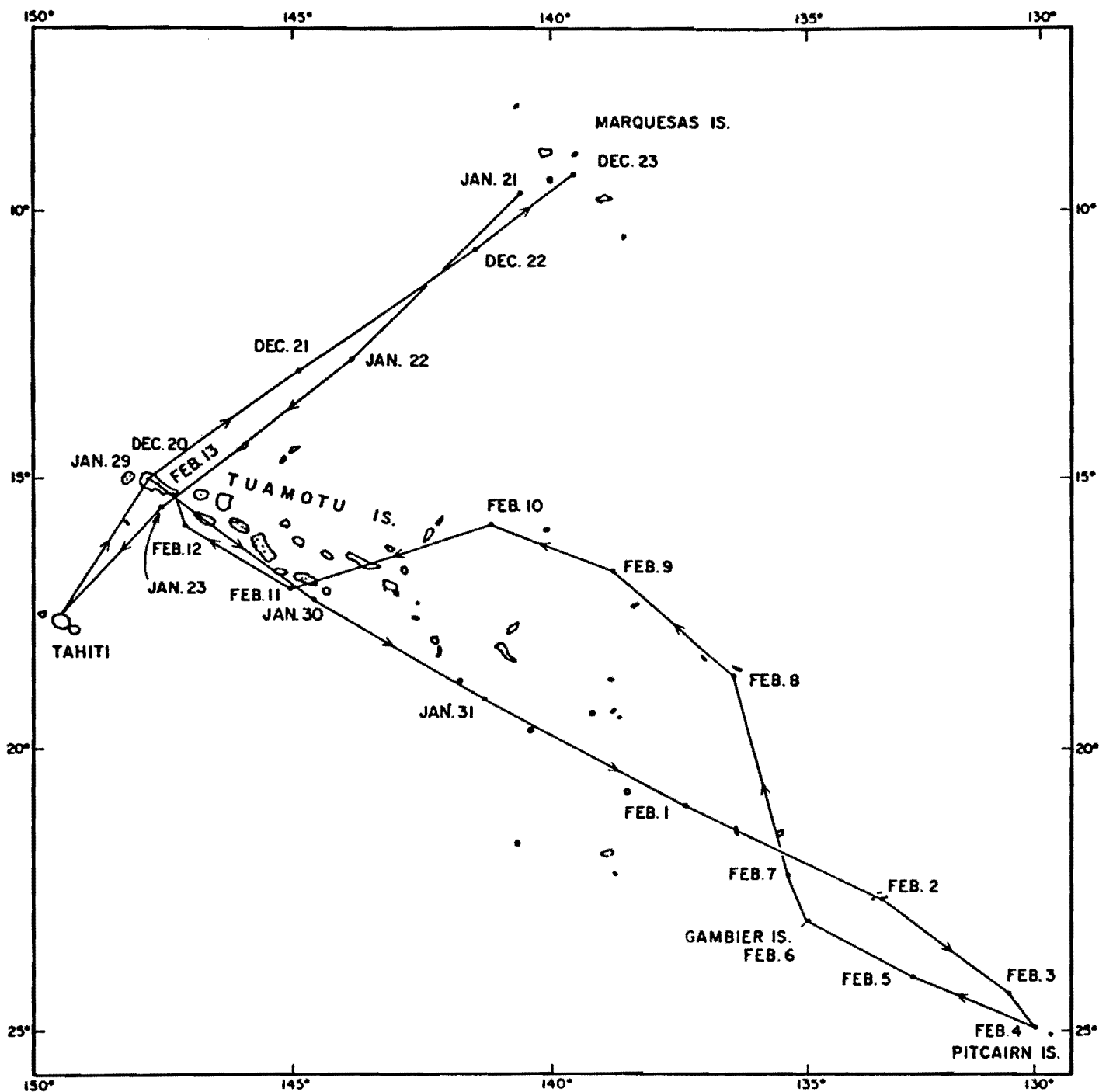


FIGURE 3. Approximate cruise track of the Hatsutori Maru No. 5, December 19, 1979-February 15, 1980, constructed by connecting the noon positions. During the period of December 24, 1979-January 20, 1980, the vessel fished almost entirely in the vicinity of 9°00'S-140°00'W.

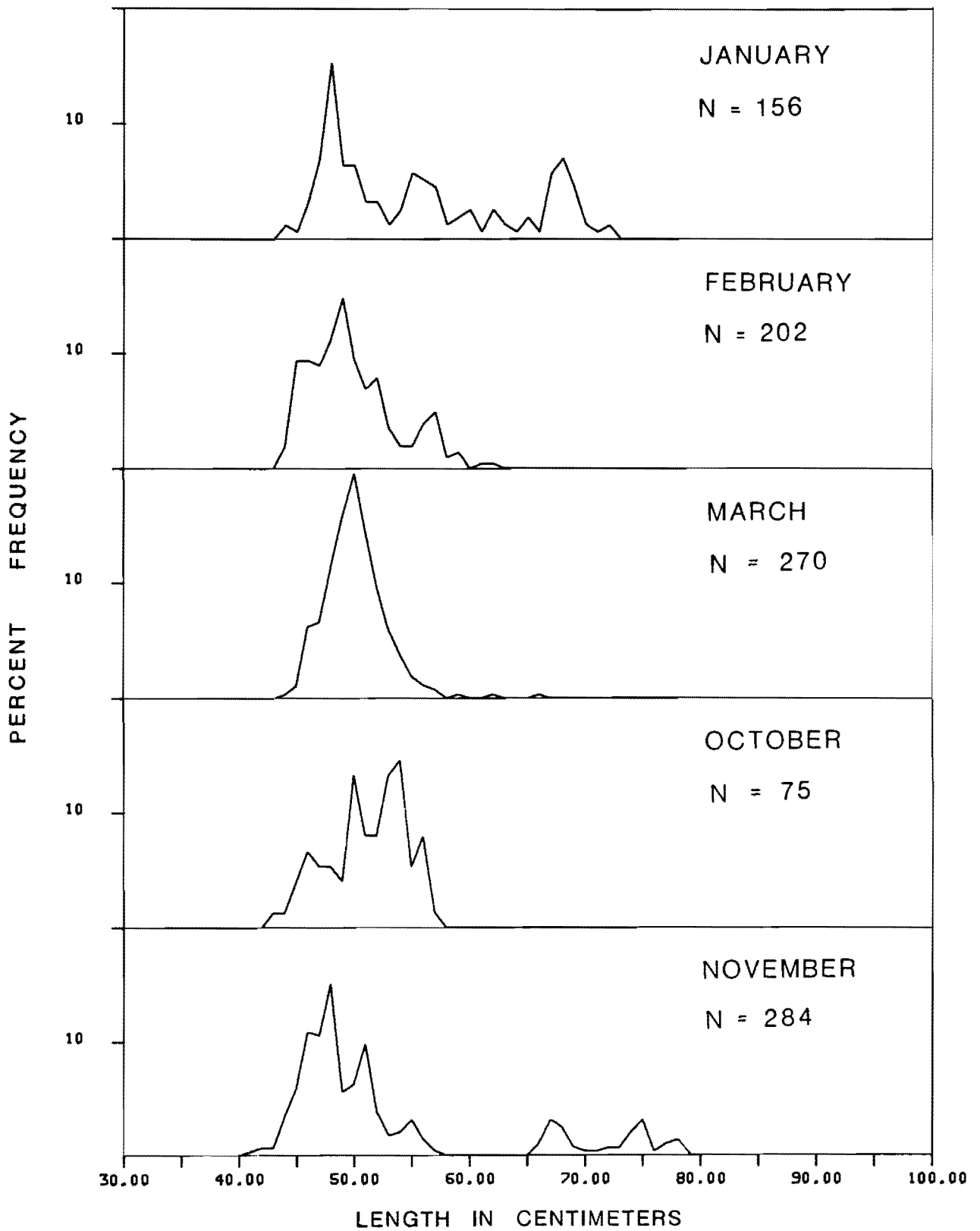


FIGURE 4. Length frequencies of skipjack caught in the Marquesas Islands in 1957.

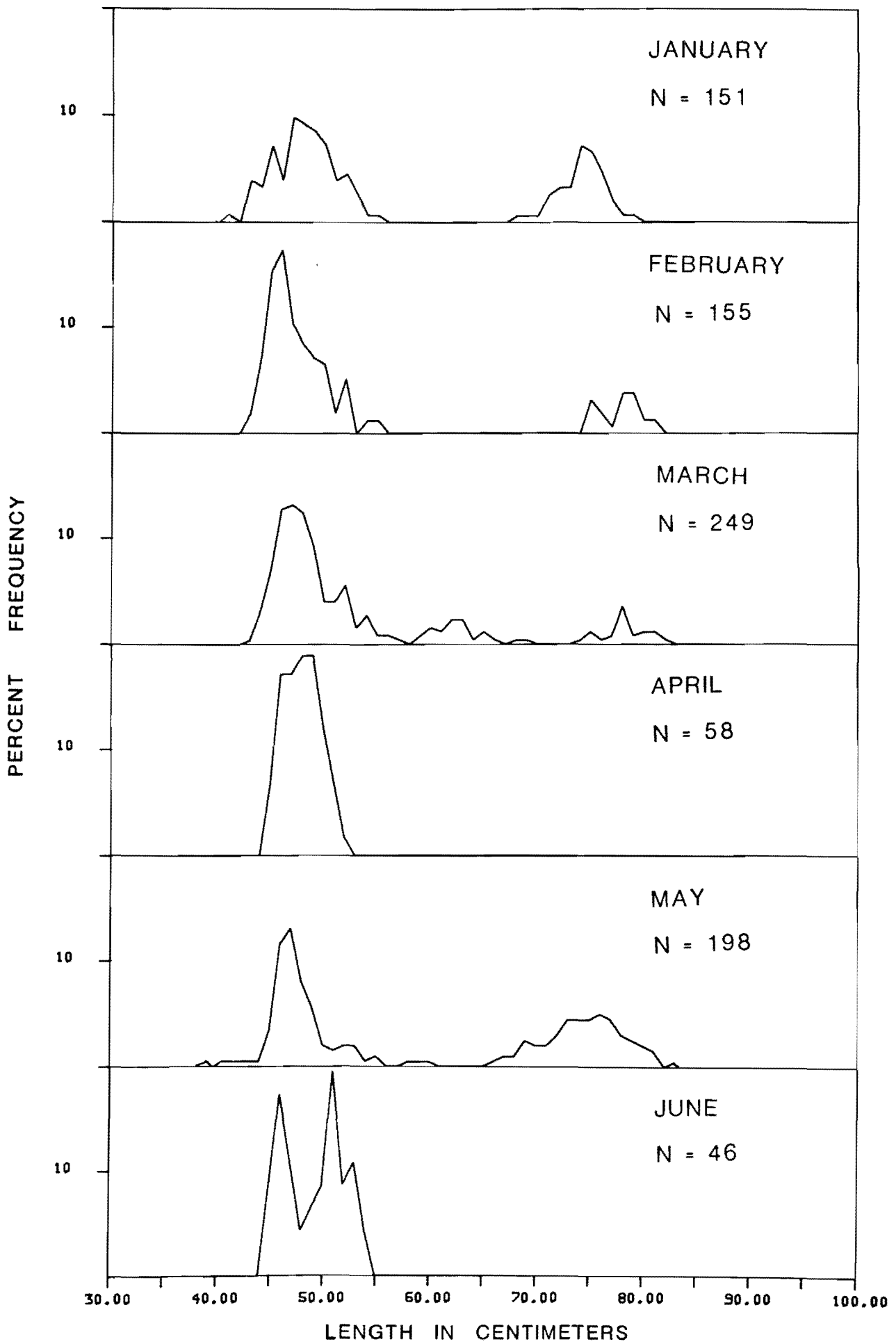


FIGURE 5. Length frequencies of skipjack caught in the Marquesas Islands in 1958.

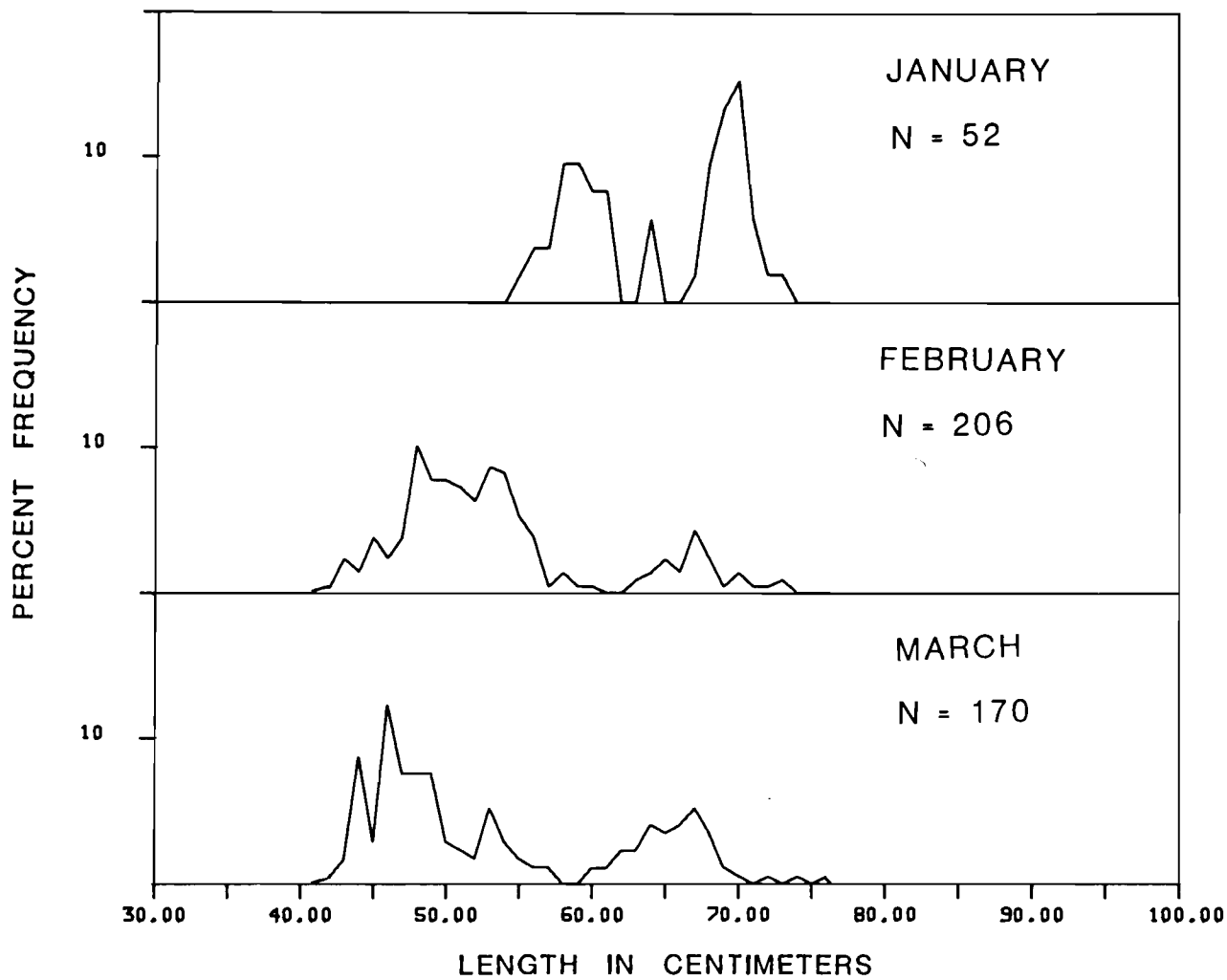


FIGURE 6. Length frequencies of skipjack caught in the Marquesas Islands in 1959.

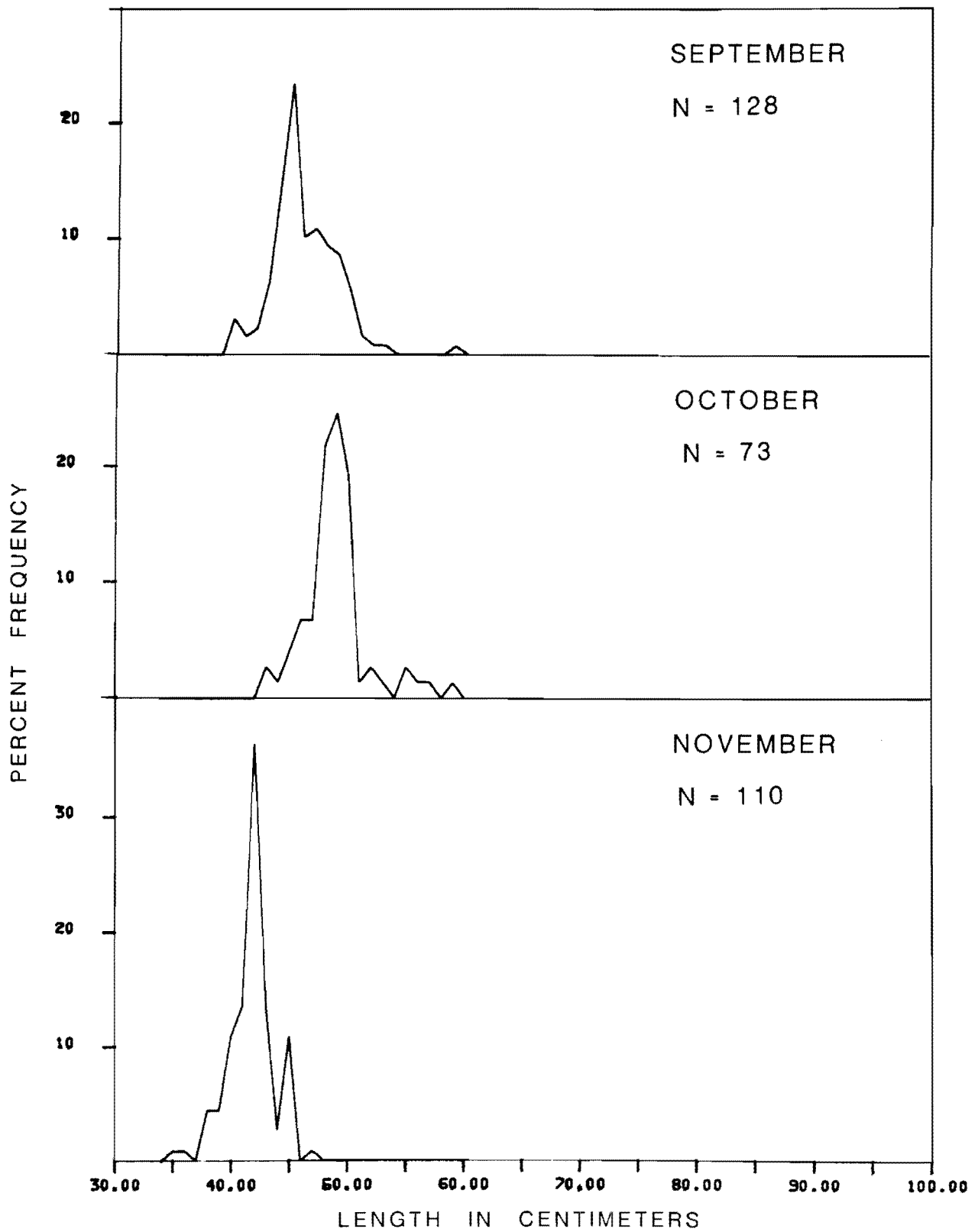


FIGURE 7. Length frequencies of skipjack caught in the Marquesas Islands in 1977.

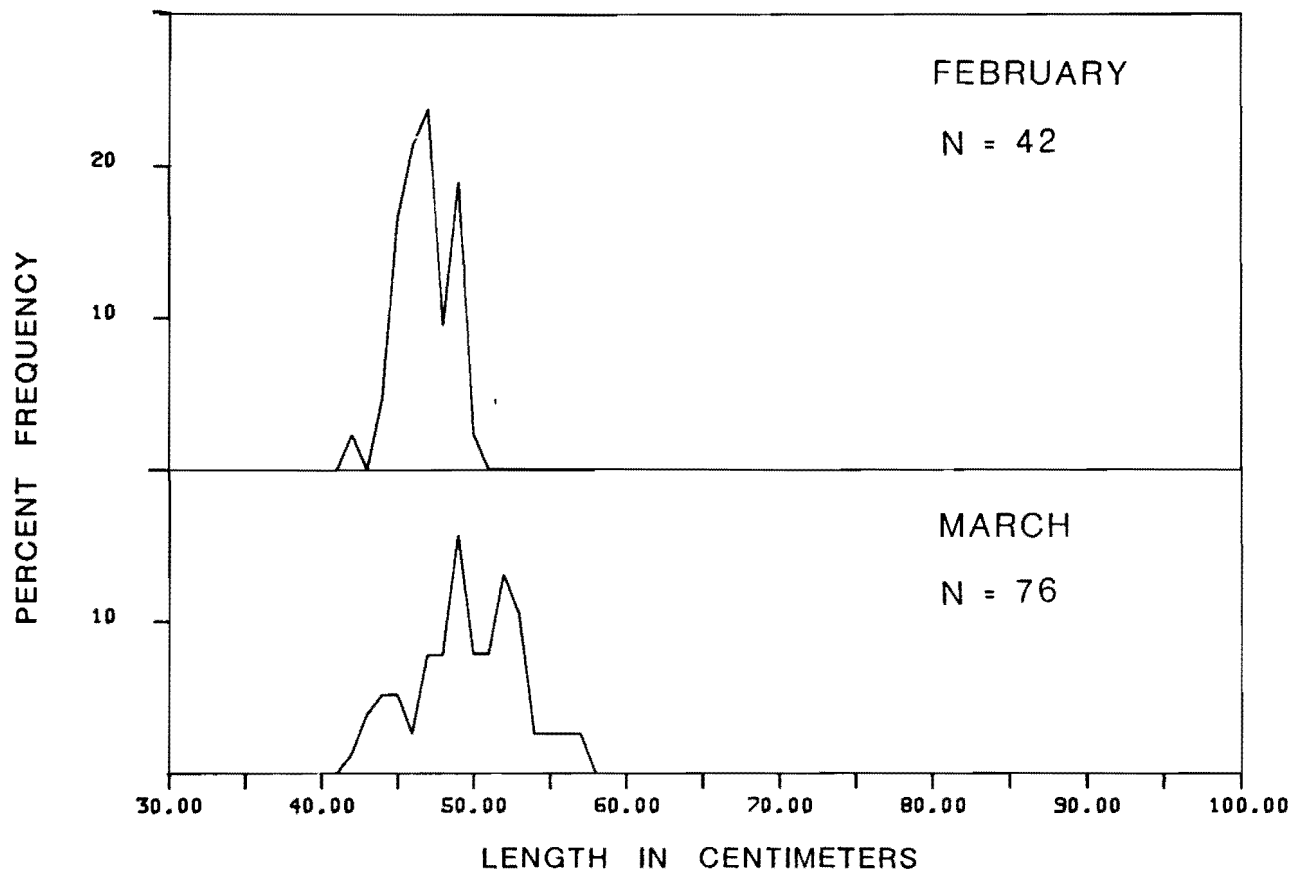


FIGURE 8. Length frequencies of skipjack caught in the Marquesas Islands in 1978.



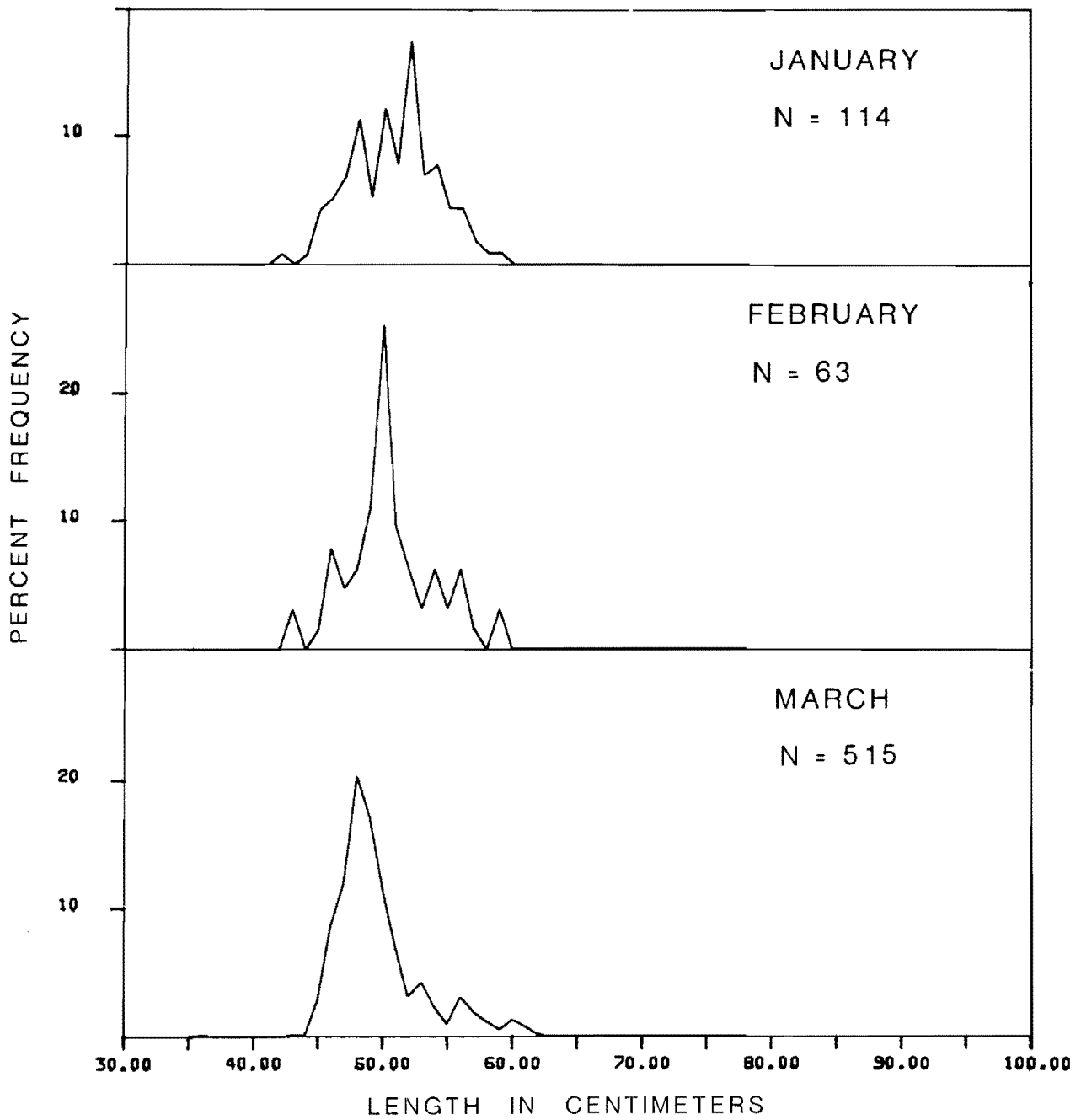


FIGURE 9. Length frequencies of skipjack caught in the Marquesas Islands in 1979.

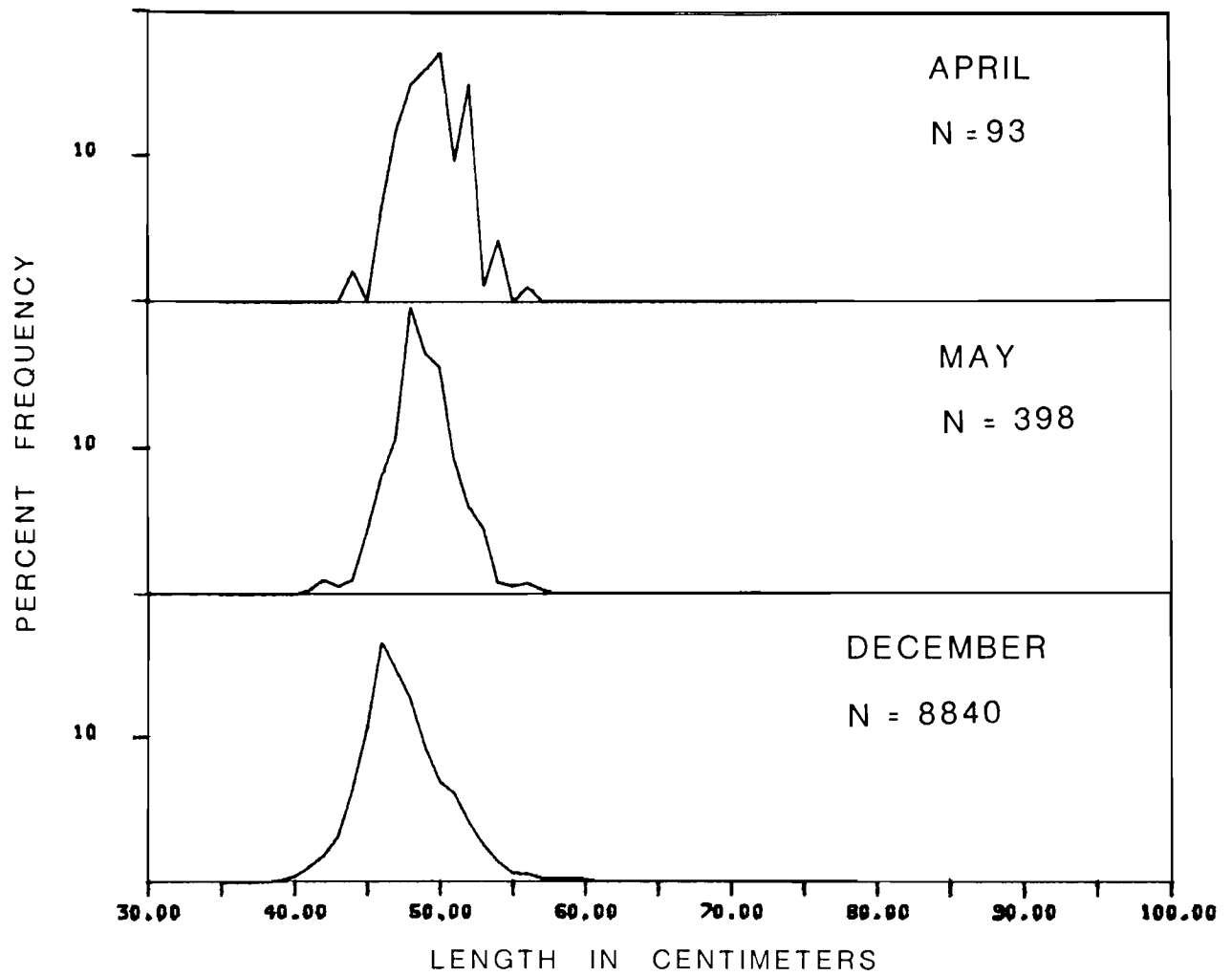


FIGURE 9. (continued)

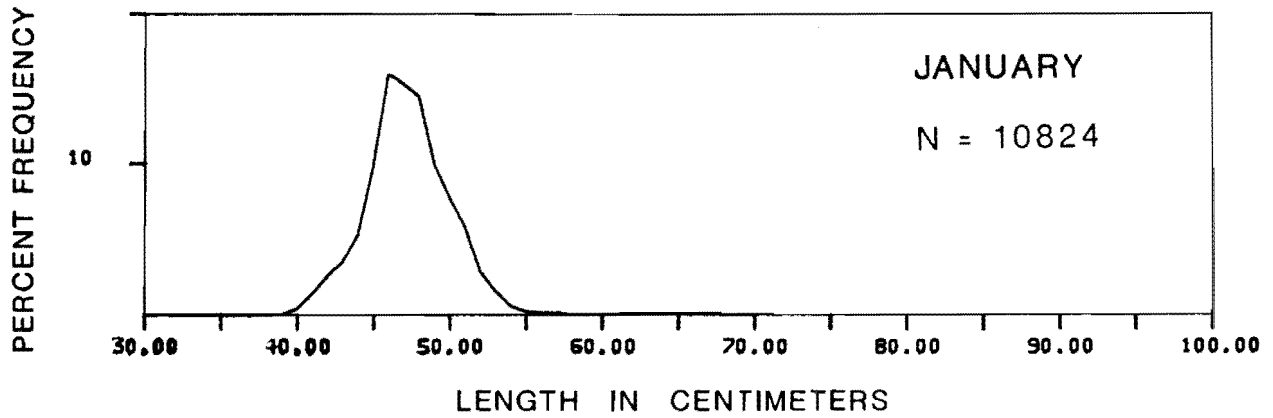


FIGURE 10. Length frequencies of skipjack caught in the Marquesas Islands in 1980.

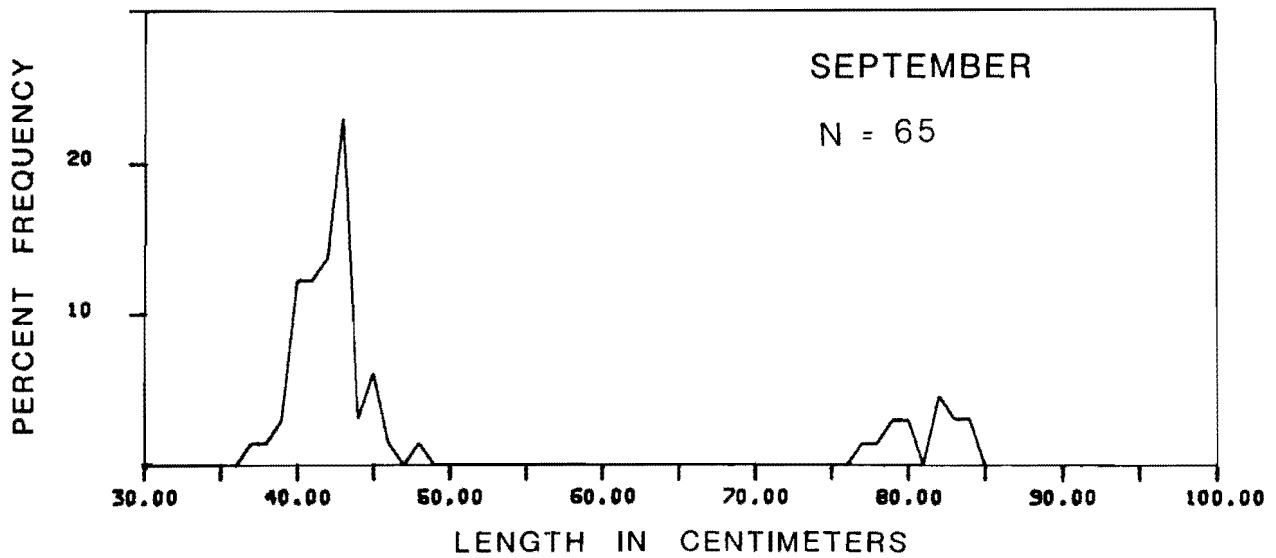


FIGURE 11. Length frequencies of skipjack caught between the Marquesas and Tuamotu islands in 1977.

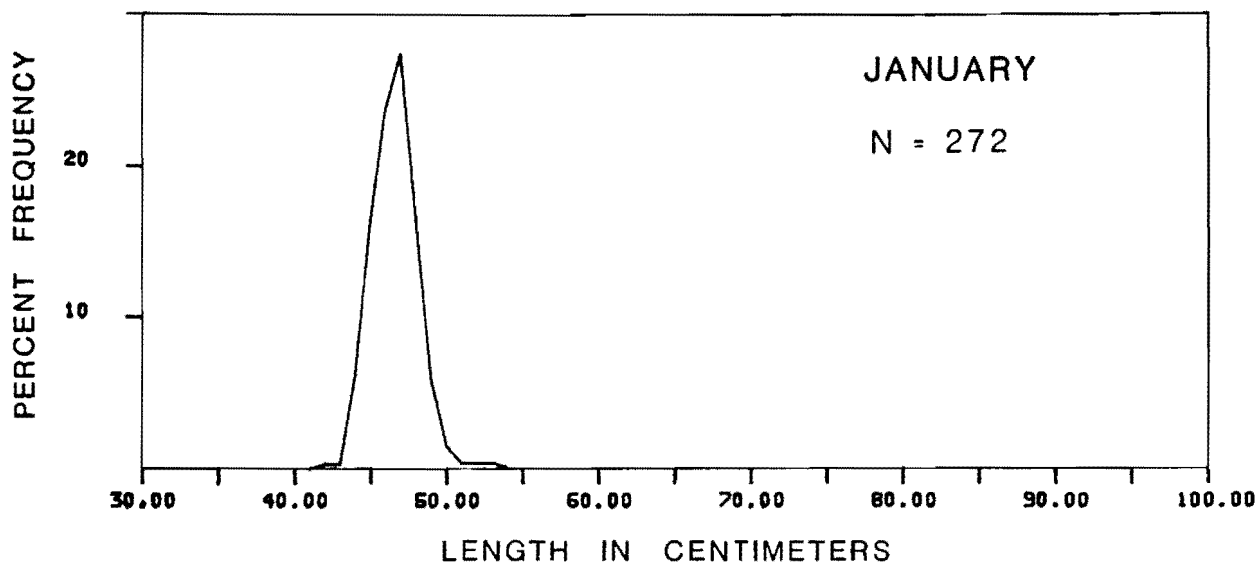


FIGURE 12. Length frequencies of skipjack caught between the Marquesas and Tuamotu islands in 1980.

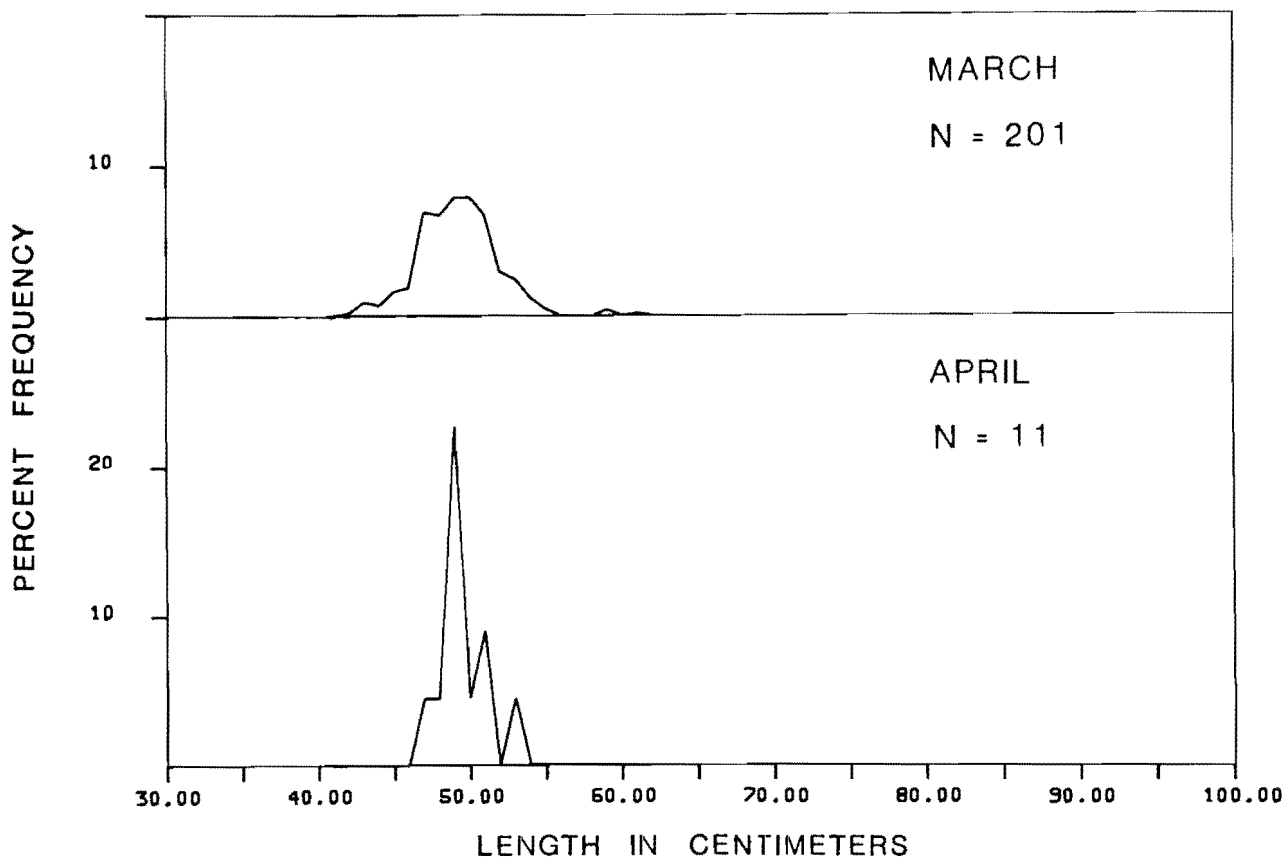


FIGURE 13. Length frequencies of skipjack caught in the Tuamotu Islands in 1978.

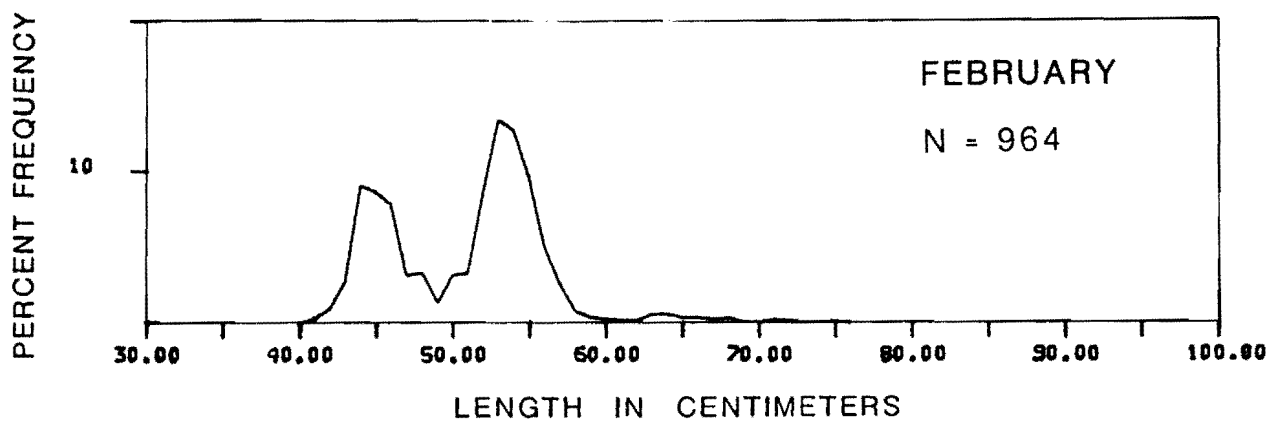


FIGURE 14. Length frequencies of skipjack caught in the Tuamotu Islands in 1980.

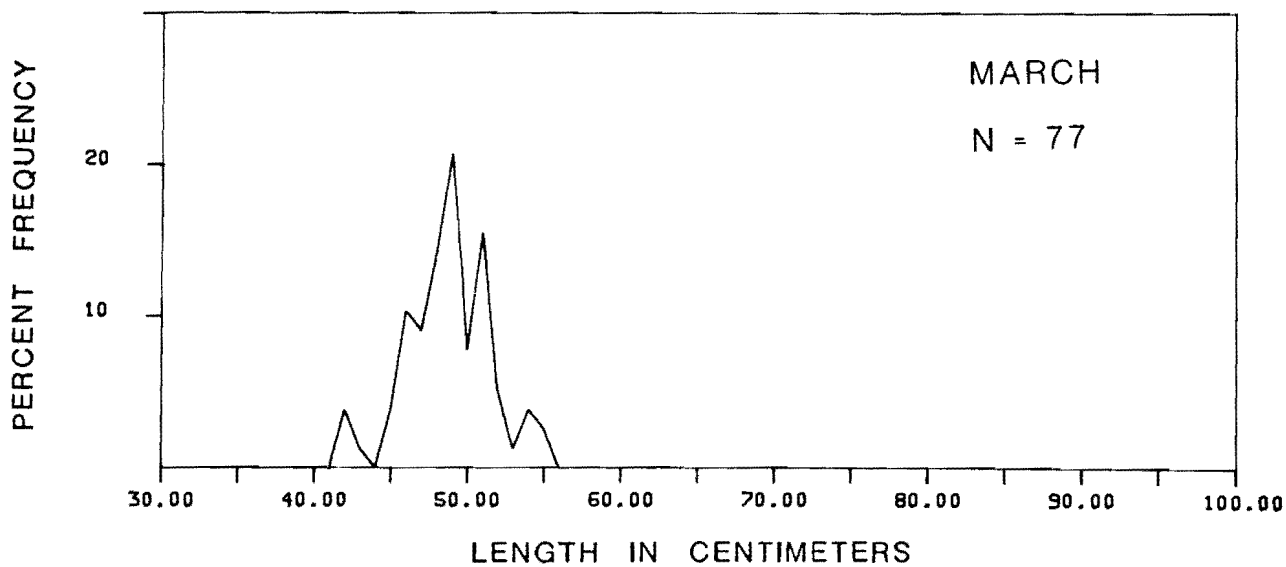


FIGURE 15. Length frequencies of skipjack caught between the Tuamotu and Society islands in 1978.

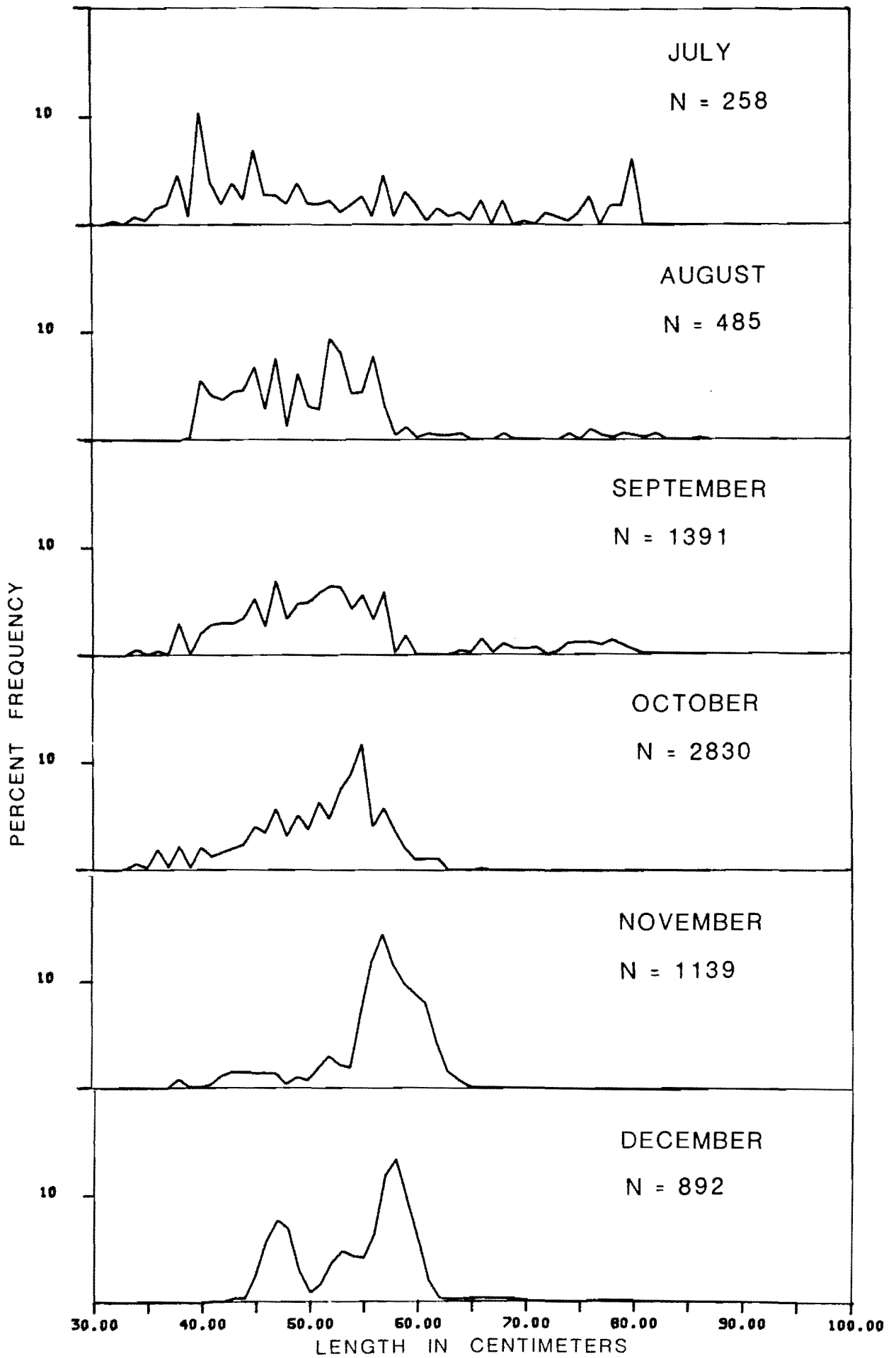


FIGURE 16. Length frequencies of skipjack caught in the Society Islands in 1973.

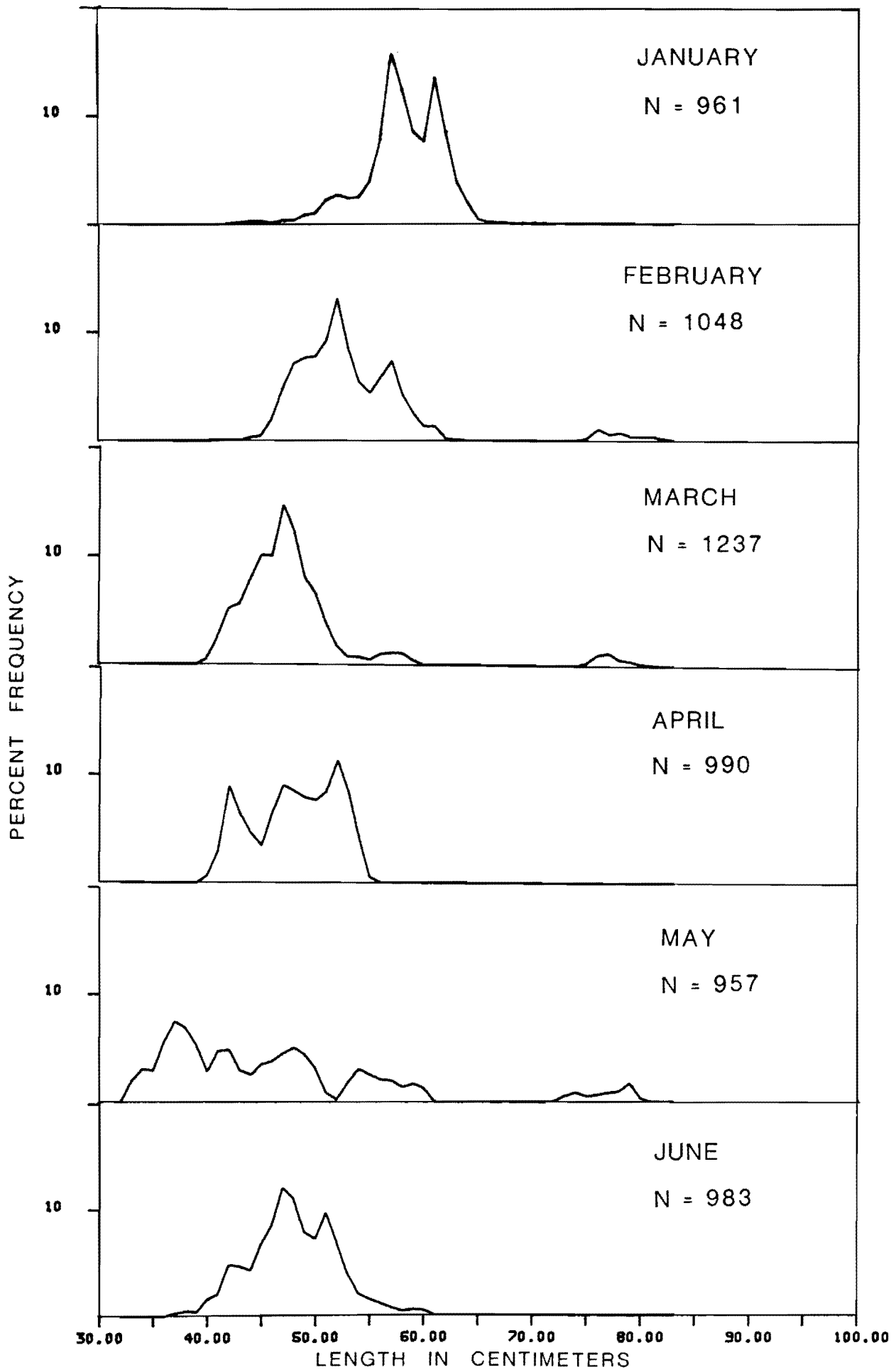


FIGURE 17. Length frequencies of skipjack caught in the Society Islands in 1974.

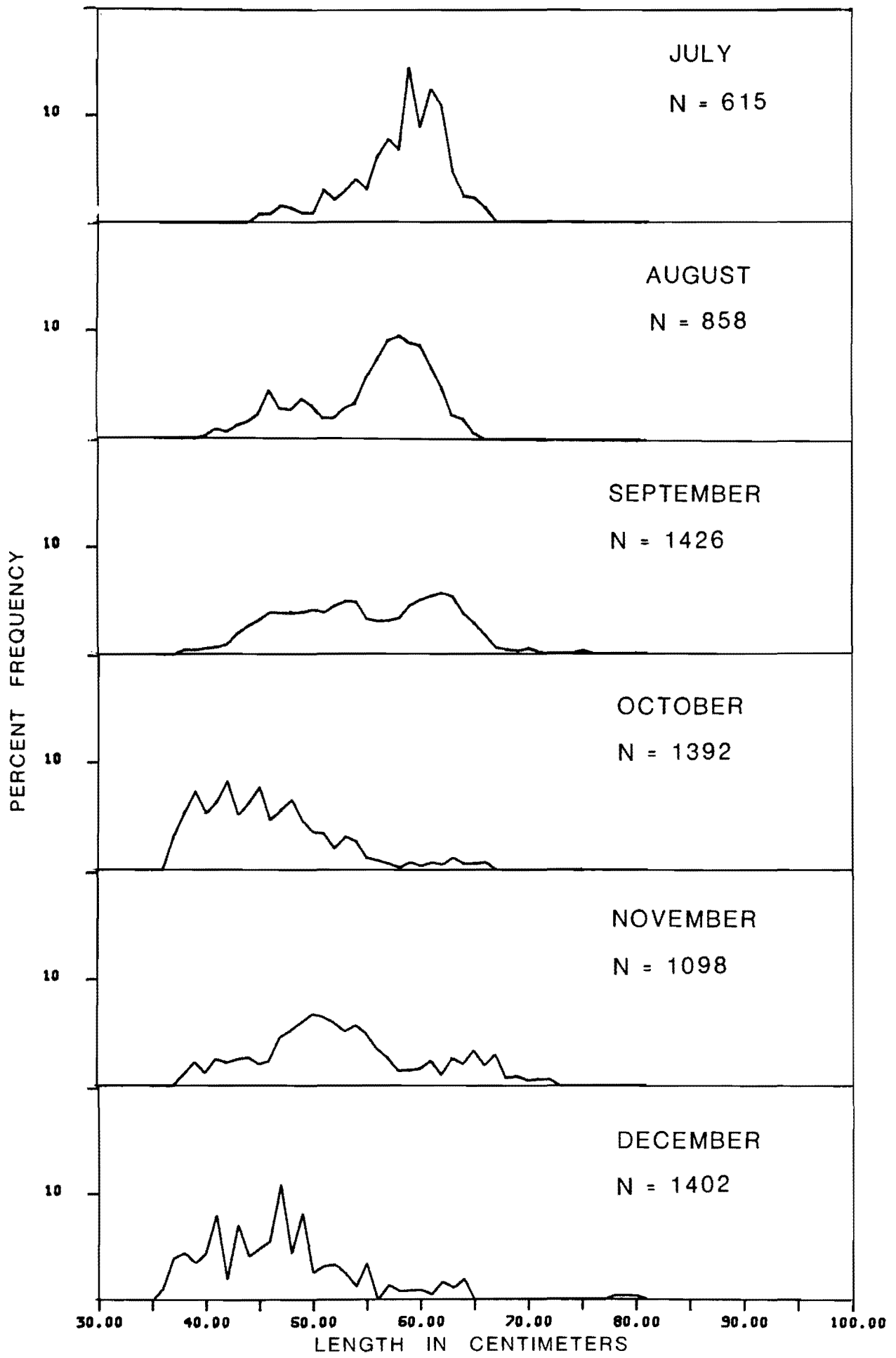


FIGURE 17. (continued)



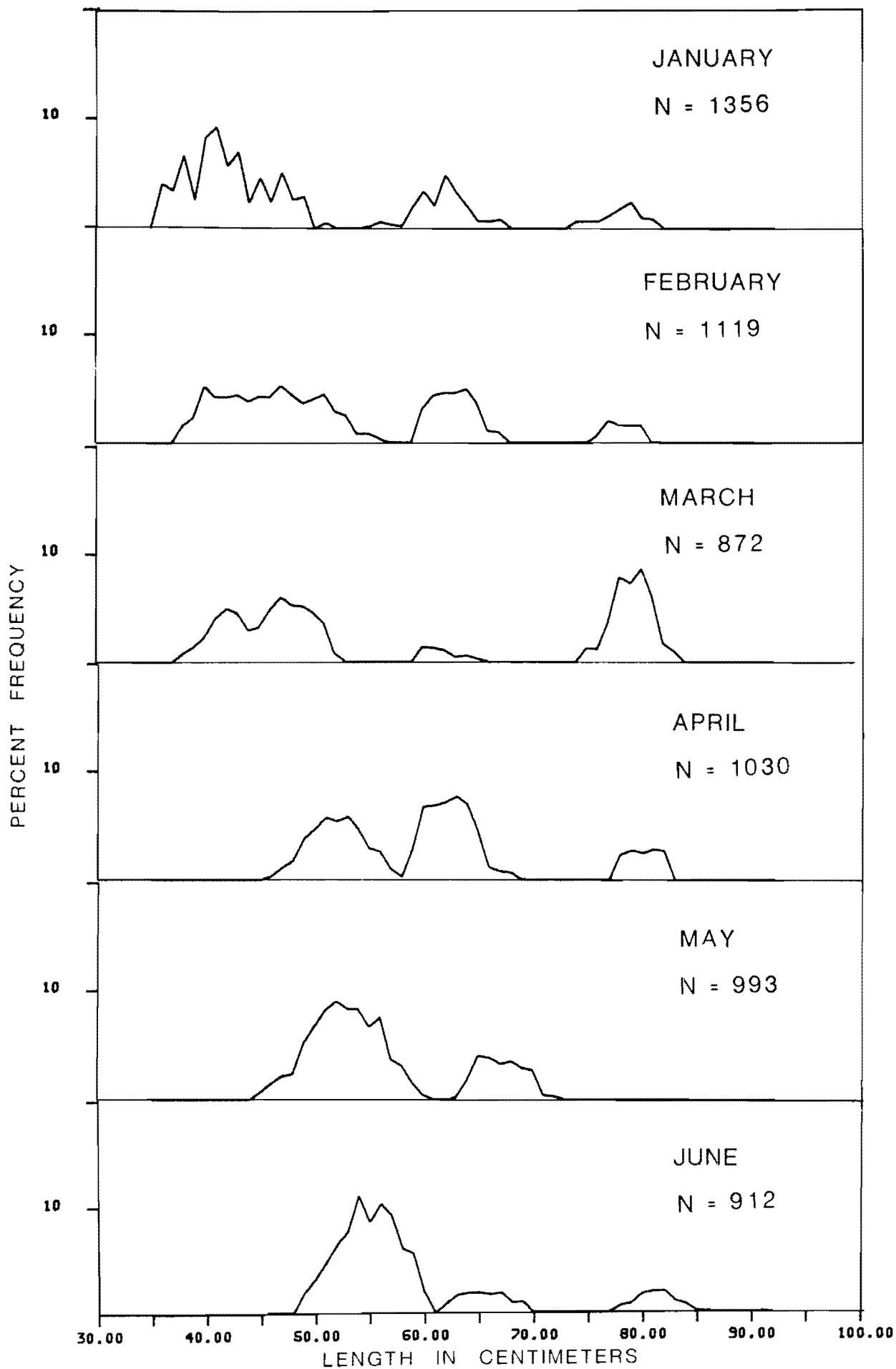


FIGURE 18. Length frequencies of skipjack caught in the Society Islands in 1975.

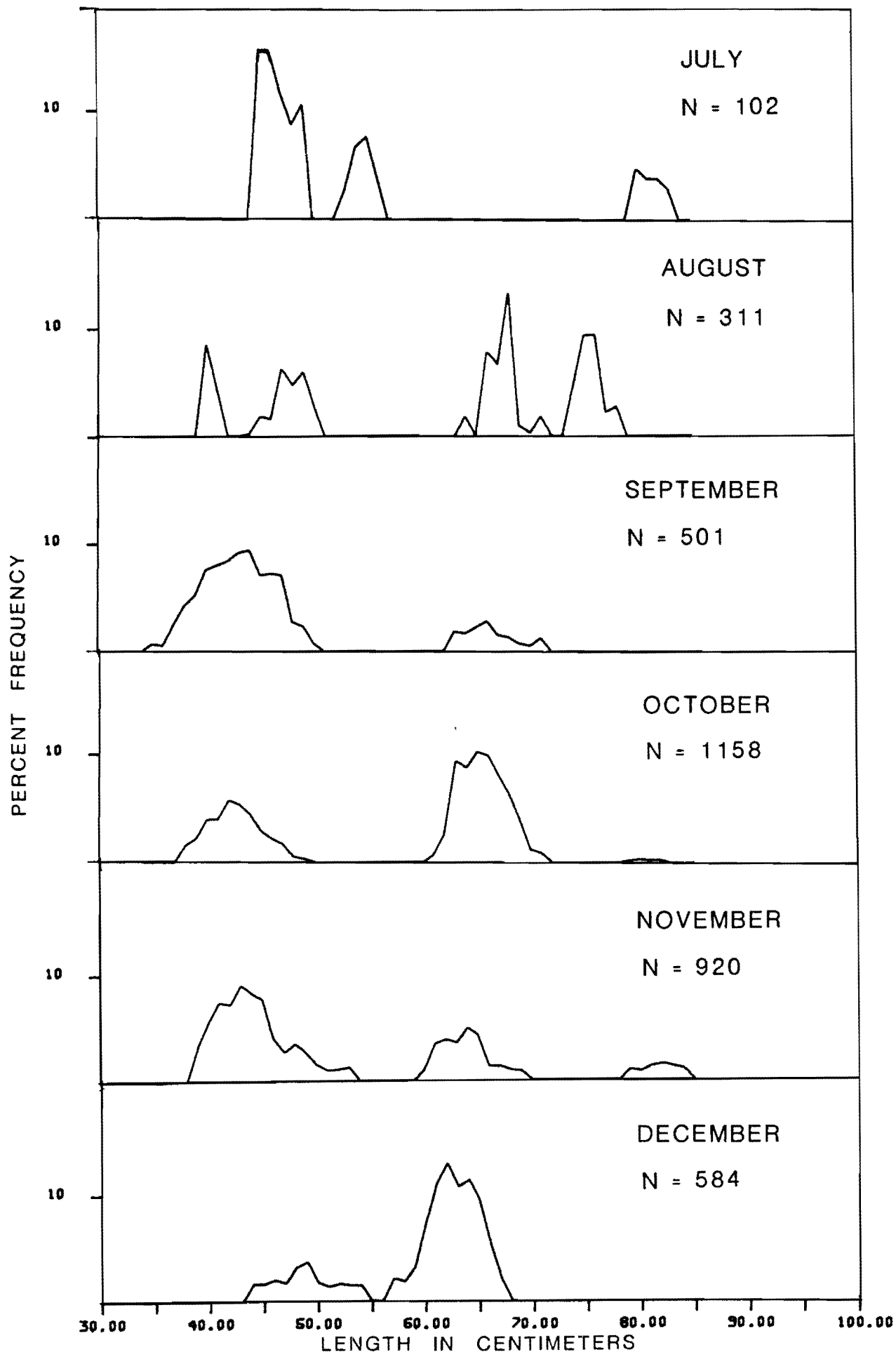


FIGURE 18. (continued)

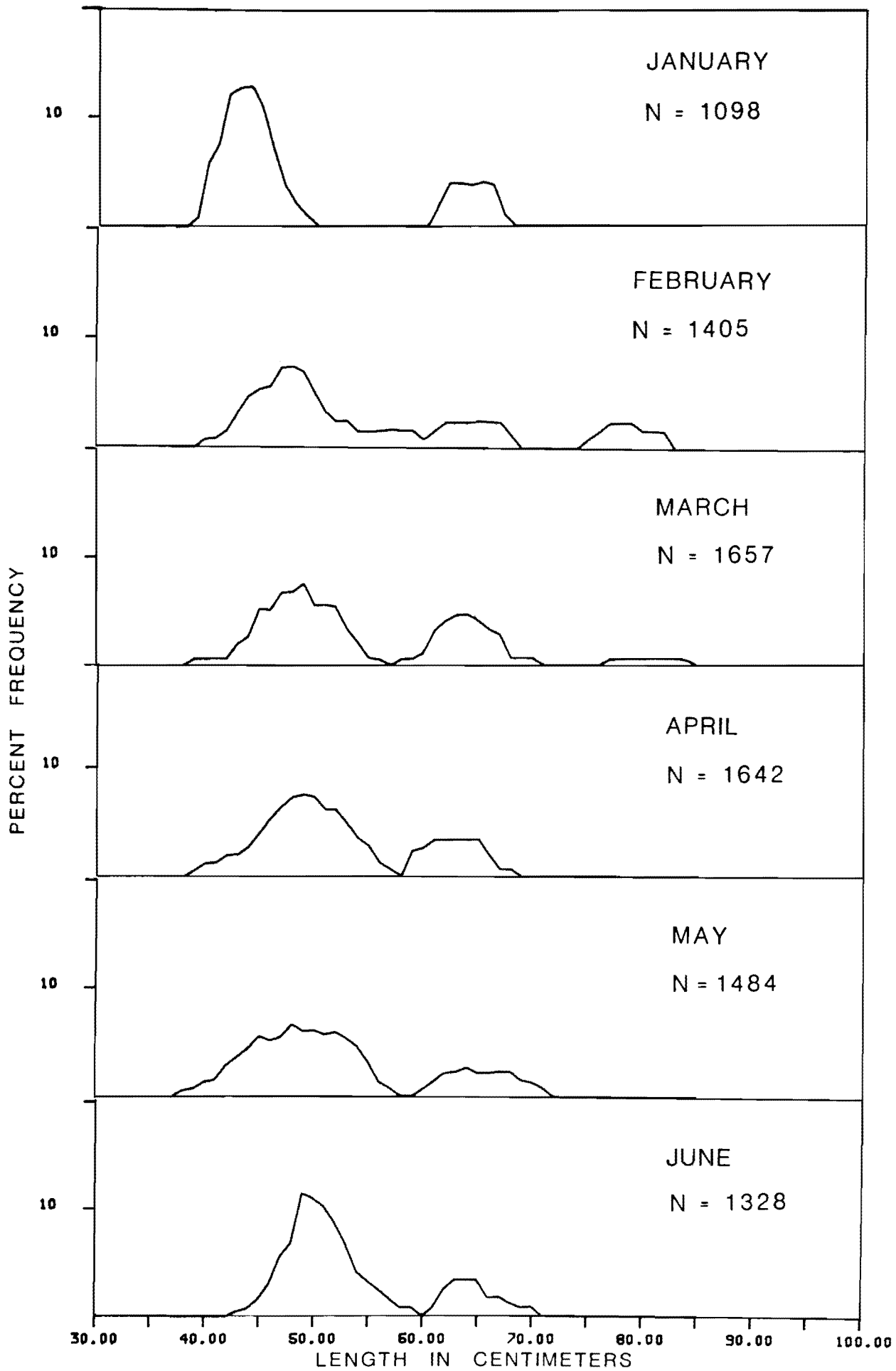


FIGURE 19. Length frequencies of skipjack caught in the Society Islands in 1976.

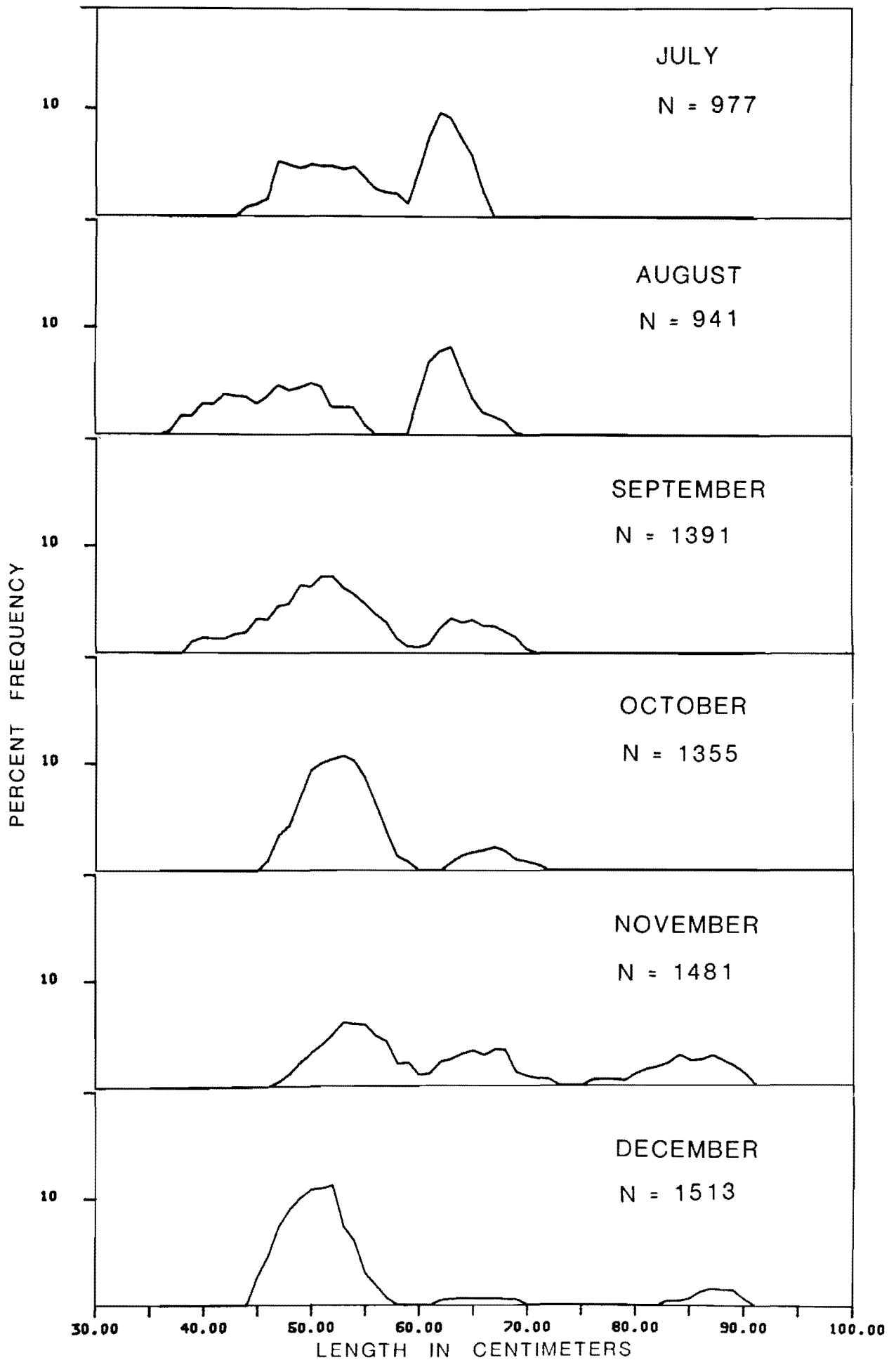


FIGURE 19. (continued)

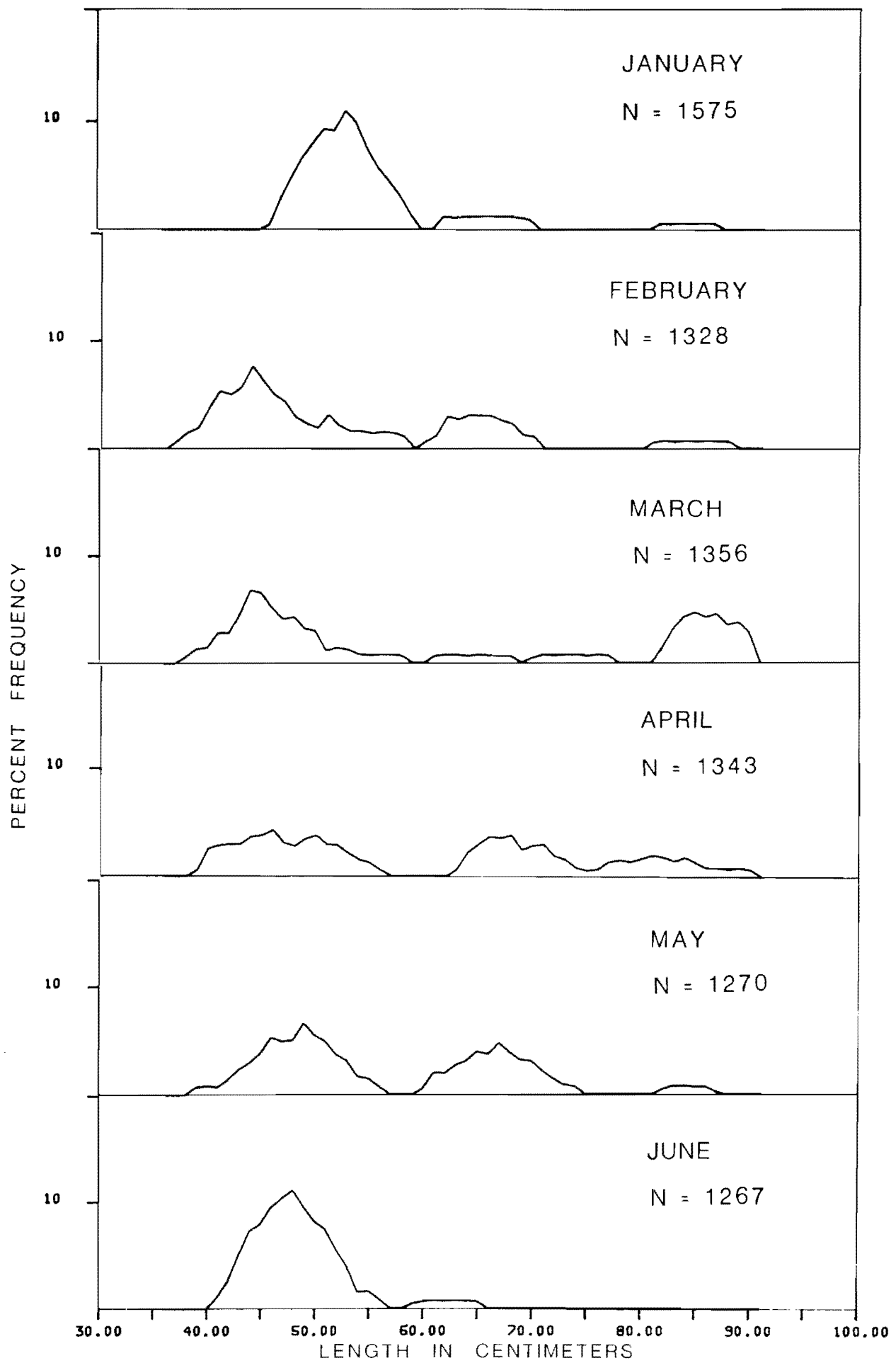


FIGURE 20. Length frequencies of skipjack caught in the Society Islands in 1977.

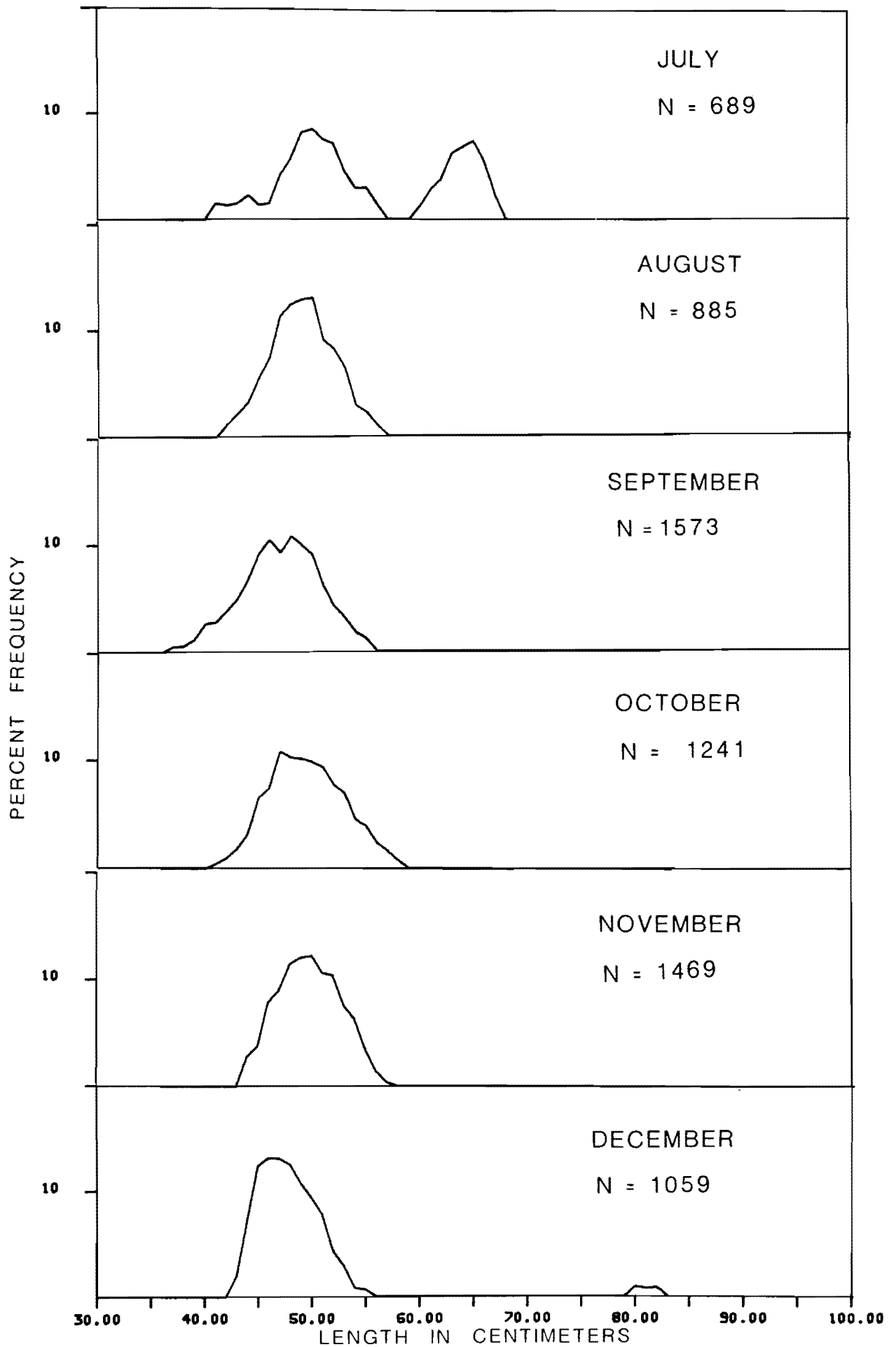


FIGURE 20. (continued)

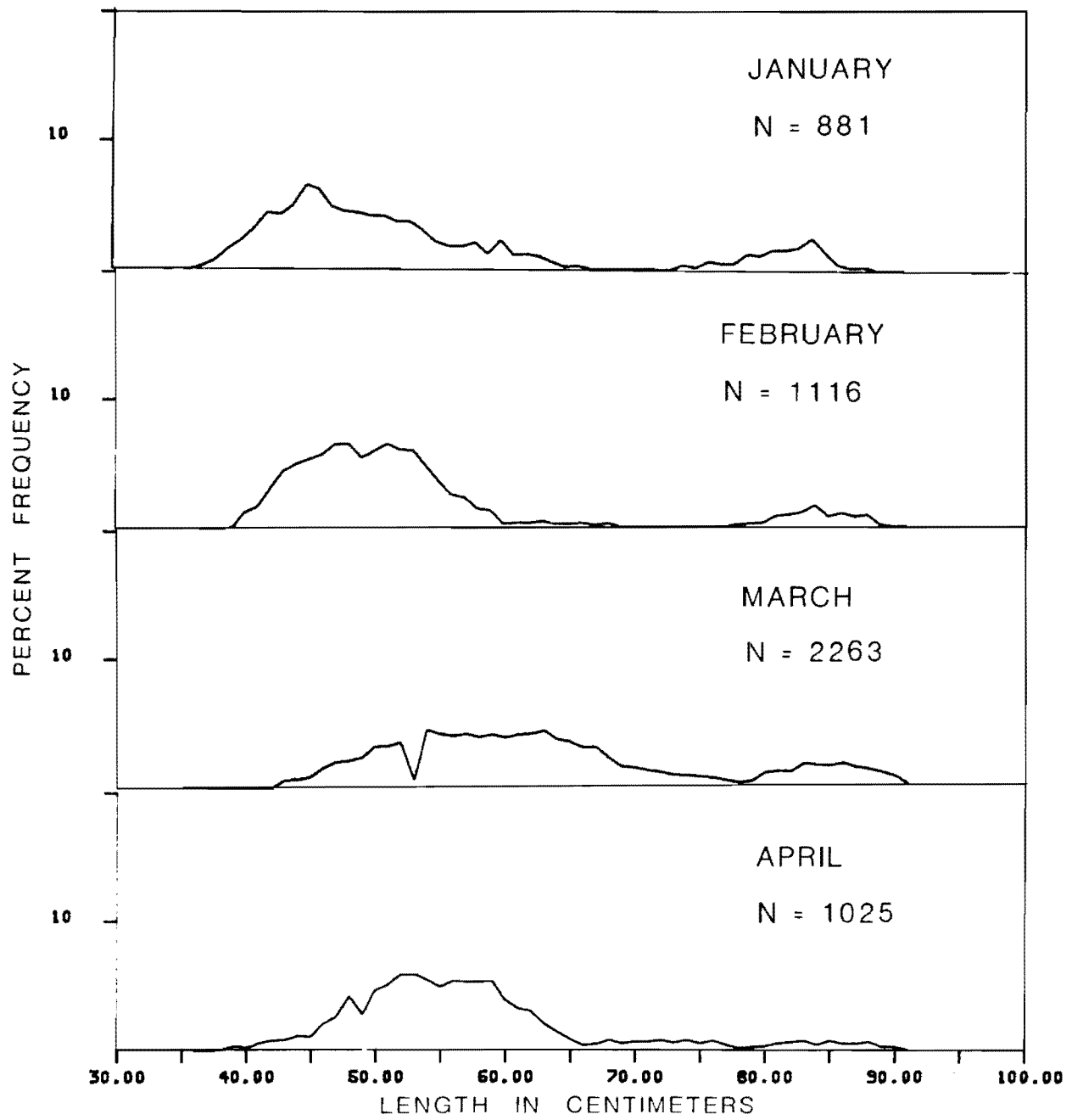


FIGURE 21. Length frequencies of skipjack caught in the Society Islands in 1978.

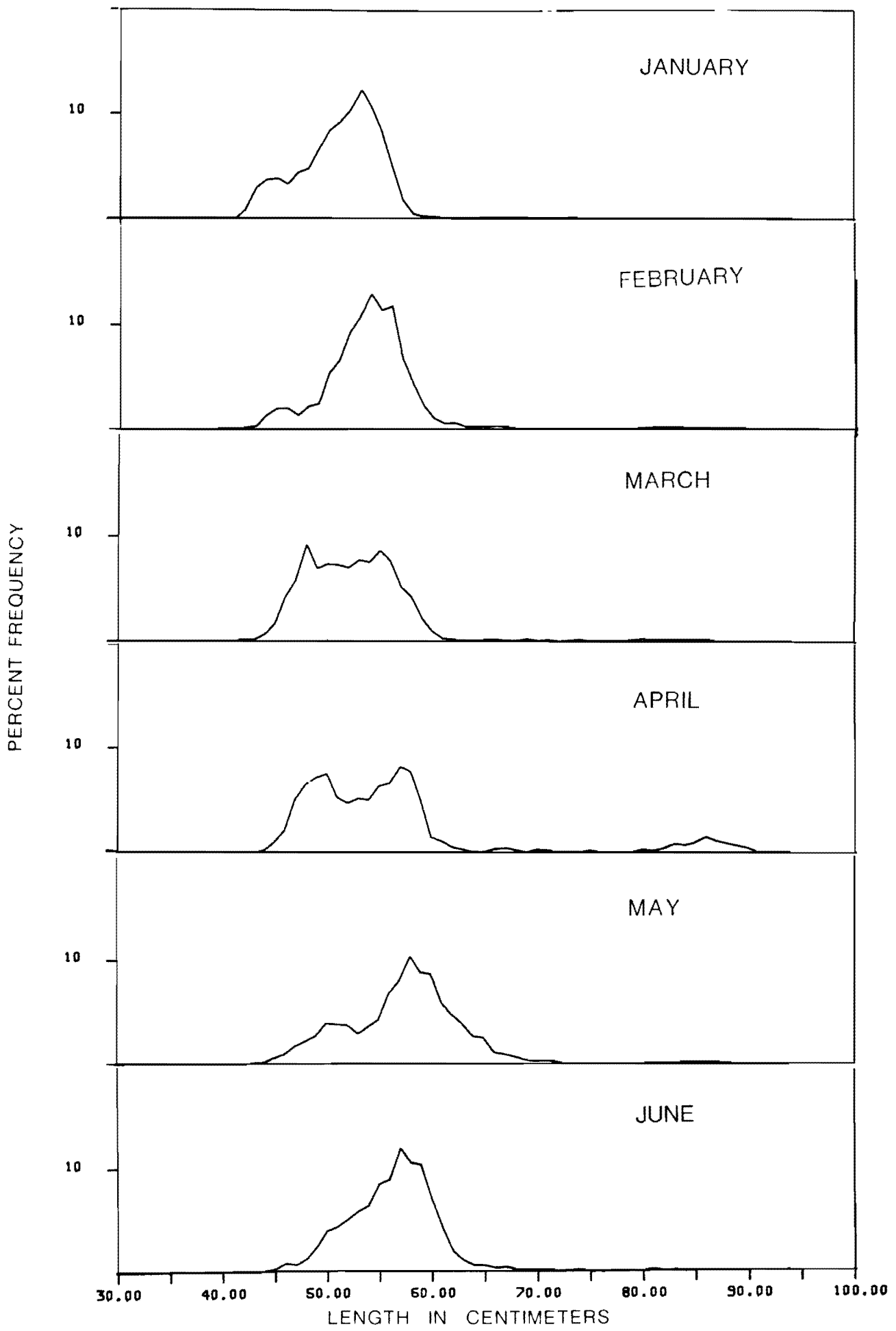


FIGURE 22. Length frequencies of skipjack caught in the Society Islands in 1979.



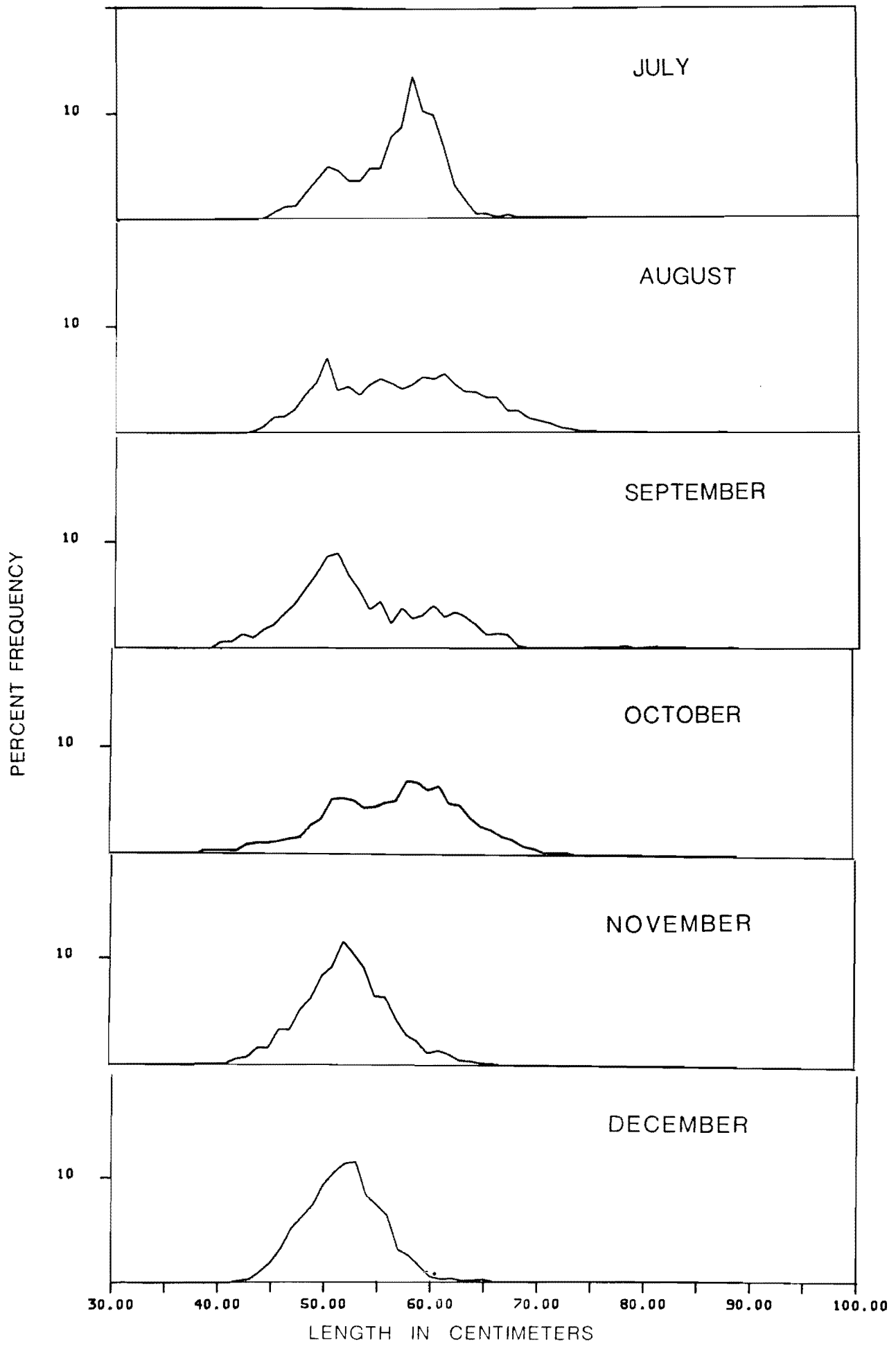


FIGURE 22. (continued)

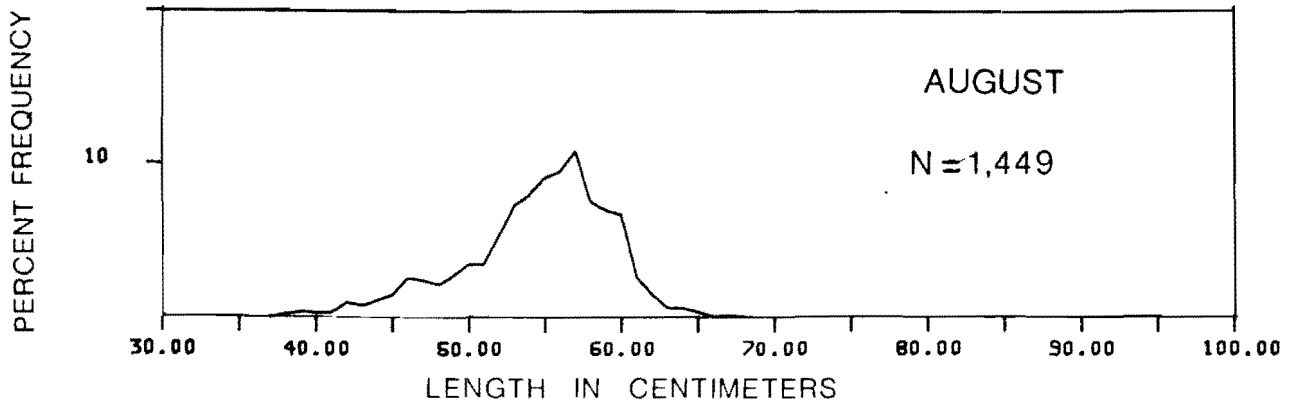


FIGURE 23. Length frequencies of skipjack caught in the Society Islands in 1980.

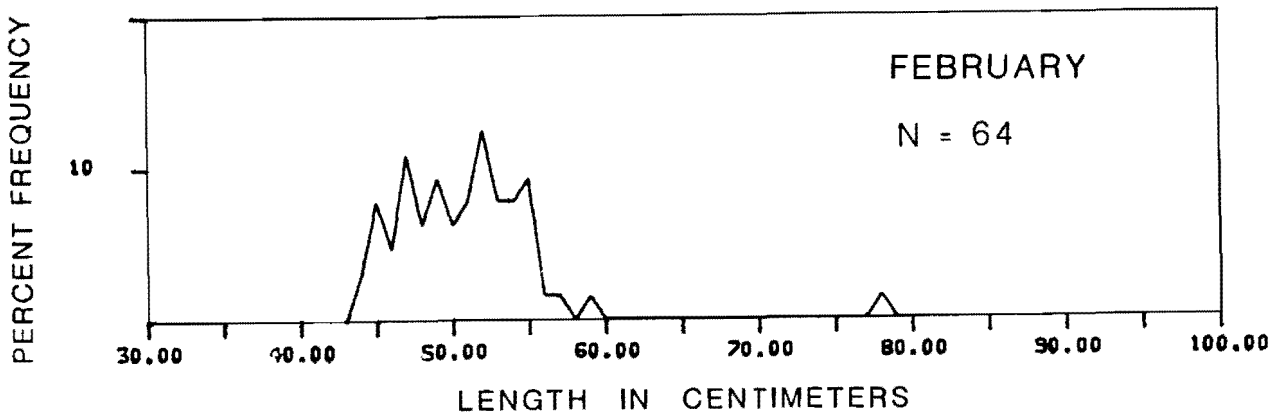


FIGURE 24. Length frequencies of skipjack caught in the Pitcairn Islands in 1980.

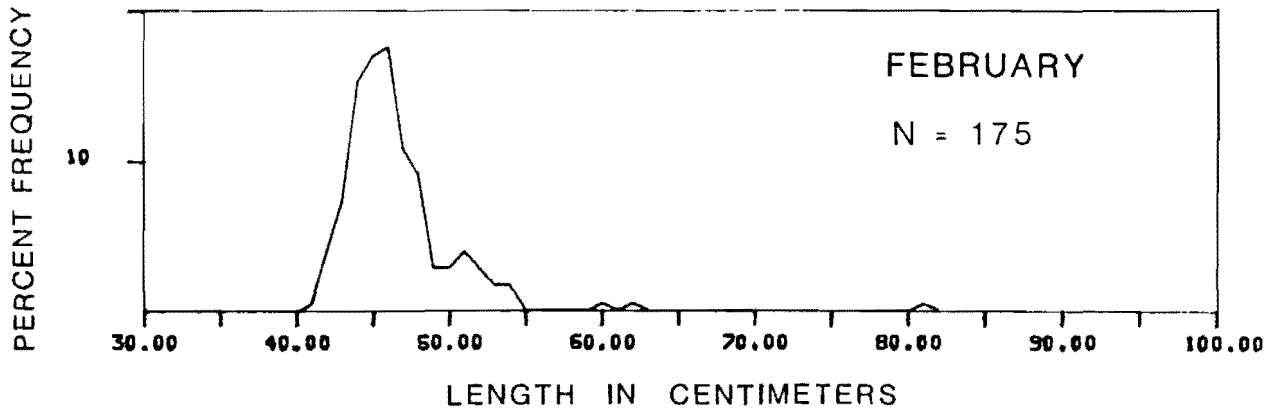


FIGURE 25. Length frequencies of skipjack caught between the Pitcairn and Gambier islands in 1980.

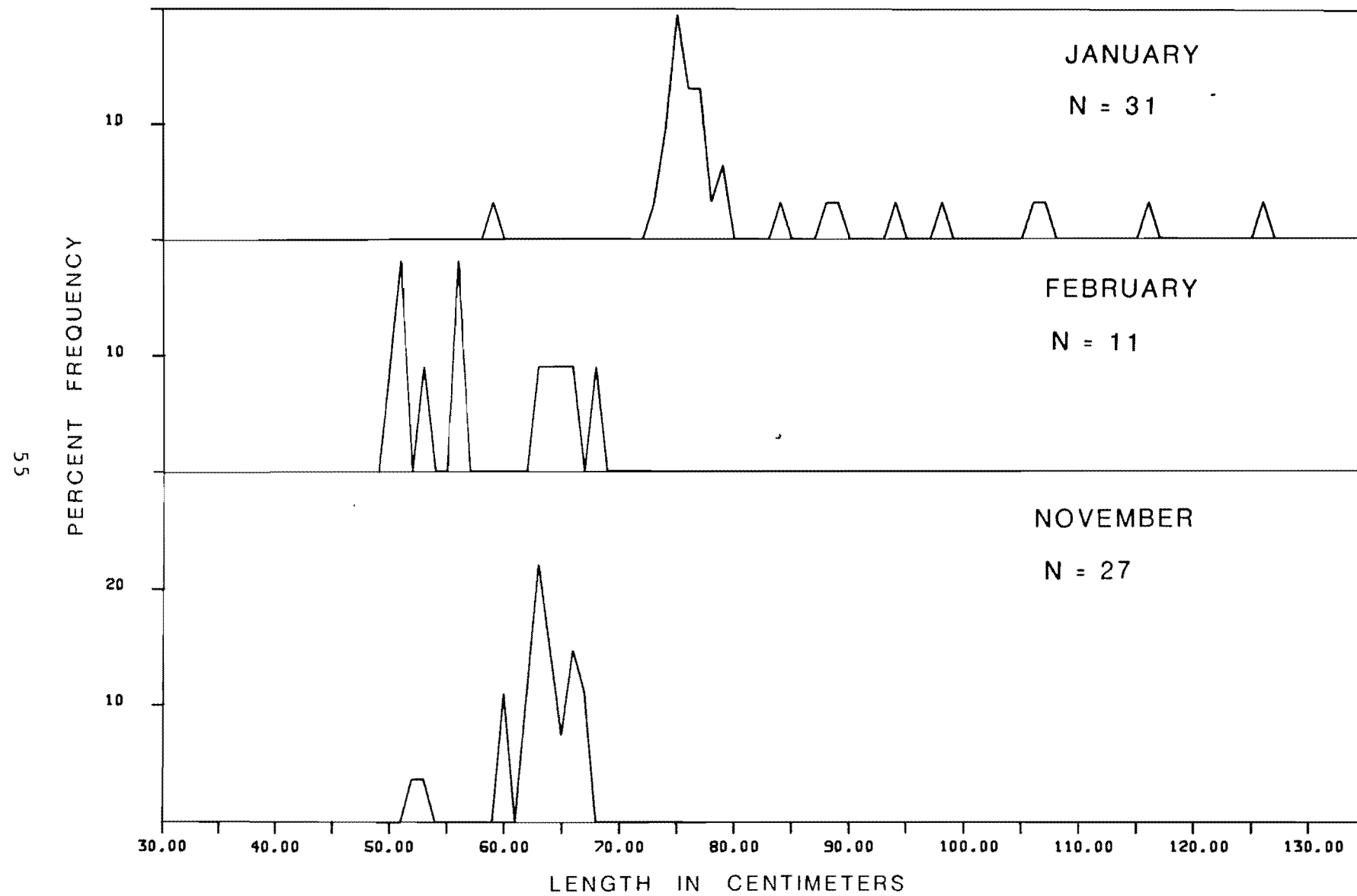


FIGURE 26. Length frequencies of yellowfin caught in the Marquesas Islands in 1957.

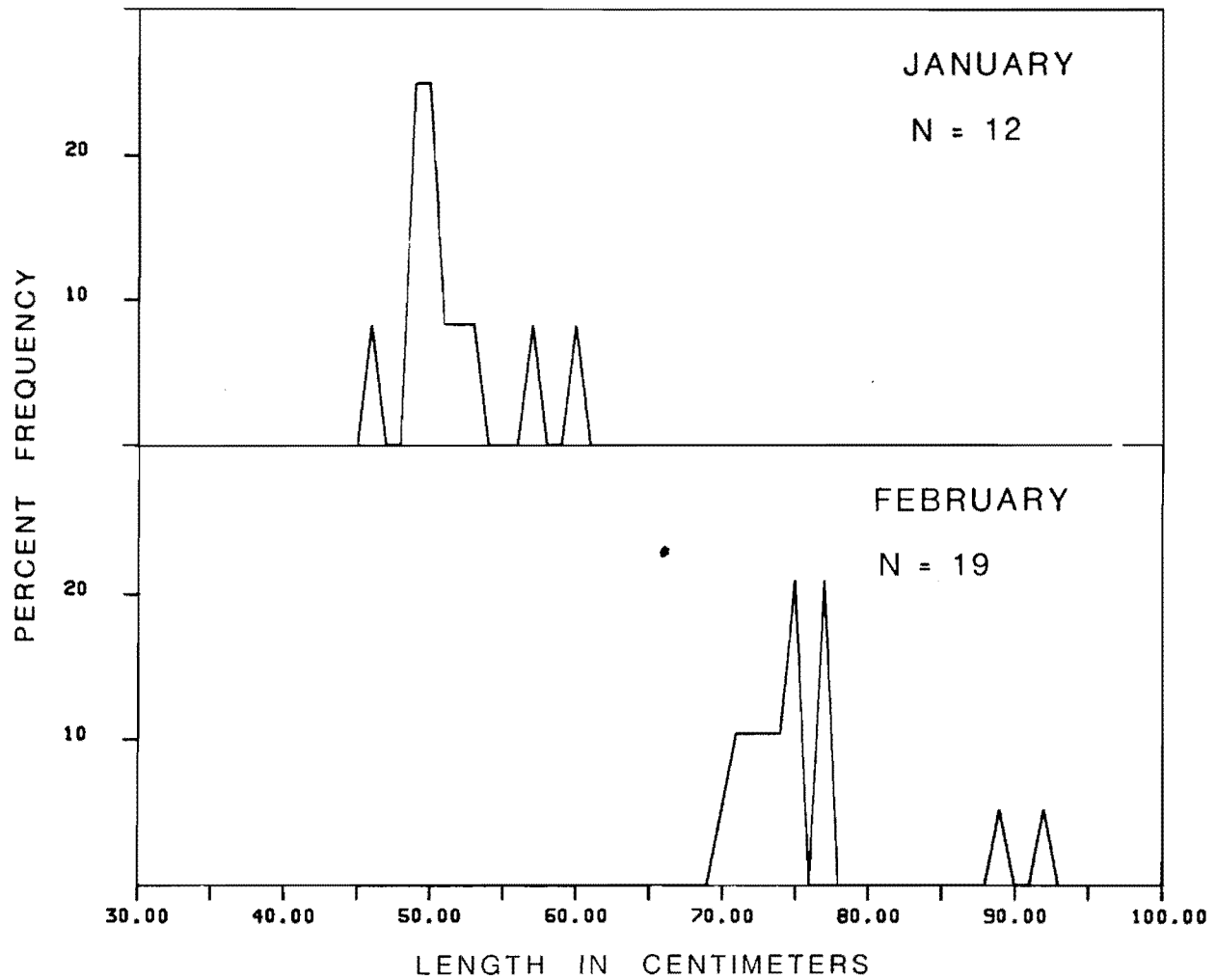


FIGURE 27. Length frequencies of yellowfin caught in the Marquesas Islands in 1958.

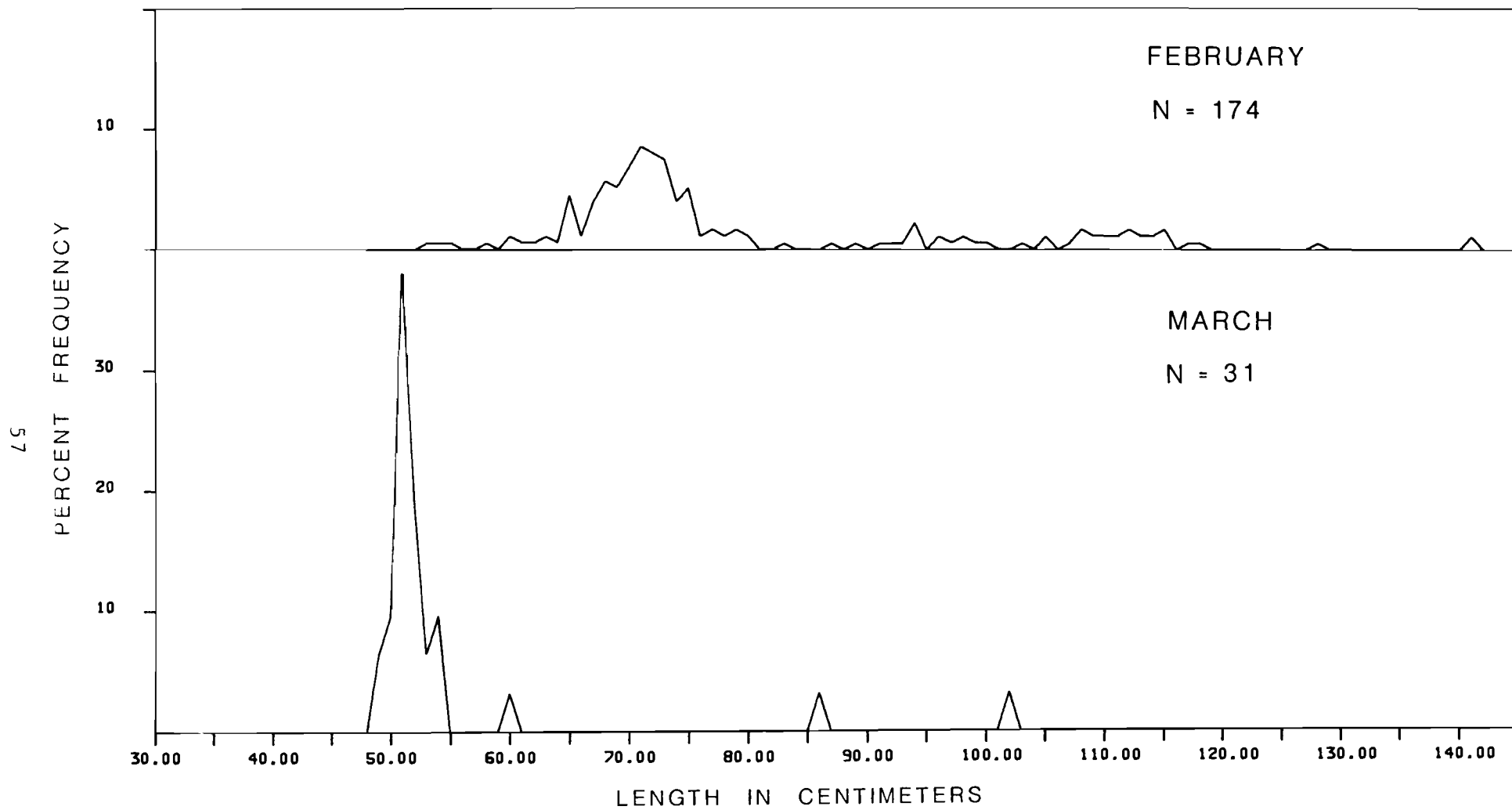


FIGURE 28. Length frequencies of yellowfin caught in the Marquesas Islands in 1959.

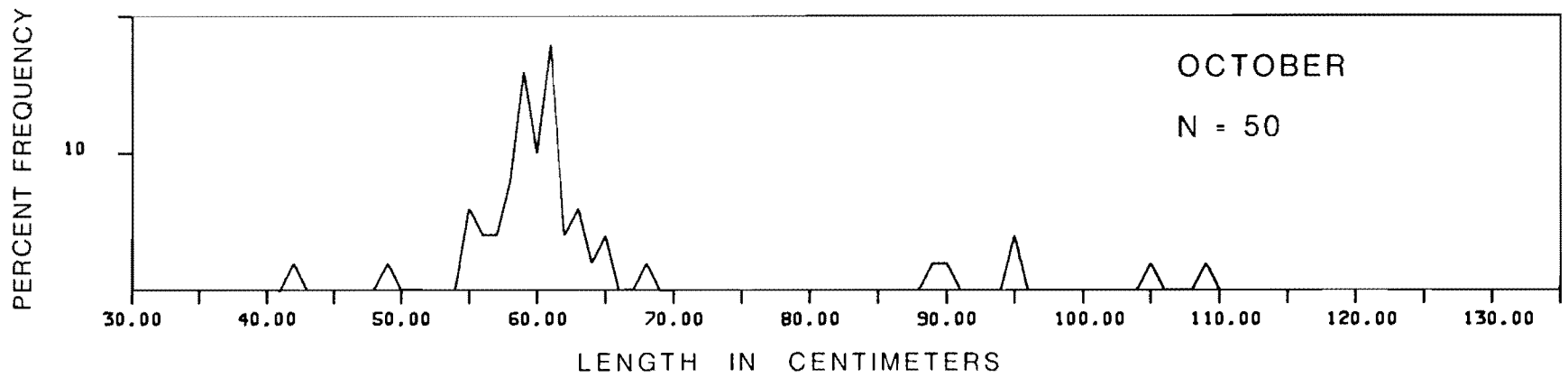


FIGURE 29. Length frequencies of yellowfin caught in the Marquesas Islands in 1977.

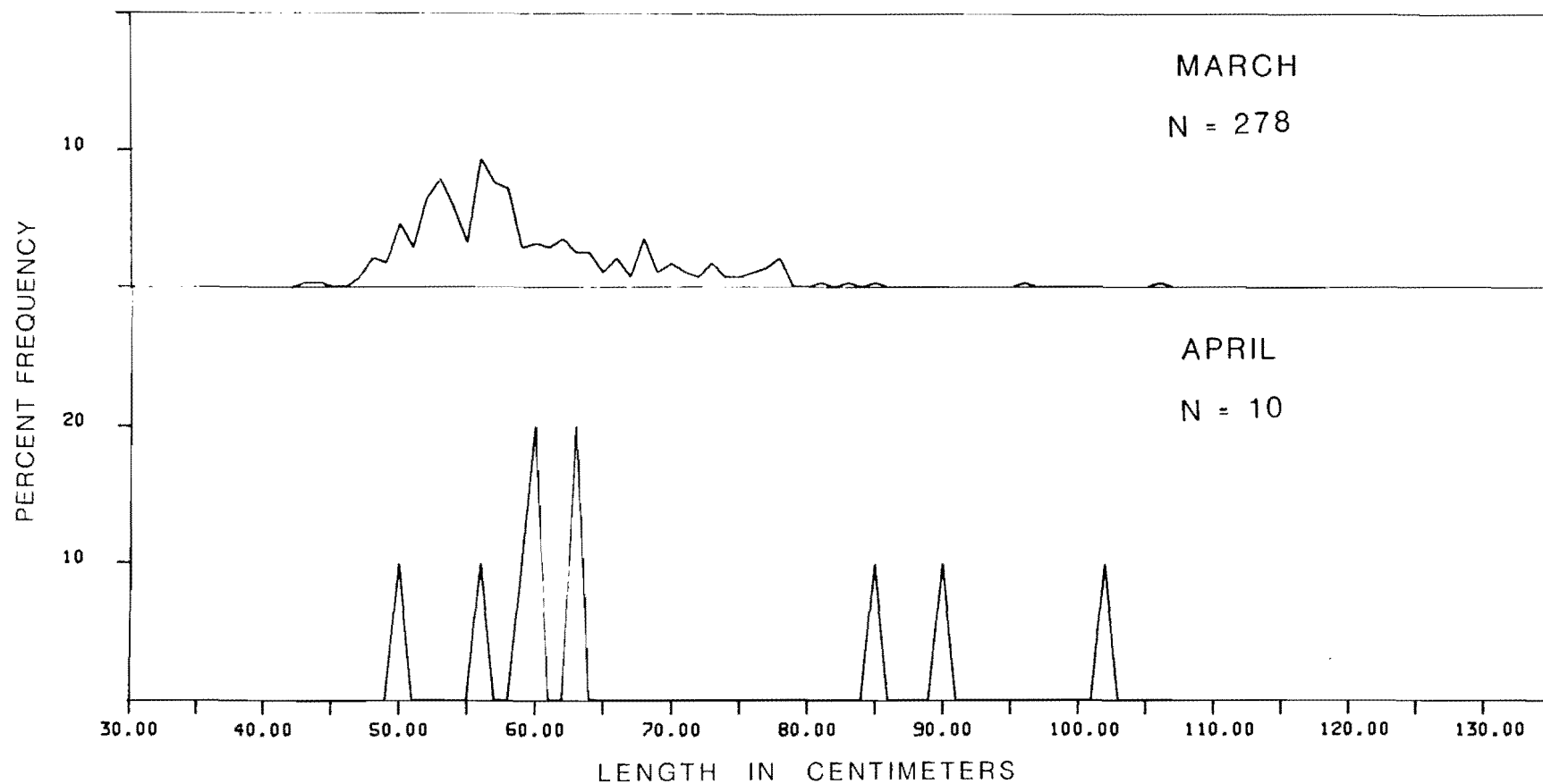


FIGURE 30. Length frequencies of yellowfin caught in the Marquesas Islands in 1978.

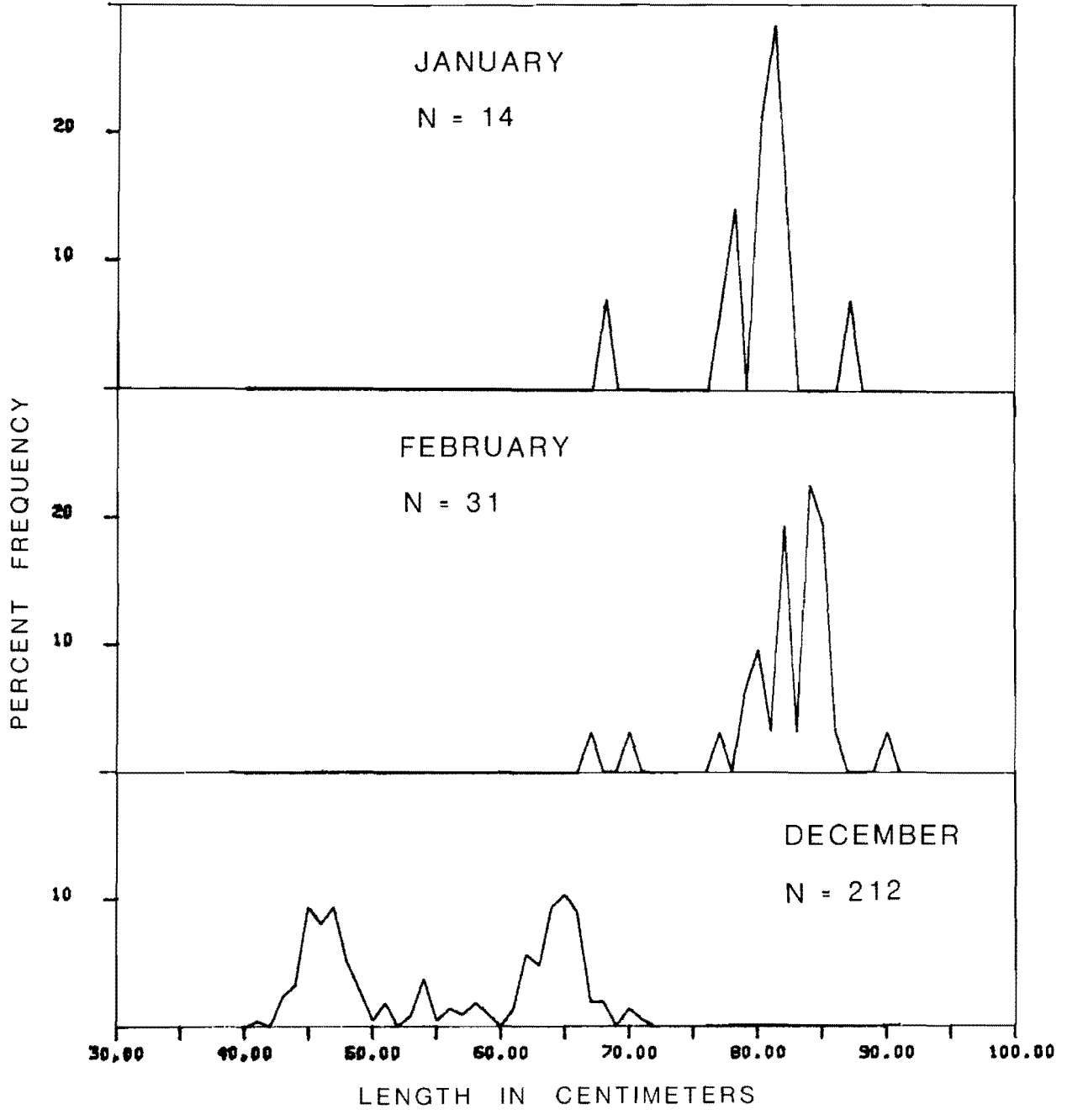


FIGURE 31. Length frequencies of yellowfin caught in the Marquesas Islands in 1979.



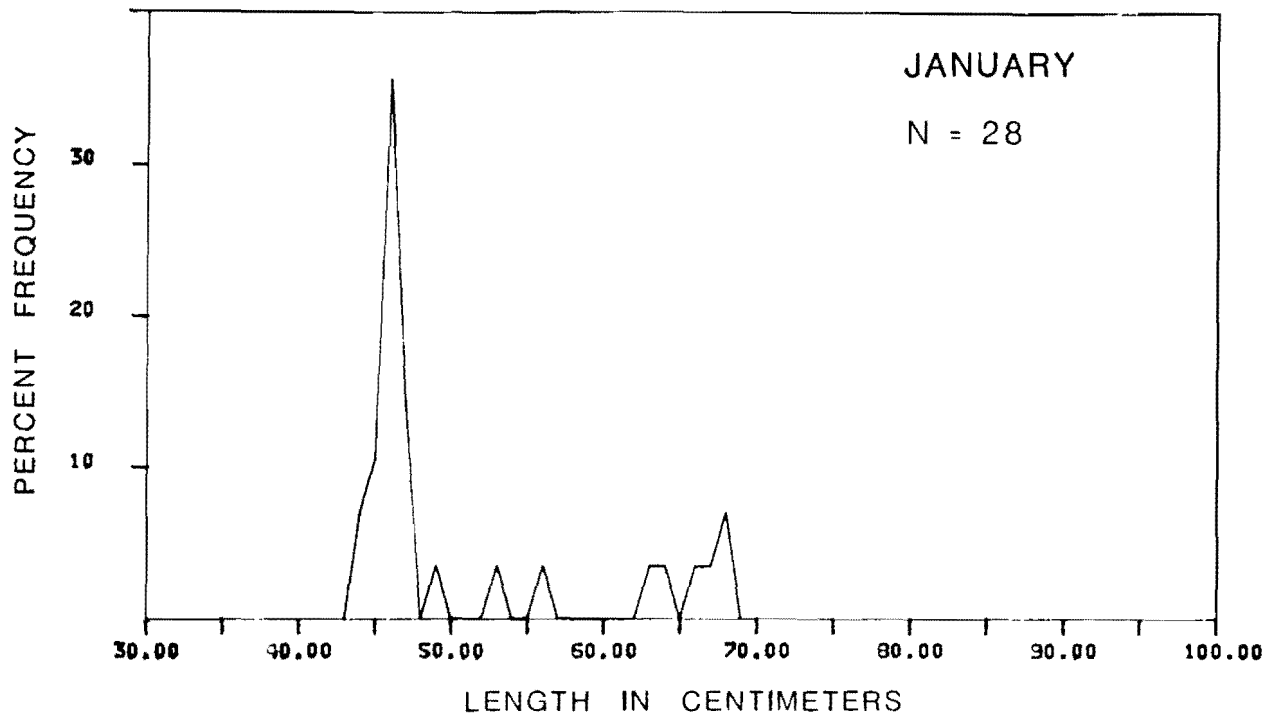


FIGURE 32. Length frequencies of yellowfin caught in the Marquesas Islands in 1980.

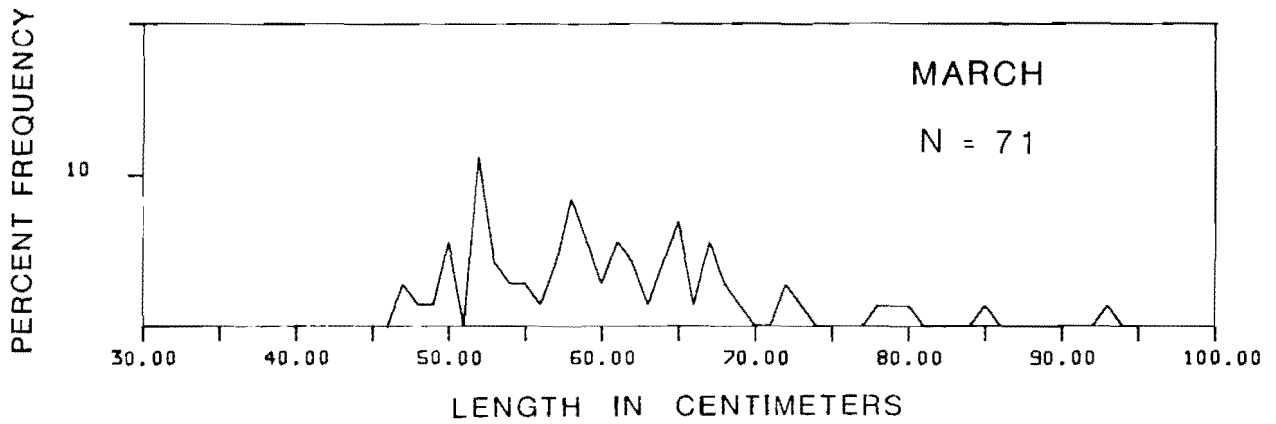


FIGURE 33. Length frequencies of yellowfin caught in the Tuamotu Islands in 1978.

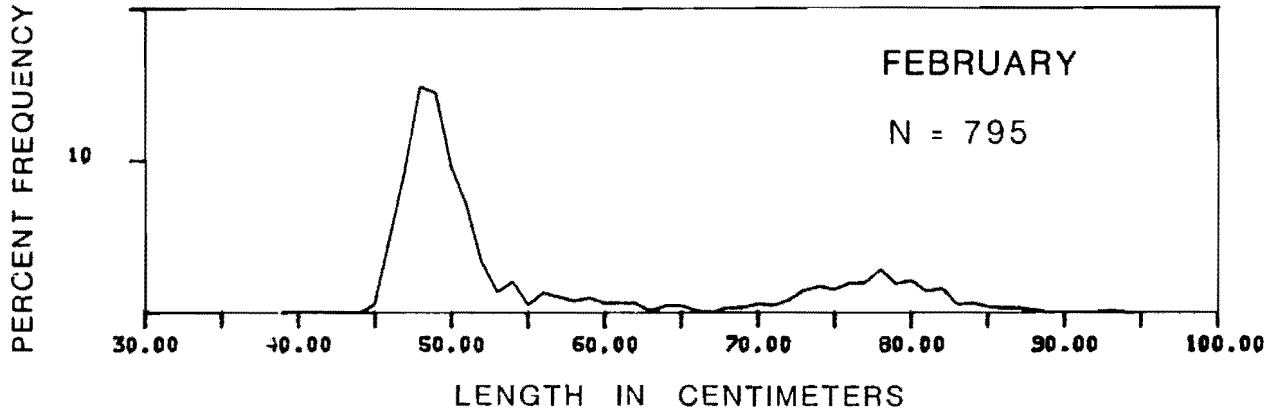


FIGURE 34. Length frequencies of yellowfin caught in the Tuamotu Islands in 1980.

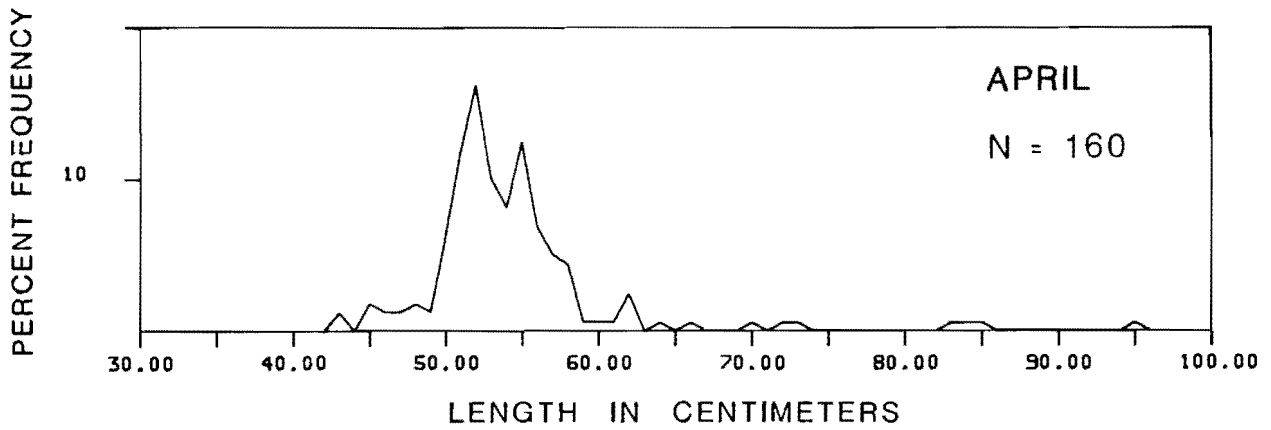


FIGURE 35. Length frequencies of yellowfin caught in the Society Islands in 1978.

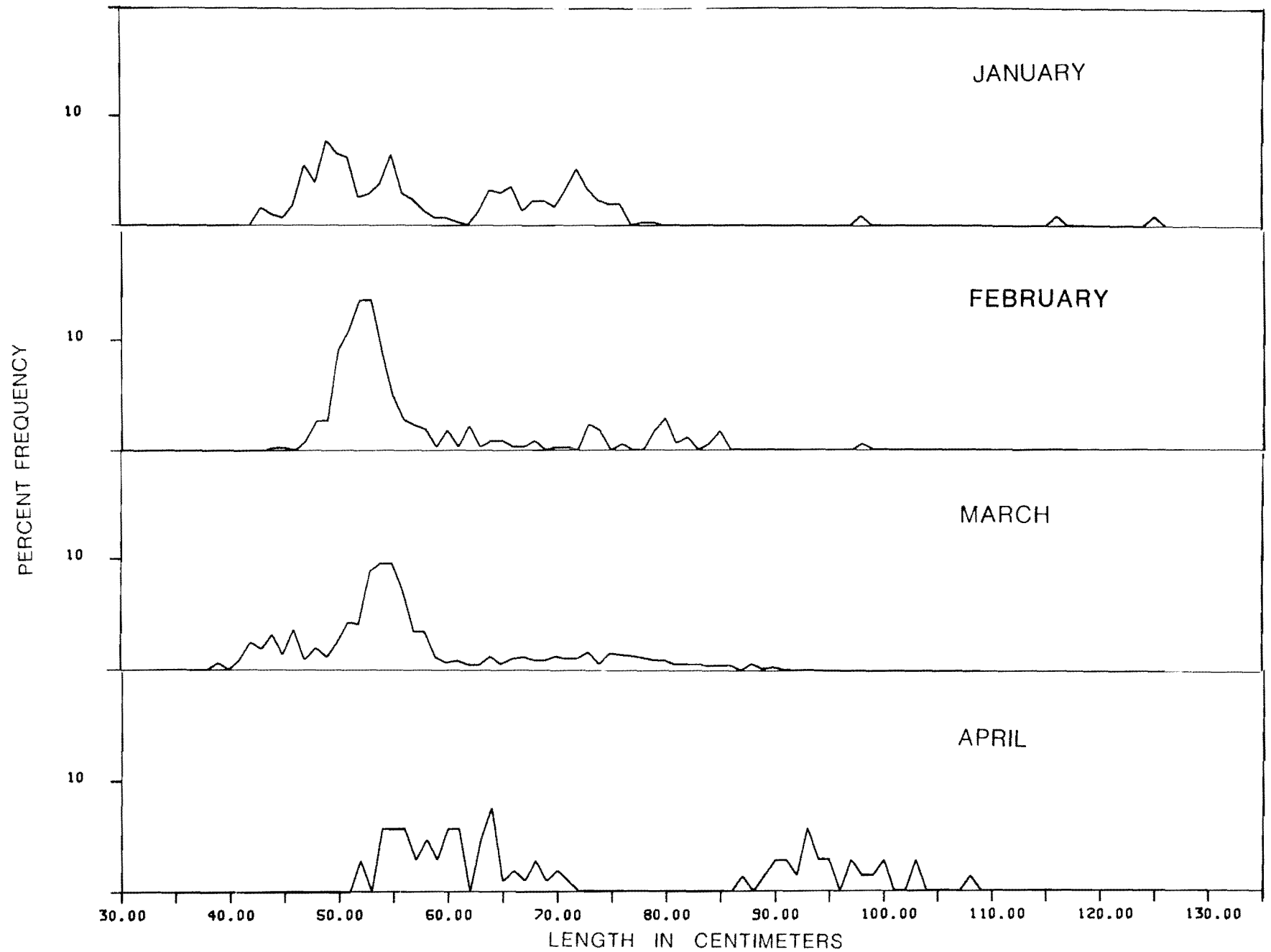


FIGURE 36. Length frequencies of yellowfin caught in the Society Islands in 1979.

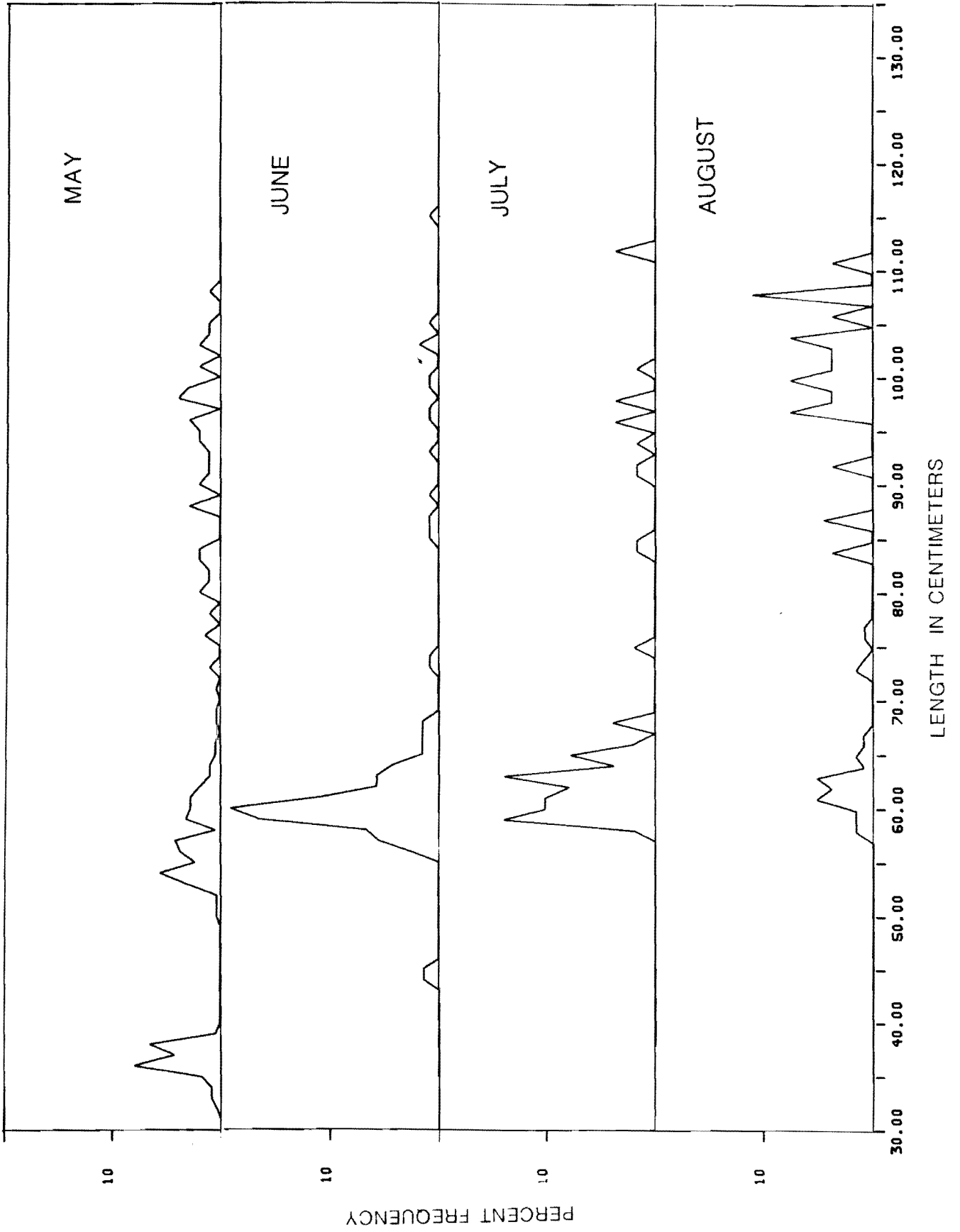


FIGURE 36. (continued)

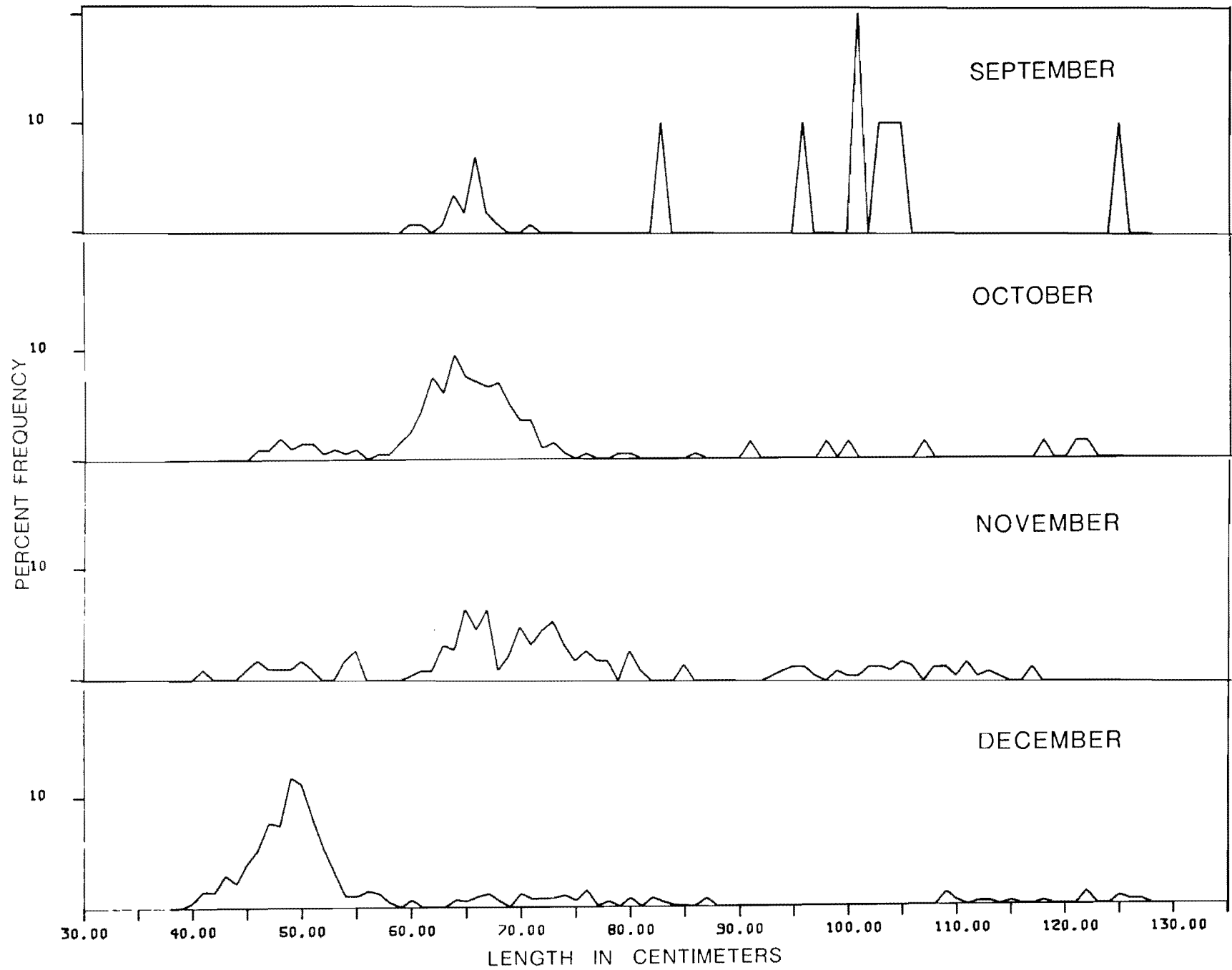


FIGURE 36. (continued)

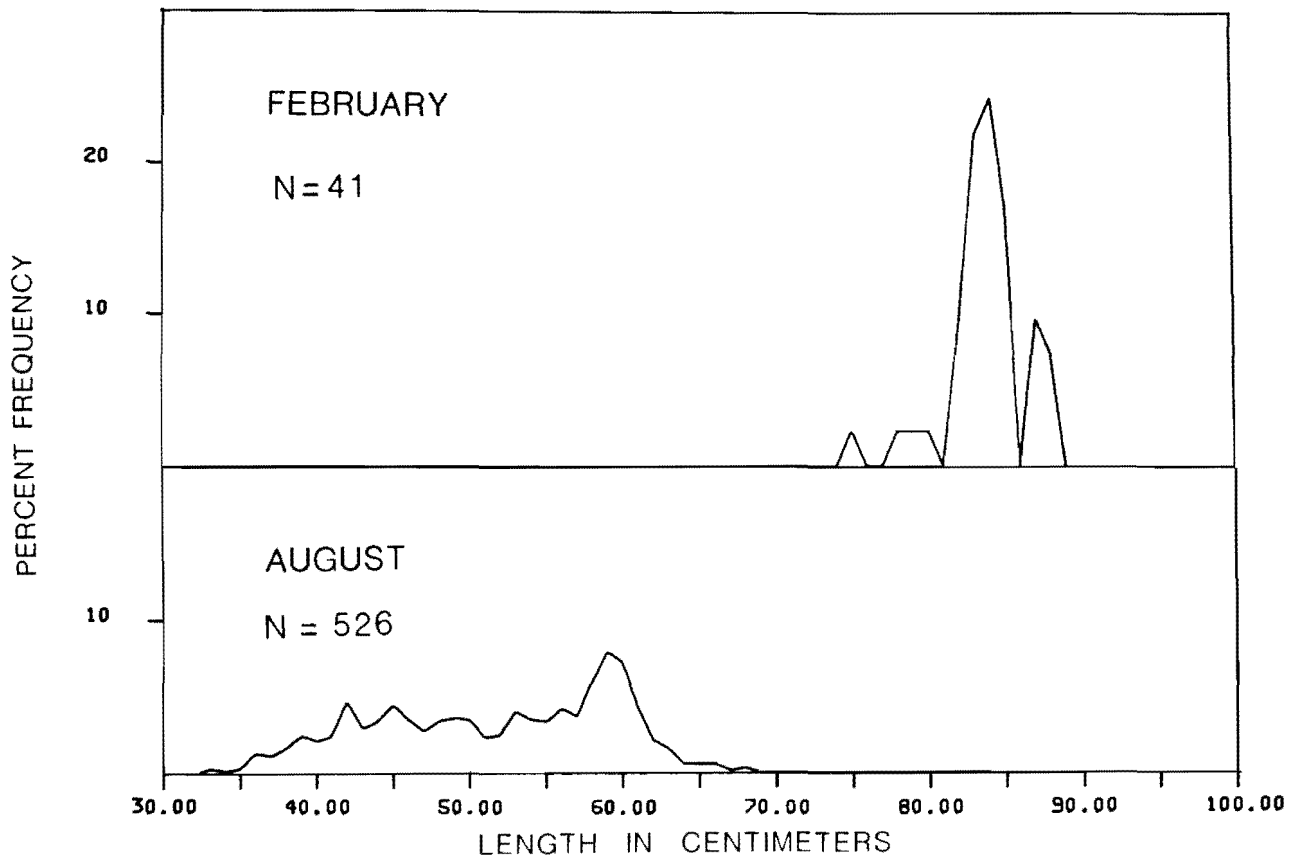


FIGURE 37. Length frequencies of yellowfin caught in the Society Islands in 1980.

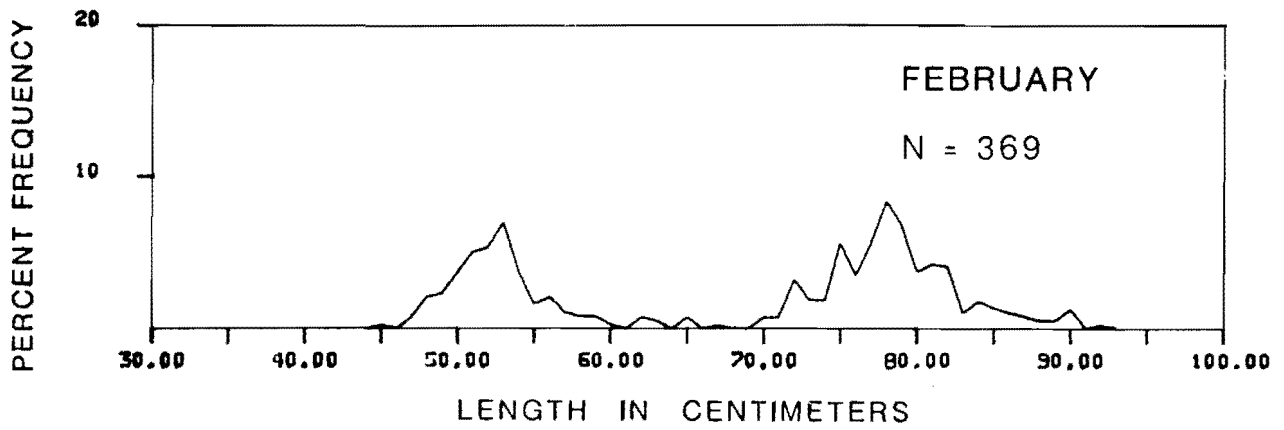


FIGURE 38. Length frequencies of yellowfin caught in the Pitcairn Islands in 1980:

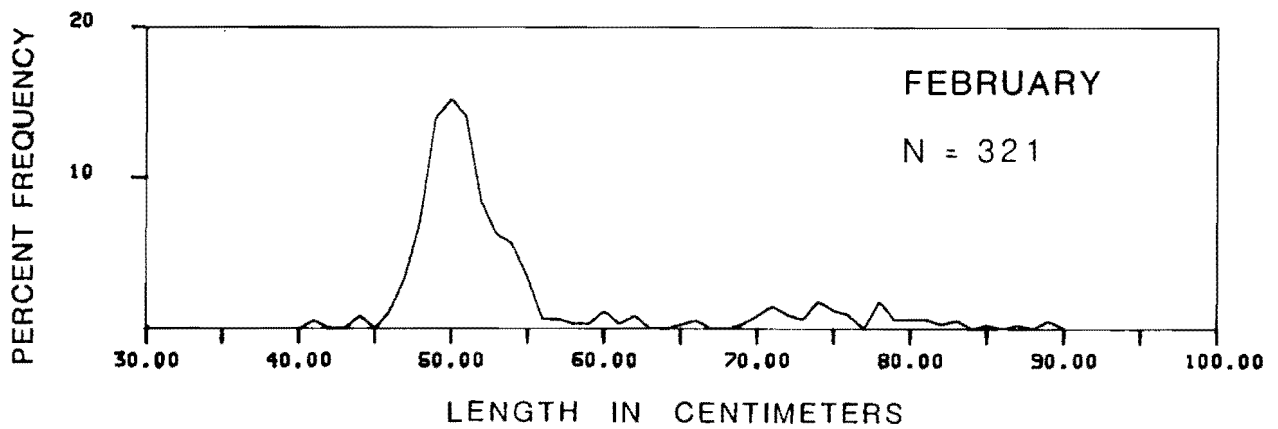


FIGURE 39. Length frequencies of yellowfin caught between the Pitcairn and Gambier islands in 1980.

TABLE 1. Tuna research and exploratory fishing conducted in the Marquesas, Tuamotu, Society, Pitcairn, Gambier, and Austral islands. The numbers in parentheses next to the vessel names are the cruise numbers. Under Areas, the six letters refer to the six island groups. Under Bait, MS refers to Marquesan sardines, and the quantities of bait are given in kilograms. In two cases, when the species of tunas were not specified, the catches were assumed to consist entirely of skipjack. In these cases, the total numbers of skipjack and yellowfin are enclosed in parentheses under Surface catches of scombrids.

Year	Months	Vessel	Gear	Areas	Bait			Surface catches of scombrids								References	
					Imported or cultured	Caught locally		Marquesas Islands				Other areas					
						MS	Other	SJ	YF	Others	Total	SJ	YF	Others	Total		
1949	Mar.-Jul.	Hawaiian Tuna	baitboat	M	-	yes	?										Royce, 1954; Austin, 1962
1953	Mar.	Challenger	baitboat	M	yes	yes	?										Royce, 1954; Austin, 1962
1954	Feb.-Apr.	Charles H. Gilbert (15)	research	M,T	-	1,324	?										Anonymous, 1954; Royce, 1954
1955	Jan.	Paramount	baitboat	M	yes	?	?										Austin, 1962
1956	Aug.-Sep.	Charles H. Gilbert (30)	research	M	-	878	29	(345)	(10)	12	367	0	0	0	0	0	Austin, 1957
1956	Aug.-Oct.	Hugh M. Smith (35)	research	M,T,S	-	-	-										Austin, 1957
1957	Jan.-Mar.	John R. Manning (34)	research	M,T,S	-	-	-	3	0	0	3	2	0	2	4	4	Wilson and Rinkel, 1957
1957	Jan.-Mar.	Charles H. Gilbert (32)	research	M,T,S	-	6,454	-	4,603	58	26	4,687	241	20	0	261	261	Wilson and Rinkel, 1957
1957	Jan.-Mar.	Hugh M. Smith (38)	research	M,T,S	-	-	-										Wilson and Rinkel, 1957
1957	Oct.-Nov.	Charles H. Gilbert (35)	research	M,T,S	-	2,018	-	1,480	34	41	1,555	628	145	0	773	773	Wilson <i>et al.</i> , 1958
1958	Jan.-Feb.	Hugh M. Smith (43)	research	M	-	2,620	-	1,160	11	5	1,176	0	0	0	0	0	Wilson <i>et al.</i> , 1958
1958	Feb.-Apr.	Charles H. Gilbert (38)	research	M,T,S	-	1,635	-	(1,783)	(16)	23	1,822	183	0	0	183	183	Wilson <i>et al.</i> , 1958
1958	May-Jun.	Hugh M. Smith (45)	research	M,T,S	-	1,094	-	793	10	4	807	0	0	1	1	1	Wilson <i>et al.</i> , 1958
1959	Jan.-Mar.	Charles H. Gilbert (43)	research	M,T,S	-	1,267	225	989	84	14	1,087	441	4	0	445	445	Yoshida, 1960
1959	Feb.-Mar.	Cape Falcon	baitboat	M,T,S	10,890	184	-	102	1,208	32	1,342	6	5	0	11	11	Yoshida, 1960
1960	Nov.	Charles H. Gilbert (50)	research	M,T,S	-	1,818	yes										Sprague, 1961
1964-1972		various	purse seiners	M	-	-	-										-
1972	Feb.-Sep.	Moetu II	baitboat	S,	-	-	840	-	-	-	-	3,621	?	?	5,230	5,230	Anonymous, 1978f
1972-1973	Dec.-Feb.	Anela	baitboat	M,S	-	1,132	4,447	4,236	0	0	4,236	10,672	?	?	10,805	10,805	Anonymous, 1978f
1973	Mar.-Apr.	Redonda	baitboat	M,S,A	-	994	2,112	0	0	0	0	211	?	?	1,425	1,425	Anonymous, 1978f
1974	Nov.	Sea Treasure	purse seiner	M,S	-	-	-										Anonymous, no date
1976	Mar.-Apr.	Sasaya Maru No. 1	baitboat	T,S	-	-	?	-	-	-	-	?	?	?	?	?	Anonymous, 1978f
1976-1977	Mar.-Aug.	Tainui	baitboat	T,S	yes	-	yes	-	-	-	-	16,202	?	?	17,263	17,263	Anonymous, 1978f
1977	Sep.-Nov.	Tainui (5001)	baitboat	M	33	255	4	372	90	122	584	65	2	15	79	79	Anonymous, 1978a
1978	Feb.-Apr.	Mary K. (5002)	baitboat	M,T,S	3,513	497	751	121	342	22	485	977	348	1	1,326	1,326	Anonymous, 1978b
1978-1979	Dec.-May	Cornucopia (5003)	baitboat	M	25	2,313	18	2,150	201	13	2,364	0	0	0	0	0	Anonymous, 1979
1978-1979	Dec.-Feb.	Hatsutori Maru	baitboat	M,T,S	516	532	1,048	1,651+	0	0	1,651+	6,497	98+	0	6,595	6,595	Kearney <i>et al.</i> , 1979; Gillett, 1981
1979-1980	Dec.-Feb.	Hatsutori Maru No. 5 (5004)	baitboat	M,T,S,P,G	1,434	5,344	524	21,722	246	3	21,971	1,327	1,647	54	3,028	3,028	Anonymous, 1980a



TABLE 2. Species of fish and invertebrates caught during the bait-fishing operations of Cruise 5004. X's indicate the presence of the taxon in question in the various operations.

Species	Nuku Hiva-day	Nuku Hiva-night	Rangiroa-night
shark	X		
Mylobatidae	X		
<u>Sardinella marquesensis</u>	X	X	
<u>Spratelloides gracilis</u>			X
<u>Chanos chanos</u>	X		
Myctophidae		X	
Synodontidae		X	X
leptocephalus larva			X
Belonidae		X	X
Hemirhamphidae	X	X	X
Exocoetidae		X	
Bregmacerotidae			X
Bothidae	X		X
Fistularidae	X	X	
Sphyraenidae		X	
Mugilidae (juvenile)		X	
<u>Mugil</u> sp.	X	X	
Polynemidae	X	X	
<u>Euthynnus affinis</u>		X	
Carangidae	X	X	
<u>Caranx sexfasciatus</u>		X	
<u>Caranx</u> sp.	X	X	
<u>Chorinemus tol</u>		X	
<u>Chorinemus</u> sp.		X	
<u>Chorinemus</u> sp. (juvenile)	X	X	
<u>Decapturus macrosoma</u>		X	X
<u>Decapturus maruadsi</u>		X	
<u>Selar crumenophthalmus</u>		X	X
<u>Trachinotus bailloni</u>	X	X	
Apogonidae		X	
<u>Rhabdamia cypselura</u>		X	
Kuhliidae		X	

TABLE 2. (continued)

Species	Nuku Hiva-day	Nuku Hiva-night	Rangiroa-night
<u>Kuhlia marginata</u>		X	
<u>Kuhlia</u> sp.		X	
Epinephilidae			X
Lutjanidae	X	X	
Mullidae		X	
<u>Upeneus vittatus</u>	X	X	X
Pempheridae		X	
Chaetodontidae	X	X	X
Pomacentridae			X
Siganidae		X	
<u>Zanclus canescens</u>	X	X	
Acanthuridae			X
Scorpaenidae	X		
Tetrodontidae	X		
Balistidae			X
<u>Pterocaesio</u> sp.		X	
<u>Pseudamia polystigma</u>			X
squid		X	
octopus		X	
crustacean	X	X	
alima (stomatopod larva)		X	
megalops (crab larva)		X	
shrimp			X
salp		X	

TABLE 3. Occurrences of Marquesan sardines in the Marquesas Islands recorded by the FWS surveys. The symbols are as follows: +, caught; 0, seen, but not caught; -, neither seen nor caught.

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Nuku Hiva												
Taiohae	+	+	+	+	+	+			+	+	+	+
Controleur	+	+	+	+	+	+			+			
Tai Oa	+	+	+	+	+	-						
Anaho	0	+	0	-								
Atiheu	-	+	+	-								
Hakaehu			0									
Marquisienne		-	-									
Hataivea				-								
Hiva Oa												
Vipihai (Taaoa)	+	-	0			+					+	
Hana Menu	-	-	-			+						
Pua Mau			0									
Hana Heku		-										
Hana Iapa			-									
Tahuata												
Hana Tetou	0	+	+	+							+	
Hana Hevane	0	+	0									
Vai Tahu	0		-	-							+	
Motopu	-			-								
Oehau	-											
Ua Huka												
Hananai	+	0	-	-								
Vaipae (Invisible)	+											
Vai Take		-										
Ua Pou												
Aneo (Hakanahi)	0		0								-	
Hate Au	-											
Hakahetau			-									
unspecified			0									
Fatu Hiva												
Omoa	0											

TABLE 4. Occurrences of Marquesan sardines in the Marquesas Islands recorded by the 1977-1980 surveys. The symbols are as follows: +, caught; 0, seen, but not caught; -, neither seen nor caught.

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Nuku Hiva												
Taiohae	+	+	+	+	+				+	+	+	+
Controleur	+	+	+	+	-				+	0		
Tai Oa	-	-	-	+	-				+	+		
Anaho	+	-	-		-					-	-	
Atiheu										-		
Aotupa				+								
Hataivea										-		
unspecified										-		
Hiva Oa												
Hanamenu	-		-									
Vipihai (Taaoa)	0		-							0		
unspecified	-											
Tahuata												
Vai Tahu	-											
Hapatoni										-		
unspecified	-		-							-		
Ua Huka												
Vaipae (Invisible)			-							+	+	
Hane		0	-							0		
Blanche			-									
Hatuana			-									
unspecified										-		
Ua Pou												
Aneo (Hakanahi)		-										
Vaiehu		-										
Hakahetau										-		
unspecified										-		
Fatu Hiva												
Vierges (Hanahave)			-							-		
Omoa										-		
Eiao												
Vaituha			-								-	

TABLE 5. Fishing effort, numbers of schools sighted, chummed, and fished, and bait and troll catches of skipjack and yellowfin in the Marquesas Islands.

Year	Month	Vessel	Days fished			Time fished				Schools			Catch (bait)			Catch (troll)			Fish per day (bait)
			Bait only	Troll	Total	Search- ing	Pursue- ing	Chum- ming	Total	Sight- ed	Chum- med	Fish- ed	SJ	YF	Total	SJ	YF	Total	
1956	Sep.	Charles H. Gilbert (30)	7	1	8				75:30	17	10	2	(345)	(0)	345	0	10	10	49.3
1957	Jan.	Charles H. Gilbert (32)	7	0	7				5:24		34		305	33	338	0	10	10	48.3
1957	Feb.	Charles H. Gilbert (32)	10	0	10				7:34		44		1,983	2	1,985	1	11	12	198.5
1957	Feb.	John R. Manning (34)	0	10	10											3	0	3	
1957	Mar.	Charles H. Gilbert (32)	8	1	9				5:43		21		2,313	0	2,313	1	2	3	289.1
1957	Oct.	Charles H. Gilbert (35)	8	4	12				2:37		23		205	5	210	0	16	16	26.2
1957	Nov.	Charles H. Gilbert (35)	9	1	10				3:57		20		1,275	6	1,281	0	4	4	142.3
1957	Dec.	Charles H. Gilbert (35)	0	1	1											0	3	3	
1958	Jan.	Hugh M. Smith (43)	10	2	12				5:27		31		708	1	709	0	9	9	70.9
1958	Feb.	Hugh M. Smith (43)	7	2	9				2:36		18		452	0	452	0	1	1	64.6
1958	Feb.	Charles H. Gilbert (38)	2	1	3				0:33		4		(108)	(0)	108	0	8	8	54.0
1958	Mar.	Charles H. Gilbert (38)	10	0	10				3:46		20		1,197	0	1,197	2	2	4	119.7
1958	Apr.	Charles H. Gilbert (38)	8	2	10				1:54		20		292	0	292	1	6	7	36.5
1958	May	Hugh M. Smith (45)	8	1	9				2:49		25		565	0	565	5	8	13	70.6
1958	Jun.	Hugh M. Smith (45)	4	3	7				0:58		7		223	0	223	0	2	2	55.8
1959	Jan.	Charles H. Gilbert (43)	0	1	1											0	0	0	
1959	Feb.	Charles H. Gilbert (43)	7	1	8				1:58		17		431	48	479	0	5	5	68.4
1959	Feb.	Cape Falcon	7	0	7				5:34		57		81	1,024	1,105	15	43	58	157.9
1959	Mar.	Charles H. Gilbert (43)	4	3	7				1:05		8		558	28	586	0	3	3	146.5
1959	Mar.	Cape Falcon	9	0	9				1:54		50		0	53	53	6	88	94	5.9
1960	Nov.	Charles H. Gilbert (50)	6	0	6														

TABLE 5. (continued)

Year	Month	Vessel	Days fished			Time fished				Schools			Catch (bait)			Catch (troll)			Fish per day (bait)
			Bait only	Troll	Total	Search- ing	Pursue- ing	Chum- ming	Total	Sight- ed	Chum- med	Fish- ed	SJ	YF	Total	SJ	YF	Total	
1977	Sep.	Tainui (5001)	2	0	2						2	2	163	7	170	0	0	0	85.0
1977	Oct.	Tainui (5001)	7	2	9						11	5	88	46	134	0	7	7	19.1
1977	Nov.	Tainui (5001)	5	2	7						10	4	121	0	121	0	30	30	24.2
1978	Feb.	Mary K. (5002)	5	0	5	34:55	0:59		35:54	10		1	32	0	32	10	11	21	6.4
1978	Mar.	Mary K. (5002)	9	0	9	62:07	3:47		65:54	11		2	67	285	352	9	36	45	39.1
1978	Apr.	Mary K. (5002)	3	0	3	33:15	0:45		34:00	3		1	1	4	5	2	6	8	1.7
1978	Dec.	Cornucopia (5003)	3	0	3	19:10	2:15		21:25	7	6	3	42	2	44	3	13	16	14.7
1979	Jan.	Cornucopia (5003)	16	0	16	77:34	12:02		89:36	40	34	13	651	9	660	23	32	55	41.2
1979	Jan.	Hatsutori Maru	7	0	7				64:30	58	36	21	1,651+		1,651+				235.9+
1979	Feb.	Cornucopia (5003)	4	13	17	119:17	5:53		125:10	62	8	6	114	0	114	103	87	190	28.5
1979	Mar.	Cornucopia (5003)	16	0	16	72:20	9:15		81:35	23	15	9	648	0	648	6	35	41	40.5
1979	Apr.	Cornucopia (5003)	21	0	21	96:06	8:19		104:25	34+	19	6	95	0	95	6	23	29	4.5
1979	May	Cornucopia (5003)	8	0	8	26:10	2:50		29:00	5	4	4	459	0	459	0	0	0	57.4
1979	Dec.	Hatsutori Maru No. 5 (5004)	9	0	9				71:00	76	73	49	9,761	211	9,972	43	5	48	1,108.0
1980	Jan.	Hatsutori Maru No. 5 (5004)	17	0	17				86:15	88	84	52	11,627	30	11,657	17	0	17	685.7

TABLE 6. Fishing effort, numbers of schools sighted, chummed, and fished, and bait and troll catches of skipjack and yellowfin in the Tuamotu Islands.

Year	Month	Vessel	Days fished			Time fished				Schools			Catch (bait)			Catch (troll)			Fish per day (bait)	
			Bait only	Troll	Total	Search- ing	Pursue- ing	Chum- ming	Total	Sight- ed	Chum- med	Fish- ed	SJ	YF	Total	SJ	YF	Total		
1957	Feb.	Charles H. Gilbert (32)	2	0	2			0:42			4			237	17	254	4	3	7	127.0
1957	Nov.	Charles H. Gilbert (35)	4	0	4			1:51			9			628	144	772	0	1	1	193.0
1958	Mar.	Charles H. Gilbert (38)	2	0	2			0:25			2			183	0	183	0	0	0	91.5
1959	Jan.	Charles H. Gilbert (43)	3	0	3			0:42			6			207	0	207	0	0	0	69.0
1959	Feb.	Charles H. Gilbert (43)	3	0	3			0:30			5			234	4	238	0	0	0	79.3
1959	Feb.	Cape Falcon	4	1	5			0:16			6			0	0	0	3	5	8	0.0
1959	Mar.	Cape Falcon	1	1	2			0:07			3			0	0	0	3	0	3	0.0
1977	Sep.	Tainui (5001)	0	3	3						0	0		0	0	0	0	2	2	
1977	Nov.	Tainui (5001)	3	0	3						5	0		0	0	0	0	0	0	0.0
1978	Mar.	Mary K. (5002)	3	0	3	26:00	5:00	31:00	8		3			230	67	297	4	5	9	99.0
1978	Apr.	Mary K. (5002)	2	0	2	15:35	0:55	16:30	4		1			54	0	54	3	0	3	27.0
1978	Dec.	Hatsutori Maru	8	0	8			78:30	66	33	24			2,356+	62+	2,418+				302.2+
1979	Jan.	Hatsutori Maru	12	0	12			99:30	65	30	22			2,163+	32+	2,195+				182.9+
1980	Feb.	Hatsutori Maru No. 5 (5004)	7	0	7			63:30	32	30	15			1,022	847	1,869	2	3	5	233.6

TABLE 7. Fishing effort, numbers of schools sighted, chummed, and fished, and bait and troll catches of skipjack and yellowfin in the Society Islands.

Year	Month	Vessel	Days fished			Time fished				Schools			Catch (bait)			Catch (troll)			Fish per day (bait)
			Bait only	Troll	Total	Search- ing	Pursue- ing	Chum- ming	Total	Sight- ed	Chum- med	Fish- ed	SJ	YF	Total	SJ	YF	Total	
1978	Mar.	Mary K. (5002)	3	0	3	21:30	1:00		22:30	4		0	0	0	3	2	5	0.0	
1978	Apr.	Mary K. (5002)	8	0	8	51:30	12:15		63:45	23		7	440	263	703	1	4	5	87.9
1978	Dec.	Hatsutori Maru	14	0	14				118:00	85	44	10	828+		828+				59.1+
1979	Jan.	Hatsutori Maru	6	0	6				32:30	18	14	6	894+	4+	898+				149.7+
1979	Feb.	Hatsutori Maru	1	0	1				12:00	10	0	0	0	0	0				0.0
1980	Feb.	Hatsutori Maru No. 5 (5004)	2	0	2				24:00	5	2	1	1	41	42	0	0	0	21.0



TABLE 8. Fishing effort, numbers of schools sighted, chummed, and fished, and bait and troll catches of skipjack and yellowfin in the Pitcairn Islands.

Year	Month	Vessel	Days fished			Time fished				Schools			Catch (bait)			Catch (troll)			Fish per day (bait)
			Bait only	Troll	Total	Search- ing	Pursue- ing	Chum- ming	Total	Sight- ed	Chum- med	Fish- ed	SJ	YF	Total	SJ	YF	Total	
1980	Feb.	Hatsutori Maru No. 5 (5004)	2	0	2				20:30	14	14	6	70	402	472	0	4	4	236.0

TABLE 9. Fishing effort, numbers of schools sighted, chummed, and fished, and bait and troll catches of skipjack and yellowfin in the Gambier Islands.

Year	Month	Vessel	Days fished			Time fished				Schools			Catch (bait)			Catch (troll)			Fish per day (bait)
			Bait only	Troll	Total	Search- ing	Pursue- ing	Chum- ming	Total	Sight- ed	Chum- med	Fish- ed	SJ	YF	Total	SJ	YF	Total	
1980	Feb.	Hatsutori Maru No. 5 (5004)	1	0	1				6:30	5	2	0	0	0	0	0	0	0	0.0

TABLE 10. Time fished, numbers and sizes of schools sighted, and schools sighted per hour of fishing in the Marquesas Islands. The letters indicate the following: S, small schools (less than 11 metric tons or 12 short tons); M, medium schools (11 to 30 metric tons or 12 to 33 short tons); L, large schools (more than 30 metric tons or 33 short tons); Unk., schools of unknown size.

Year	Month	Vessel	Time fished	Skipjack				Yellowfin				Mixed				Unidentified				Total	Schools per hour		
				S	M	L	Unk.	S	M	L	Unk.	S	M	L	Unk.	S	M	L	Unk.				
1956	Sep.	Charles H. Gilbert (30)																	17	17			
1960	Nov.	Charles H. Gilbert (50)																	35	35			
1978	Feb.	Mary K. (5002)	35:54				4												4	2	10	0.28	
1978	Mar.	Mary K. (5002)	65:54				5												5	1	11	0.17	
1978	Apr.	Mary K. (5002)	34:00																3		3	0.09	
1978	Dec.	Cornucopia (5003)	21:25	3					2					1							1	7	0.33
1979	Jan.	Cornucopia (5003)	89:36	19					7	1	4	2		3	3					1		40	0.45
1979	Jan.	Hatsutori Maru	64:30				28					2							4		24	0.90	
1979	Feb.	Cornucopia (5003)	125:10	22	6	3	1		9	4	1	6		6	2					2		62	0.50
1979	Mar.	Cornucopia (5003)	81:35	7	1	2			3	3	1	1		2	1	1				1		23	0.28
1979	Apr.	Cornucopia (5003)	104:25	6	4				14	7	24									1		34+	0.33+
1979	May	Cornucopia (5003)	29:00	1	3				1													5	0.17
1979	Dec.	Hatsutori Maru No. 5 (5004)	71:00	15	31	11			1					5	7					3	2	75	1.06
1980	Jan.	Hatsutori Maru No. 5 (5004)	86:15	33	28	18			1	1				4		1				2		88	1.02

TABLE 11. Time fished, numbers and sizes of schools sighted, and schools sighted per hour of fishing in the Tuamotu Islands. The letters indicate the following: S, small schools (less than 11 metric tons or 12 short tons); M, medium schools (11 to 30 metric tons or 12 to 33 short tons); L, large schools (more than 30 metric tons or 33 short tons); Unk., schools of unknown size.

Year	Month	Vessel	Time fished	Skipjack				Yellowfin				Mixed				Unidentified				Total	Schools per hour			
				S	M	L	Unk.	S	M	L	Unk.	S	M	L	Unk.	S	M	L	Unk.					
1978	Mar.	Mary K. (5002)	31:00				3													8	0.26			
1978	Apr.	Mary K. (5002)	16:30				3													4	0.24			
1978	Dec.	Hatsutori Maru	78:30				25				1									35	0.84			
1979	Jan.	Hatsutori Maru	99:30				18				1									41	0.65			
1980	Feb.	Hatsutori Maru No. 5 (5004)	63:30	4	3				5					5					1	5	7	2	32	0.50

TABLE 12. Time fished, numbers and sizes of schools sighted, and schools sighted per hour of fishing in the Society Islands. The letters indicate the following: S, small schools (less than 11 metric tons or 12 short tons); M, medium schools (11 to 30 metric tons or 12 to 33 short tons); L, large schools (more than 30 metric tons or 33 short tons); Unk., schools of unknown size.

Year	Month	Vessel	Time fished	Skipjack				Yellowfin				Mixed				Unidentified				Total	Schools per hour	
				S	M	L	Unk.	S	M	L	Unk.	S	M	L	Unk.	S	M	L	Unk.			
1978	Mar.	Mary K. (5002)	22:30				3				1									4	0.18	
1978	Apr.	Mary K. (5002)	63:45				6				2				15					23	0.36	
1978	Dec.	Hatsutori Maru	118:00				18				2				2				63	85	0.72	
1979	Jan.	Hatsutori Maru	32:30				7								2				9	18	0.55	
1979	Feb.	Hatsutori Maru	12:00																10	10	0.83	
1980	Feb.	Hatsutori Maru No. 5 (5004)	24:00							1				1					2	1	5	0.21

TABLE 13. Time fished, numbers and sizes of schools sighted, and schools sighted per hour of fishing in the Pitcairn Islands. The letters indicate the following: S, small schools (less than 11 metric tons or 12 short tons); M, medium schools (11 to 30 metric tons or 12 to 33 short tons); L, large schools (more than 30 metric tons or 33 short tons); Unk., schools of unknown size.

Year	Month	Vessel	Time Fished	Skipjack				Yellowfin				Mixed				Unidentified				Total	Schools per hour	
				S	M	L	Unk.	S	M	L	Unk.	S	M	L	Unk.	S	M	L	Unk.			
1980	Feb.	Hatsutori Maru No. 5 (5004)	20:30					1	1					3	2				5	2	14	0.68

TABLE 14. Results obtained by the chartered vessels of the SPC. The numbers in the last column are explained in the text.

Area	Years	Months	Hours	Schools sighted					Schools chummed	Schools fished	Fish tagged		Schools sighted per hour	Fish tagged per hour	Reference
				SJ	YF	SJ+YF	Others	Total			SJ	YF			
Papua New Guinea	1977	Oct.	191.5	37	56	7	20	120	61	26	1,117	21	0.63	5.9	1
Papua New Guinea	1979	May-Jul.	407.5	63	27	40	199	329	206	91	7,683	784	0.81	20.8	18
Solomon Islands	1977	Nov.-Dec.	262.0	39	23	16	41	119	71	22	2,225	118	0.45	8.9	2
New Caledonia	1977-1978	Dec.-Jan.	222.5	103	4	6	48	161	129	64	10,212	60	0.72	46.2	3
New Hebrides	1977	Dec.	20.5	5	0	2	6	13	3	1	51	0	0.63	2.5	4
New Hebrides	1978	Jan.	35.5	12	0	2	6	20	15	11	1,205	245	0.56	40.8	4
Fiji	1978	Jan.-Feb.	160.5	27	14	15	91	145	63	33	4,340	510	0.90	30.2	5
Fiji	1978	Mar.-Apr.	55.0	21	1	9	8	39	37	17	4,157	330	0.71	81.6	5
Kingdom of Tonga	1978	Apr.-May	104.0	15	0	8	28	51	40	20	1,408	260	0.49	16.0	6
Wallis and Futuna Islands	1978	May	131.0	49	1	3	61	114	70	49	13,534	239	0.87	105.1	7
Western Samoa	1978	Jun.	45.0	17	1	2	77	97	10	6	1,768	78	2.16	41.0	8
American Samoa	1978	May-Jun.	59.0	11	0	0	48	59	18	3	74	0	1.00	1.3	9
Tuvalu	1978	Jun.-Jul.	112.0	43	1	1	68	119	62	27	2,573	166	1.06	24.5	10
Kiribati	1978	Jul.	94.0	45	3	3	66	117	59	33	4,380	44	1.24	47.1	11
Kiribati	1979	Nov.-Dec.	101.0	22	2	3	77	104	23	13	518	24	1.03	5.4	20
Trust Territories	1978	Jul.-Aug.	155.0	7	1	4	52	64	43	10	1,268	6	0.41	8.2	12
Trust Territories	1979	Nov.	176.0	15	4	5	74	98	69	21	1,659	806	0.56	14.0	19
Trust Terr. and Guam	1978	Oct.-Nov.	265.0	14	8	8	91	121	89	22	2,447	73	0.46	9.5	12
Tokelau	1978	Nov.	56.5	2	0	1	114	117	7	3	65	0	2.07	1.2	13
Cook Islands	1978	Nov.-Dec.	95.0	20	0	2	102	124	36	13	1,226	0	1.31	12.9	15

TABLE 14. (continued)

Area	Years	Months	Hours	Schools sighted					Schools chummed	Schools fished	Fish tagged		Schools sighted per hour	Fish tagged per hour	Reference
				SJ	YF	SJ+YF	Others	Total			SJ	YF			
Cook Islands	1979	Feb.	39.5	3	0	1	3	7	4	2	9	0	0.18	0.2	15
New Zealand	1979	Feb.-Mar.	288.5	91	0	0	81	172	108	46	11,614	0	0.60	40.3	16
Australia	1979	Apr.-May	309.2	108	6	16	54	184	164	75	6,969	65	0.60	22.7	17
Marquesas Islands	1979	Jan.	64.5	27	2	4	25	58	36	21	1,651	0	0.90	25.6	14
Marquesas Islands	1979-1980	Dec.-Jan.	157.2	136	3	15	9	163	157	101	18,623	189	1.04	119.7	21
Tuamotu Islands	1978-1979	Dec.-Jan.	178.0	43	2	6	80	131	63	46	4,519	94	0.74	25.9	14
Tuamotu Islands	1980	Jan.-Feb.	105.8	15	5	6	63	89	30	15	816	653	0.84	13.9	21
Society Islands	1978-1979	Dec.-Feb.	162.5	25	2	2	84	113	58	16	1,722	4	0.70	10.6	14
Society Islands	1979-1980	Dec.-Feb.	33.0	1	1	1	14	17	2	1	1	33	0.52	1.0	21
Pitcairn Islands	1980	Feb.	20.5	0	2	4	8	14	14	6	59	290	0.68	17.0	22
Gambier Islands	1980	Feb.	6.5	0	0	0	5	5	2	0	0	0	0.77	0.0	21
Nieu	1980	Feb.-Mar	17.5	3	2	1	13	19	5	2	91	31	1.08	7.0	23
Norfolk Island	1980	Mar.	44.0	3	1	2	8	14	12	6	1,113	254	0.32	31.1	24
Nauru	1980	Jul.	34.0	3	1	0	39	43	-	-	-	-	1.26	-	25



TABLE 16. Numbers of fish tagged in the Marquesas, Tuamotu, Society, Pitcairn, and Gambier islands during 1977-1980. BE stands for bigeye and FT stands for frigate tuna.

	5001		5002		5003		SPC 1978-1979		5004				Total			
	SJ	YF	SJ	YF	SJ	YF	SJ	YF	SJ	YF	BE	FT	SJ	YF	BE	FT
Marquesas Islands	303	47	106	276	1,874	72	1,651	0	18,391	189	1	1	22,325	584	1	1
Marquesas-Tuamotus	57	0	4	5	0	0	256	0	232	0	0	0	549	5	0	0
Tuamotu Islands	0	0	231	70	0	0	4,519	94	816	653	0	0	5,566	817	0	0
Tuamotus-Societies	0	0	235	2	0	0	0	0	0	0	0	0	235	2	0	0
Society Islands	0	0	421	258	0	0	1,722	4	1	33	0	0	2,144	295	0	0
Pitcairn Islands	0	0	0	0	0	0	0	0	59	290	0	0	59	290	0	0
Pitcairns-Gambiers	0	0	0	0	0	0	0	0	175	300	34	0	175	300	34	0
Gambier Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	360	47	997	611	1,874	72	8,148	98	19,674	1,465	35	1	31,053	2,293	35	1



APPENDIX TABLE 1. List of vessel captains, scientific personnel, and observers for the 1977-1980 cruises.

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Cruise 5001 ( <u>Tainui</u> )	
Captain - Alain Pacaud	
Scientific personnel and observers	
Craig J. Orange (IATTC)	Sep. 19-Nov. 26, 1977
Bernard R. Smith (DPI)	Sep. 19-Oct. 3, 1977
Louis Marec (ORSTOM)	Oct. 3-24, 1977
Yves Brosse (SPPF)	Oct. 24-Nov. 7, 1977
Cruise 5002 ( <u>Mary K.</u> )	
Captain - Ted A. Dunn	
Scientific personnel and observers	
Craig J. Orange (IATTC)	Jan. 22-Mar. 14, 1978
Vaughn M. Silva (IATTC)	Jan. 16-May 13, 1978
Alain Pacaud (CNEXO)	Feb. 23-Mar. 19, 1978; Mar. 25-Apr. 12, 1978
Raymond Rereao (SPPF)	Mar. 19-24, 1978; Apr. 14-18, 1978
Michel Lafitte (CNEXO)	Apr. 14-18, 1978
Cruise 5003 ( <u>Cornucopia</u> )	
Captain - Roger W. Davies	
Fishing Captain - Walter H. Paulo	
Scientific personnel and observers	
William H. Bayliff (IATTC)	Dec. 7, 1978-Jan. 11, 1979
Gary A. Hunt (IATTC)	Dec. 7, 1978-May 23, 1979
Kurt M. Schaefer (IATTC)	Feb. 17-May 23, 1979
Pierre Garen (CNEXO)	Dec. 26, 1978-Jan. 8, 1979
Cruise 5004 ( <u>Hatsutori Maru No. 5</u> )	
Captain - Mitsutoyo Kaneda	
Scientific personnel and observers	
James Joseph (IATTC)	Jan. 18-24, 1980
William H. Bayliff (IATTC)	Dec. 19, 1979-Feb. 15, 1980
Terry J. Foreman (IATTC)	Dec. 19, 1979-Feb. 15, 1980
Robert E. Kearney (SPC)	Jan. 18-24, 1980
Charles Ellway (SPC)	Dec. 13-14, 1979
Robert D. Gillett (SPC)	Dec. 14, 1979-Feb. 15, 1980
Jean-Pierre Hallier (SPC)	Dec. 13-14, 1979; Feb. 15-17, 1980
James N. Ianelli (SPC)	Dec. 13, 1979-Feb. 17, 1980
Pierre M. Kleiber (SPC)	Dec. 15, 1979-Jan. 24, 1980
A. W. Argue (SPC)	Jan. 28, 1980-Feb. 17, 1980
Pierre Buttin (SER)	Jan. 28, 1980-Feb. 15, 1980
Bruno Ugolini (SPPF)	Jan. 28, 1980-Feb. 15, 1980

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APPENDIX TABLE 2. Summary of bait fishing activities during cruise 5001. The first line for each date indicates fishing with the bait net between mid-night and sunrise, the last line indicates fishing with the bait net between sunset and midnight, and the middle lines indicate fishing with the beach seine during the daytime. The catches are given in buckets (about 1 kg or 2.2 pounds per bucket). The abbreviations for the species are as follows: MS, Marquesan sardine; K, ka'oa.

Date	Bay	Island	Day		Night	
			Sets	Catch	Sets	Catch
Sep. 28	Taiohae	Nuku Hiva	3	20 MS		
29	Tai Oa	Nuku Hiva	2	15 MS		
	Controleur	Nuku Hiva			0	0
30	Controleur	Nuku Hiva			0	0
	Controleur	Nuku Hiva	2	5 MS		
	Taiohae	Nuku Hiva			0	0
Oct. 1	Taiohae	Nuku Hiva	3	25 MS		
	Anaho	Nuku Hiva			0	0
2	Anaho	Nuku Hiva	0	0		
	Atiheu	Nuku Hiva	0	0		
	Atiheu	Nuku Hiva			0	0
3	Hane	Ua Huka		0		
	Vaipae	Ua Huka	1	35 MS		
4	Taiohae	Nuku Hiva			0	0
	Taiohae	Nuku Hiva			0	0
5	Taiohae	Nuku Hiva	3	9 MS		
	Hakahetau	Ua Pou			0	0
6	Hakahetau	Ua Pou			0	0
	Hakahetau	Ua Pou	0	0		
	Vipihai	Hiva Oa			0	0
7	Vipihai	Hiva Oa			0	0
	Vipihai	Hiva Oa	0	0		
	Hapatoni	Tahuata			0	0
8	Vierges	Fatu Hiva	0	0		
	Omoa	Fatu Hiva	0	0		
9	Tai Oa	Nuku Hiva	1	1 MS		
	Controleur	Nuku Hiva	0	0		
	Controleur	Nuku Hiva			0	0

APPENDIX TABLE 2. (continued)

Date	Bay	Island	Day		Night	
			Sets	Catch	Sets	Catch
Oct. 10	Controleur	Nuku Hiva			0	0
	Controleur	Nuku Hiva	1	0		
	Taiohae	Nuku Hiva	2	8 MS		
11	Taiohae	Nuku Hiva	1	25 MS		
21	Taiohae	Nuku Hiva	2	18 MS		
22	Vaipae	Ua Huka	1	1 MS		
23	various	Ua Huka	0	0		
	Vaipae	Ua Huka	0	0		
24	Vaipae	Ua Huka	0	0		
	Taiohae	Nuku Hiva			0	0
25	Taiohae	Nuku Hiva			0	0
	Taiohae	Nuku Hiva	2	30 MS		
27	Tai Oa	Nuku Hiva	0	0		
	various	Nuku Hiva	0	0		
	Anaho	Nuku Hiva			0	0
28	Anaho	Nuku Hiva			0	0
	Anaho	Nuku Hiva	0	0		
	Hataivea	Nuku Hiva	0	0		
	Controleur	Nuku Hiva	0	0		
	Controleur	Nuku Hiva			0	0
29	Controleur	Nuku Hiva	0	0		
31	Taiohae	Nuku Hiva	3	44 MS		
	Taiohae	Nuku Hiva			0	0
Nov. 1	Vaituha	Eiao			0	0
2	Taiohae	Nuku Hiva			0	0
	Taiohae	Nuku Hiva			0	0
3	Taiohae	Nuku Hiva	0	0		

APPENDIX TABLE 2. (continued)

Date	Bay	Island	Day		Night	
			Sets	Catch	Sets	Catch
Nov. 4	Taiohae	Nuku Hiva	0	0		
	Anaho	Nuku Hiva	0	0		
	Anaho	Nuku Hiva			0	0
7	Vaipae	Ua Huka	2	8 MS		
	Taiohae	Nuku Hiva			0	0
8	Taiohae	Nuku Hiva			0	0
	Taiohae	Nuku Hiva	3	11 MS+4 K		
9	Tai Oa	Nuku Hiva	0	0		
10	Taiohae	Nuku Hiva	0	0		
Total	Taiohae	Nuku Hiva	22	190 MS+4 K	0	0
Total	other	Nuku Hiva	6	21 MS	0	0
Total		other	4	44 MS	0	0
Total		Marquesas Is.	32	255 MS+4 K	0	0

APPENDIX TABLE 3. Summary of bait fishing activities during Cruise 5002. The first line for each date indicates fishing with the bait net between midnight and sunrise, the last line indicates fishing with the bait net between sunset and midnight, and the middle lines indicate fishing with the beach seine during the daytime. The catches are given in scoops (about 8 pounds or 3.6 kg per scoop). The abbreviations for the species are as follows: MS, Marquesan sardine; K, ka'oa; M, mullet; V, ouma; BF, bonefish; N, nape; MF, milkfish.

Date	Location	Island	Day		Night	
			Sets	Catch	Sets	Catch
Feb. 22	Taiohae	Nuku Hiva			0	0
	Taiohae	Nuku Hiva			0	0
23	Tai Oa	Nuku Hiva			0	0
	Tai Oa	Nuku Hiva			0	0
24	Taiohae	Nuku Hiva	0	0		
25	Controleur	Nuku Hiva	1	0		
	Controleur	Nuku Hiva			0	0
	Controleur	Nuku Hiva			0	0
26	Controleur	Nuku Hiva	0	0		
	Taiohae	Nuku Hiva			0	0
	Taiohae	Nuku Hiva			0	0
27	Taiohae	Nuku Hiva	3	18 MS		
	Anaho	Nuku Hiva	0	0		
	Anaho	Nuku Hiva			1	1
	Anaho	Nuku Hiva			0	0
Mar. 1						
	Anaho	Nuku Hiva			0	0
2	Taiohae	Nuku Hiva	4	16 MS+3 K		
	Taiohae	Nuku Hiva			0	0
	Taiohae	Nuku Hiva			0	0
3	Vaipae	Ua Huka	1	0		
	Blanche	Ua Huka	0	0		
	Hatuana	Ua Huka	0	0		
	Hane	Ua Huka	0	0		
	Hanamenu	Hiva Oa			0	0
	Hanamenu	Hiva Oa			0	0
4	Hanamenu	Hiva Oa	1	2 M		
	various	Tahuata	0	0		
	Vipihai	Hiva Oa			0	0
	Vipihai	Hiva Oa			0	0
5	Vierges	Fatu Hiva			0	0
	Vierges	Fatu Hiva			0	0
6	Vierges	Fatu Hiva	0	0		
	Vierges	Fatu Hiva			0	0

APPENDIX TABLE 3. (continued)

Date	Location	Island	Day		Night	
			Sets	Catch	Sets	Catch
Mar. 7	Vierges	Nuku Hiva			0	0
	Taiohae	Nuku Hiva			0	0
8	Taiohae	Nuku Hiva	10	41 MS+10 K	1	0
	Taiohae	Nuku Hiva			0	0
	Taiohae	Nuku Hiva			0	0
9	Taiohae	Nuku Hiva	3	3 MS	0	0
	Taiohae	Nuku Hiva			0	0
	Taiohae	Nuku Hiva			0	0
10	Vaituha	Eiao			0	0
	Vaituha	Eiao			0	0
12	Anaho	Nuku Hiva			0	0
	Controleur	Nuku Hiva	2	1 MS		
	Taiohae	Nuku Hiva			1	24 P
13	Taiohae	Nuku Hiva	5	12 MS+5 K		
14	Vaipae	Ua Huka	2	0		
	Taiohae	Nuku Hiva			0	0
15	Taiohae	Nuku Hiva			0	0
	Taiohae	Nuku Hiva	6	5 MS+2 K		
21	Pariete	Rangiroa			0	0
	Pariete	Rangiroa			0	0
26	Vaitape	Bora Bora			0	0
	Vaitape	Bora Bora			0	0
27	Paorie	Bora Bora	4	1 V+4 BF		
	Vaitape	Bora Bora			0	0
28	Vaitape	Bora Bora			0	0
	Vaitape	Bora Bora			0	0
	Vaitape	Bora Bora			0	0
29	Paorie	Bora Bora	2	0		
	Vaitape	Bora Bora	0	0		
	Vaitape	Bora Bora			0	0
30	Vaitape	Bora Bora			0	0
	channel	Maupiti	12	4 M		
	channel	Maupiti			0	0

APPENDIX TABLE 3. (continued)

Date	Location	Island	Day		Night		
			Sets	Catch	Sets	Catch	
Mar. 31	channel	Maupiti			0	0	
	channel	Maupiti	6	8 N			
	Apu	Tahaa			0	0	
Apr. 1	Apu	Tahaa			1	6 SS	
	Rauoro	Tahaa	5	24 V+9 M			
	Haamene	Tahaa			0	0	
	Haamene	Tahaa			1	5 SS	
	2	Paorie	Bora Bora			0	0
3	Paorie	Bora Bora			0	0	
	various	Bora Bora	4	44 V+8 M*			
	Vaitape	Bora Bora			0	0	
	Vaitape	Bora Bora			0	0	
4	Vaitape	Bora Bora			0	0	
	Vaitape	Bora Bora			0	0	
5	Uturoa	Raiatea			0	0	
	Uturoa	Raiatea			0	0	
	various	Tahaa	6	13 V+2 N*			
6	Tuatau Is.	Tahaa	2	0			
	Hurepiti	Tahaa			0	0	
	Hurepiti	Tahaa			0	0	
	7	Vaitape	Bora Bora			0	0
	Vaitape	Bora Bora			0	0	
8	various	Bora Bora	5	2 MF+2 M+12 V**			
	Vaitape	Bora Bora			0	0	
	Vaitape	Bora Bora			0	0	
9	Vaitape	Bora Bora			0	0	
	Vaitape	Bora Bora			0	0	
10	Fare	Huahine			0	0	
	Fare	Huahine			0	0	
11							
15	various	Tahaa	6	4 V+2 M			
	Faaha	Tahaa			0	0	
	Faaha	Tahaa			0	0	
16							
17	Avatoru	Rangiroa			0	0	
	Avatoru	Rangiroa			0	0	
18							

APPENDIX TABLE 3. (continued)

Date	Location	Island	Day		Night	
			Sets	Catch	Sets	Catch
Apr. 22	Taiohae	Nuku Hiva			0	0
	Taiohae	Nuku Hiva			0	0
23	Taiohae	Nuku Hiva			0	0
	Taiohae	Nuku Hiva			0	0
24	Taiohae	Nuku Hiva			0	0
	Taiohae	Nuku Hiva			0	0
25	Taiohae	Nuku Hiva	2	35 MS+5 K		
	Taiohae	Nuku Hiva			0	0
26	Taiohae	Nuku Hiva	2	5 MS	0	0
	Taiohae	Nuku Hiva				
Total	Taiohae	Nuku Hiva	35	135 MS+25 K	2	24 P
Total	other	Nuku Hiva	3	1 MS	1	0
Total		other	4	2 M	0	0
Total		Marquesas Is.	42	136 MS+25 K+2 M	3	24P
Total		Society Is.	52	98 V+4 BF+27 M +8 N+2 MF	2	11 SS

\* used Mary K.'s and Tainui's nets together

\*\* used Tainui's net



APPENDIX TABLE 4. Summary of bait fishing activities during Cruise 5003. The first line for each date indicates fishing with the bait net between midnight and sunrise, the last line indicates fishing with the bait net between sunset and midnight, and the middle lines indicate fishing with the beach seine during the daytime. The catches are given in buckets (about 8 pounds or 3.6 kg per bucket). The abbreviations for the species are as follows: MS, Marquesan sardine; M, mullet; S, scad.

Date	Bay	Island	Day		Night	
			Sets	Catch	Sets	Catch
Jan. 3	Taiohae	Nuku Hiva			0	0
	Taiohae	Nuku Hiva			0	0
4	Taiohae	Nuku Hiva	4	13.5 MS		
10	Taiohae	Nuku Hiva	3	16 MS		
11	Taiohae	Nuku Hiva	4	27 MS		
15	Taiohae	Nuku Hiva	5	25 MS		
16	Taiohae	Nuku Hiva	3	15.5 MS		
17	Taiohae	Nuku Hiva	2	0.5 MS		
	Taiohae	Nuku Hiva			0	0
18	Controleur	Nuku Hiva	1	0		
	Controleur	Nuku Hiva			1	3.5 MS+1.5 S
	Controleur	Nuku Hiva			1	0
19	Controleur	Nuku Hiva	2	26 MS		
20	Controleur	Nuku Hiva	3	11 MS		
21	Controleur	Nuku Hiva	1	70 MS		
24	Tai Oa	Nuku Hiva	1	0		
	Controleur	Nuku Hiva	1	21 MS		
25	Taiohae	Nuku Hiva	5	10 MS		

APPENDIX TABLE 4. (continued)

Date	Bay	Island	Day			Night	
			Sets	Catch		Sets	Catch
Jan. 26	Controleur	Nuku Hiva				0	0
	Controleur	Nuku Hiva				1	0
27	Controleur	Nuku Hiva	0	0			
	Anaho	Nuku Hiva	0	0			
	Taiohae	Nuku Hiva				0	0
28	Taiohae	Nuku Hiva	4	20	MS		
	Taiohae	Nuku Hiva				0	0
	Taiohae	Nuku Hiva				0	0
29	Controleur	Nuku Hiva	2	10	MS		
Feb. 1	Tai Oa	Nuku Hiva	0	0			
	Taiohae	Nuku Hiva				0	0
2	Controleur	Nuku Hiva	4	7.5	MS+3 M		
8	Vaiehu	Ua Pou				0	0
	Vaiehu	Ua Pou				0	0
9	Aneo	Ua Pou	0	0			
11	Hane	Ua Huka	0	0			
23	Taiohae	Nuku Hiva	3	19	MS		
24	Taiohae	Nuku Hiva	1	0			
25	Taiohae	Nuku Hiva	4	10	MS		
26	Taiohae	Nuku Hiva	3	10	MS		
28	Taiohae	Nuku Hiva	4	8	MS		
Mar. 1	Taiohae	Nuku Hiva	0	0			
	Controleur	Nuku Hiva				0	0
	Controleur	Nuku Hiva				0	0
2	Controleur	Nuku Hiva	2	11	MS		
	Controleur	Nuku Hiva				0	0

APPENDIX TABLE 4. (continued)

Date	Bay	Island	Day			Night	
			Sets	Catch		Sets	Catch
Mar. 3	Controleur	Nuku Hiva				0	0
	Controleur	Nuku Hiva	0	0			
5	Taiohae	Nuku Hiva	3	10	MS		
7	Taiohae	Nuku Hiva	3	5.5	MS		
8	Controleur	Nuku Hiva	2	7	MS		
9	Controleur	Nuku Hiva	2	9	MS		
10	Taiohae	Nuku Hiva	2	0			
	Tai Oa	Nuku Hiva	0	0			
13	Taiohae	Nuku Hiva	1	20	MS		
14	Taiohae	Nuku Hiva	1	1.5	MS		
15	Taiohae	Nuku Hiva	3	8	MS		
16	Taiohae	Nuku Hiva	0	0			
17	Taiohae	Nuku Hiva	2	8	MS		
18	Taiohae	Nuku Hiva	1	15	MS		
21	Taiohae	Nuku Hiva	0	0			
	Controleur	Nuku Hiva	0	0			
22	Taiohae	Nuku Hiva	0	0			
	Controleur	Nuku Hiva	1	0			
23	Taiohae	Nuku Hiva	1	1	MS		

APPENDIX TABLE 4. (continued)

Date	Bay	Island	Day			Night	
			Sets	Catch		Sets	Catch
Mar. 24	Taiohae	Nuku Hiva	0	1	MS		
25	Taiohae	Nuku Hiva	1	3	MS		
27	Taiohae	Nuku Hiva	2	15	MS		
	Taiohae	Nuku Hiva				0	0
	Taiohae	Nuku Hiva				0	0
28	Taiohae	Nuku Hiva	2	11	MS		
	Taiohae	Nuku Hiva				0	0
	Taiohae	Nuku Hiva				0	0
29	Taiohae	Nuku Hiva	2	4	MS		
30	Taiohae	Nuku Hiva	1	8	MS		
Apr. 1	Taiohae	Nuku Hiva	2	15	MS		
4	Taiohae	Nuku Hiva	1	3	MS		
5	Controleur	Nuku Hiva	0	0			
6	Taiohae	Nuku Hiva	1	2	MS		
7	Taiohae	Nuku Hiva	1	2	MS		
	Controleur	Nuku Hiva	1	0.5	MS		
8	Taiohae	Nuku Hiva	0	0			
	Controleur	Nuku Hiva	0	0			
9	Taiohae	Nuku Hiva	0	0			
10	Taiohae	Nuku Hiva	3	20	MS		
11	Taiohae	Nuku Hiva	2	8	MS		
12	Taiohae	Nuku Hiva	3	6.5	MS		

APPENDIX TABLE 4. (continued)

Date	Bay	Island	Day		Night	
			Sets	Catch	Sets	Catch
Apr. 13	Taiohae	Nuku Hiva	1	0		
14	Taiohae	Nuku Hiva	4	6.5	MS	
15	Taiohae	Nuku Hiva	1	2	MS	
	Aotupa	Nuku Hiva	1	5	MS	
16	Taiohae	Nuku Hiva	0	0		
17	Taiohae	Nuku Hiva	1	8	MS	
18	Taiohae	Nuku Hiva	4	3	MS	
19	Taiohae	Nuku Hiva	1	0		
	Controleur	Nuku Hiva	0	0		
20	Taiohae	Nuku Hiva	3	10	MS	
21	Taiohae	Nuku Hiva	2	7.5	MS	
22	Taiohae	Nuku Hiva	0	0		
	Tai Oa	Nuku Hiva	1	12	MS	
23	Taiohae	Nuku Hiva	2	1	MS	
24	Taiohae	Nuku Hiva	3	8	MS	
25	Taiohae	Nuku Hiva	5	10	MS	
26	Taiohae	Nuku Hiva	1	1	MS	
27	Taiohae	Nuku Hiva	0	0		
	Tai Oa	Nuku Hiva	0	0		

APPENDIX TABLE 4. (continued)

Date	Bay	Island	Day		Night	
			Sets	Catch	Sets	Catch
Apr. 28	Taiohae	Nuku Hiva	4	7.5 MS		
29	Taiohae	Nuku Hiva	2	2 MS		
30	Taiohae	Nuku Hiva	1	2 MS		
	Controleur	Nuku Hiva	1	1 MS		
May 1	Taiohae	Nuku Hiva	1	0		
2	Taiohae	Nuku Hiva	5	6 MS+0.5 other		
3	Taiohae	Nuku Hiva	0	0		
	Tai Oa	Nuku Hiva	0	0		
4	Taiohae	Nuku Hiva	3	8 MS		
5	Taiohae	Nuku Hiva	3	8 MS		
6	Taiohae	Nuku Hiva	0	0		
	Controleur	Nuku Hiva	0	0		
7	Taiohae	Nuku Hiva	0	0		
	Tai Oa	Nuku Hiva	0	0		
8	Taiohae	Nuku Hiva	0	0		
9	Taiohae	Nuku Hiva	0	0		
10	Taiohae	Nuku Hiva	1	0		
11	Taiohae	Nuku Hiva	3	6 MS		
12	Taiohae	Nuku Hiva	0	0		

APPENDIX TABLE 4. (continued)

Date	Bay	Island	Day			Night	
			Sets	Catch		Sets	Catch
May 13	Taiohae	Nuku Hiva	1	2	MS		
14	Taiohae	Nuku Hiva	0	0			
15	Taiohae	Nuku Hiva	0	0			
16	Taiohae Anaho	Nuku Hiva Nuku Hiva	0 0	0 0			
17	Taiohae	Nuku Hiva	1	2	MS		
18	Taiohae	Nuku Hiva	0	0			
19	Taiohae	Nuku Hiva	0	0			
20	Taiohae	Nuku Hiva	0	0			
Total	Taiohae	Nuku Hiva	136	442.5	MS+3 M+ 0.5 other	0	0
Total	other	Nuku Hiva	26	191.5	MS	3	3.5 MS+1.5 S
Total		other	0	0		0	0
Total		Marquesas Is.	162	634	MS+3 M+ 0.5 other	3	3.5 MS+1.5 S

APPENDIX TABLE 5. Summary of bait fishing activities during Cruise 5004. The first line for each date indicates fishing with the bait net between midnight and sunrise, the last line indicates fishing with the bait net between sunset and midnight, and the middle lines indicate fishing with the beach seine during the daytime. The catches are given in buckets (about 1.5 kg or 3.3 pounds per bucket). The numbers in parentheses after the catches indicate the percentages, by number, of sardines (Marquesas Islands) or of sprats (Tuamotu and Society islands).

Date	Location	Island	Day		Night	
			Sets	Catch	Sets	Catch
Dec. 24	Taiohae	Nuku Hiva			0	0
	Taiohae	Nuku Hiva			1	537 (96)
25	Taiohae	Nuku Hiva			0	0
	Taiohae	Nuku Hiva			1	224 (100)
26	Taiohae	Nuku Hiva			0	0
	Taiohae	Nuku Hiva			1	23 (100)
27	Taiohae	Nuku Hiva			2	35 (98)
	Taiohae	Nuku Hiva			0	0
28	Taiohae	Nuku Hiva			1	0
	Taiohae	Nuku Hiva	4	58 (99)		
29	Taiohae	Nuku Hiva			1	18 (100)
	Taiohae	Nuku Hiva				
30	Taiohae	Nuku Hiva				
	Taiohae	Nuku Hiva	4	80 (93)		
Jan. 2	Vai Tahu	Tahuata	0	0		
	various	Tahuata	0	0		
	Vipihai	Hiva Oa	0	0		
	Hanamenu	Hiva Oa	0	0		
3	various	Ua Pou	0	0		
	Tai Oa	Nuku Hiva	0	0		
	Controleur	Nuku Hiva	0	0		
	Taiohae	Nuku Hiva	0	0		
	Taiohae	Nuku Hiva			1	22 (70)
4	Taiohae	Nuku Hiva	4	38 (94)		
	Controleur	Nuku Hiva			1	213 (92)



APPENDIX TABLE 5. (continued)

Date	Location	Island	Day		Night	
			Sets	Catch	Sets	Catch
Jan. 5	Controleur	Nuku Hiva			1	64 (99)
	Controleur	Nuku Hiva			1	163 (98)
6	Controleur	Nuku Hiva			1	1 (100)
	Controleur	Nuku Hiva			1	346 (100)
7	Controleur	Nuku Hiva			1	185 (99)
	Controleur	Nuku Hiva			1	57 (100)
8	Controleur	Nuku Hiva			1	53 (99)
	Controleur	Nuku Hiva			1	23 (100)
9	Taiohae	Nuku Hiva			1	230 (48)
	Taiohae	Nuku Hiva			1	0
10	Taiohae	Nuku Hiva	1	15 (95)		
	Controleur	Nuku Hiva			1	106 (99)
11	Controleur	Nuku Hiva			1	117 (99)
	Controleur	Nuku Hiva			1	146 (82)
12	Controleur	Nuku Hiva			1	56 (88)
	Controleur	Nuku Hiva			1	114 (74)
13	Controleur	Nuku Hiva			1	67 (56)
	Controleur	Nuku Hiva			1	32 (99)
14	Controleur	Nuku Hiva			1	32 (99)
	Taiohae	Nuku Hiva	4	86 (99)		
15	Taiohae	Nuku Hiva			1	65 (93)
	Controleur	Nuku Hiva			1	109 (91)
16	Controleur	Nuku Hiva			1	67 (99)
	Controleur	Nuku Hiva			1	158 (99)
17	Controleur	Nuku Hiva			1	35 (99)
	Controleur	Nuku Hiva			1	43 (99)
18	Controleur	Nuku Hiva	1	1 (100)		
	Controleur	Nuku Hiva			1	29 (90)
19	Controleur	Nuku Hiva			1	64 (38)
	Taiohae	Nuku Hiva	4	42 (88)		
20	Controleur	Nuku Hiva			1	8 (95)
	Controleur	Nuku Hiva			1	4 (95)
19	Taiohae	Nuku Hiva	4	36 (94)		
	Anaho	Nuku Hiva			1	61 (98)
20	Anaho	Nuku Hiva			1	47 (97)
	Anaho	Nuku Hiva			1	0

APPENDIX TABLE 5. (continued)

Date	Location	Island	Day		Night	
			Sets	Catch	Sets	Catch
Jan. 21	Anaho	Nuku Hiva			1	2 (90)
Feb. 3	various Bounty Bay	Oeno Pitcairn	0	0	0	0
	Bounty Bay	Pitcairn			0	0
4	Bounty Bay	Pitcairn			0	0
	Bounty Bay	Pitcairn			0	0
5						
6	various various	Gambier Gambier	0	0	0	0
	various	Gambier			0	0
7						
13	lagoon	Rangiroa			1	3 (98)
	lagoon	Rangiroa			1	40 (99)
14						
15	Port Phaeton	Tahiti			1	40 (0)
	Port Phaeton	Tahiti			1	92 (0)
16						
Total	Taiohae	Nuku Hiva	27	390 (95)	7	1,054 (86)
Total	Controleur	Nuku Hiva	1	1 (100)	27	2,357 (92)
Total	Anaho	Nuku Hiva			4	110 (97)
Total	other	Nuku Hiva	0	0		
Total		other	0	0		
Total		Marquesas Is.	28	391 (95)	38	3,521 (90)

APPENDIX TABLE 5. (continued)

Date	Location	Island	Day		Night	
			Sets	Catch	Sets	Catch
Total		Pitcairn Is.	0	0	0	0
Total		Gambier Is.	0	0	0	0
Total		Tuamotu Is.			2	43 (99)
Total		Society Is.			2	132 (0)

APPENDIX TABLE 6. Data for schools of fish chummed during Cruise 5001.

Date	Location	Sea-surface temperature		Yellowfin		Skipjack	
		C	F	Tagged	Total	Tagged	Total
Sep. 25	10°13'S-143°26'W	28.7	83.7	0	0	7	13
26	10°26' -141°27'	28.5	83.3	0	0	0	0
26	10°04' -141°17'	28.6	83.5	0	0	50	52
28	9°01' -140°04'	28.1	82.6	0	0	123	163
29	8°58' -140°08'	28.1	82.6	7	7	0	0
Oct. 1	9°00' -139°59'	28.2	82.8	37	43	15	15
4	8°57' -139°43'	28.0	82.4	3	3	1	1
5	9°05' -140°06'	28.4	83.1	0	0	0	0
5	9°07' -140°04'	28.1	82.6	0	0	0	0
5	9°13' -140°05'	28.0	82.4	0	0	0	0
8	10°25' -138°42'	28.0	82.4	0	0	0	0
11	8°59' -140°16'	28.1	82.6	0	0	6	6
11	8°52' -140°27'	28.1	82.6	0	0	2	2
21	8°55' -140°05'	28.0	82.4	0	0	0	0
21	9°01' -139°55'	27.8	82.0	0	0	0	0
26	8°51' -140°36'	28.2	82.8	0	0	49	64
Nov. 1	7°54' -139°48'	28.1	82.6	0	0	0	0
1	7°52' -140°06'	28.4	83.1	0	0	3	3
2	8°29' -140°21'	28.0	82.4	0	0	0	0
7	9°05' -139°42'	28.1	82.6	0	0	13	13
7	9°03' -139°44'	28.1	82.6	0	0	0	0
9	9°11' -140°08'	28.4	83.1	0	0	0	0
9	9°08' -140°05'	28.4	83.1	0	0	4	4
9	9°02' -140°05'	28.3	82.9	0	0	87	101
9	9°03' -140°01'	28.3	82.9	0	0		
11	9°28' -140°04'	28.6	83.5	0	0	0	0
13	14°01' -145°17'	29.5	85.1	0	0	0	0
13	13°57' -145°06'	29.5	85.1	0	0	0	0
13	14°21' -145°57'	29.5	85.1	0	0	0	0
15	14°53' -147°50'	29.5	85.1	0	0	0	0
15	15°00' -147°55'	29.5	85.1	0	0	0	0
Total				47	53	360	437

APPENDIX TABLE 7. Summary of troll fishing results during Cruise 5001. Rangiroa, Ahe, and Manihi are in the Tuamotu Islands. The scientific names of the fish are listed in Table 15.

Date	Area	Yellowfin		Bigeye		Dogtooth tuna		Wahoo		Mahi mahi		Jacks		Rainbow runner		Job fish		Barracuda		Red snapper	
		No.	Kg.	No.	Kg.	No.	Kg.	No.	Kg.	No.	Kg.	No.	Kg.	No.	Kg.	No.	Kg.	No.	Kg.	No.	Kg.
Sep. 22	Rangiroa							2	16												
22	Ahe	1	20					1	8			1	5								
23	Manini	1	5					3	50												
24	Manihi							2	30												
26	high seas									1	7										
Oct. 4	Ua Huka	1	8					2	20												
20	Ua Huka							1	15												
23	Ua Huka	1	12					1	15												
26	Hatu Iti	5	55			19	280	9	75			12	145	3	23	21	105				
Nov. 1	Clark Bank	2	40			5	65	4	40			7	106			6	60				
1	Motu One	1	30			1	20	3	15			26	235								
2	Eiao			1	20	1	5	4	28			3	24								
5	Clark Bank	12	185			6	86	13	100			15	146			12	67	1	8	1	6
5	Motu One	1	8									17	94			3	15			5	30
6	Hatu Iti	14	200			40	378	12	89			7	71			23	100				
12	high seas							3	14												
13	high seas							2	10												
14	Manini							2	10			1	4								
Total		39	563	1	20	72	834	65	530	1	7	91	830	3	23	64	347	1	8	6	36

APPENDIX TABLE 8. Summary of tuna fishing activities during Cruise 5002. The abbreviations in the remarks column are as follows: JS, jig strike; S, school; YF, yellowfin; SJ, skipjack.

Date	Location	Sea-surface temperature		Bait-caught				Jig-caught				Other	Remarks
				Yellowfin		Skipjack		Yellowfin		Skipjack			
				Tagged	Total	Tagged	Total	Tagged	Total	Tagged	Total		
Feb. 22	8°51'S-140°00'W	?	?	-	-	-	-	0	2	0	0		JS
23	9°25' -140°11'	83.8	28.8	0	0	0	0	0	0	2	2		S(?)
23	9°30' -140°13'	84	28.9	-	-	-	-	0	0	2	2		JS
23	9°04' -140°11'	83	28.3	0	0	32	32	0	0	3	3		S (YF+SJ)
24	8°47' -140°25'	83.1	28.4	0	0	0	0	0	0	0	0	1 dogtooth tuna, 1 bullet, 1 jack, 1 job fish	S(?)
24	8°48' -140°36'	83.1	28.4	-	-	-	-	6	6	1	1		JS
27	9°00' -140°03'	83.5	28.6	0	0	0	0	0	0	1	1		S (two SJ)
27	8°49' -139°59'	83	28.3	-	-	-	-	1	1	0	0		JS
28	8°28' -139°52'	82	27.8	0	0	0	0	0	0	0	0		S (SJ)
28	8°06' -139°35'	82.5	28.1	0	0	0	0	2	2	1	1	1 rainbow runner	S (three YF+SJ)
28	8°12' -139°36'	82.7	28.2	0	0	0	0	0	0	0	0		S (SJ)
Mar. 1	8°04' -139°34'	82	27.8	-	-	-	-	0	2	0	0		JS
1	7°58' -139°58'	82.7	28.2	224	282	46	60	0	0	0	0	2 kawakawa, 1 wahoo	S (YF+SJ)
1	8°00' -139°56'	?	?	0	0	0	0	0	0	0	0		S (YF+SJ)
1	8°06' -140°07'	?	?	0	0	0	0	0	0	0	0		S (YF+SJ)
1	8°04' -139°56'	?	?	0	0	0	0	0	0	0	0		S (YF+SJ)
2	8°47' -140°00'	?	?	-	-	-	-	4	4	0	0	1 kawakawa, 3 wahoo	JS
2	8°53' -139°58'	?	?	-	-	-	-	3	3	0	0		JS
3	8°58' -139°36'	?	?	-	-	-	-	0	1	0	0		JS
3	9°07' -139°31'	83	28.3	0	0	0	0	2	2	3	3		S(?)
4	9°53' -139°04'	82.9	28.3	-	-	-	-	1	1	0	0		JS
4	10°01' -139°03'	83.5	28.6	0	0	0	0	0	0	0	0		S (SJ)
7	10°00' -139°10'	83.7	28.7	0	0	0	0	0	0	0	0		S (SJ)
7	9°36' -139°26'	84	28.9	-	-	-	-	0	0	1	1		JS
7	9°26' -139°35'	83.5	28.6	0	0	0	0	0	0	1	1		S (SJ)
10	8°46' -140°14'	83.2	28.4	-	-	-	-	2	2	0	0		JS
10	8°26' -140°16'	83.5	28.6	0	0	0	0	0	0	0	0		S (SJ)
10	8°08' -140°36'	83.2	28.4	-	-	-	-	0	0	2	3		JS
11	7°55' -140°37'	82	27.8	-	-	-	-	10	11	0	0	7 kawakawa, 1 bullet, 3 wahoo	JS
11	7°40' -140°38'	82.4	28.0	0	0	0	0	0	0	0	0		S (SJ)
11	7°47' -140°30'	83	28.3	2	3	7	7	0	0	0	0		S (YF+SJ)

APPENDIX TABLE 8. (continued)

Date	Location	Sea-surface temperature		Bait-caught				Jig-caught				Other	Remarks	
				Yellowfin		Skipjack		Yellowfin		Skipjack				
				Tagged	Total	Tagged	Total	Tagged	Total	Tagged	Total			
Mar. 12	8°47' -140°04'	83.3	28.5	-	-	-	-	2	2	0	0			JS
12	8°54' -139°59'	83.3	28.5	-	-	-	-	4	5	0	0	1 wahoo		JS
14	8°58' -139°36'	83.2	28.4	-	-	-	-	3	3	0	0			JS
14	8°37' -139°44'	83.4	28.6	-	-	-	-	0	0	1	1	1 wahoo		JS
16	10°44' -142°11'	83.5	28.6	-	-	-	-	0	0	1	1			JS
16	10°50' -142°16'	83.4	28.6	-	-	-	-	0	0	1	1			JS
17	12°39' -144°20'	83.3	28.5	-	-	-	-	0	0	2	2			JS
17	12°57' -144°45'	83.3	28.5	0	0	0	0	0	0	0	1			S(?)
18	14°28' -146°43'	83	28.3	0	0	0	0	4	4	0	0			S (YF+SJ)
18	14°32' -146°56'	83	28.3	0	0	0	0	0	0	2	2			S (YF+SJ)
18	14°46' -147°25'	83	28.3					0	0	0	0			S (SJ)
18	14°48' -147°29'	83	28.3	0	0	184	191	0	0	0	0			S (SJ)
21	14°48' -147°36'	83.9	28.8	-	-	-	-	1	1	1	1			JS
21	14°56' -147°50'	84	28.9	0	0	0	0	0	0	0	0			S(?)
21	15°03' -147°59'	84	28.9	-	-	-	-	0	0	0	1			JS
21	15°02' -148°00'	83.8	28.8	65	67	7	7	0	0	0	0			S (YF+SJ)
22	14°57' -147°36'	84	28.9	0	0	32	32	0	0	0	0			S (200 tons SJ)
23	16°08' -148°23'	84	28.9	2	2	10	10	0	0	0	0			S (SJ)
23	16°17' -148°22'	84	28.9	0	0	225	227	0	0	0	0			S (SJ)
30	16°29' -152°09'	83.9	28.8	0	0	0	0	2	2	0	0			S (YF)
31	16°32' -152°09'	84	28.9	0	0	0	0	0	0	1	1			S (SJ)
31	16°38' -152°00'	84.7	29.3	0	0	0	0	0	0	0	0			S (SJ)
31	16°43' -151°47'	85	29.4	0	0	0	0	0	0	2	2			S (SJ)
Apr. 2	16°35' -151°21'	84.5	29.2	0	0	0	0	1	1	0	0			S(70 tons YF+SJ)
2	16°26' -151°36'	84.6	29.2	0	1	262	273	0	0	0	0			S (SJ)
4	16°21' -151°47'	84.2	29.0	9	9	20	20	0	0	0	0			S (YF+SJ)
4	16°14' -151°52'	84.6	29.2	0	0	0	0	0	0	0	0			S (YF+SJ)
4	16°32' -151°40'	84.7	29.3	0	0	0	0	0	0	0	0			S (YF+SJ)
4	16°34' -151°41'	84.9	29.4	0	0	0	0	0	0	0	0			S (YF+SJ)
4	16°35' -151°51'	85.1	29.5	0	0	0	0	0	0	0	0			S (YF+SJ)
5	16°35' -151°39'	84.9	29.4	1	1	0	0	0	0	0	0			S (YF+SJ)

APPENDIX TABLE 8. (continued)

Date	Location	Sea-surface temperature		Bait-caught				Jig-caught				Other	Remarks
				Yellowfin		Skipjack		Yellowfin		Skipjack			
				Tagged	Total	Tagged	Total	Tagged	Total	Tagged	Total		
Apr. 5	16°36' -151°37'	85	29.4	40	40	10	10	0	0	0	0		S (YF+SJ)
5	16°34' -151°36'	85.2	29.6	85	88	2	3	0	0	0	0		S (YF+SJ)
7	16°46' -151°33'	84.2	29.0	10	11	1	1	0	0	0	0		S (YF)
7	16°58' -151°23'	84.5	29.2	0	0	0	0	0	0	0	0		S (YF+SJ)
7	16°30' -151°20'	85.2	29.6	0	0	0	0	0	0	0	0		S (YF+SJ)
7	16°33' -151°20'	85.2	29.6	0	0	0	0	0	0	0	0		S (YF+SJ)
7	16°31' -151°26'	85.2	29.6	105	108	122	133	0	0	0	0		S (YF+SJ)
9	16°27' -151°28'	84.7	29.3	0	0	0	0	0	0	0	0		S (SJ)
9	16°32' -151°32'	84.7	29.3	5	5	0	0	0	0	0	0		S(5 tons YF+SJ)
9	16°39' -151°35'	84.5	29.2	0	0	0	0	0	0	1	1		S (SJ)
9	16°37' -151°47'	84.5	29.2	0	0	0	0	0	2	0	0		S (YF)
10	16°40' -151°42'	84.1	28.9	0	0	0	0	0	0	0	0		S (SJ)
10	16°30' -151°34'	84.2	29.0	0	0	0	0	0	1	0	0		S (YF+SJ)
10	16°38' -151°17'	84.1	28.9	0	0	0	0	0	0	0	0		S (SJ)
10	16°41' -151°12'	84.1	28.9	0	0	0	0	0	0	0	0		S (SJ)
17	15°00' -147°57'	85.9	29.9	0	0	0	0	0	0	3	3		S (SJ)
18	14°56' -147°36'	86	30.0	0	0	0	0	0	0	0	0		S (YF+SJ)
18	14°50' -147°41'	86	30.0	0	0	2	54	0	0	0	0		S (SJ)
18	14°52' -147°51'	86	30.0	0	0	0	0	0	0	0	0		S (SJ)
20	12°53' -145°12'	85.2	29.6	-	-	-	-	0	0	0	0	1 wahoo	
21	10°43' -142°12'	85.1	29.5	-	-	-	-	5	5	0	0		JS
22	8°52' -140°53'	85	29.4	4	4	1	1	0	0	0	0	1 jack, 1 rainbow runner	S (YF+SJ)
22	8°42' -140°43'	85.1	29.5	-	-	-	-	3	3	0	0		JS
26	9°21' -140°13'	84.9	29.4	0	0	0	0	1	1	0	0		S (YF+SJ)
27	7°50' -140°39'	84	28.9	0	0	0	0	2	2	2	2		S (YF+SJ)
Total				552	621	963	1,061	59	69	34	37		



APPENDIX TABLE 9. Summary of tuna fishing activities during Cruise 5003. Unless otherwise noted, two jiglines were towed when fishing was taking place. For example, on December 29 the total jig fishing time was 3 hours and 45 minutes. There were 2 hours and 45 minutes of fishing with one jig line, so the remainder of the time, 1 hour, two jig lines were employed.

Date	Location	Sea-surface temperature		Time	Bait fishing				Jig fishing				Jig lines		
		temperature			Time	Yellowfin		Skipjack		Time	Yellowfin			Skipjack	
		F	C			Tagged	Total	Tagged	Total		Tagged	Total		Tagged	Total
Dec. 29	Eiao	81.8	27.7	0:45	2	2	0	0	3:45	6	11	1	1	1,2:45	
30	Eiao	80.8-81.3	27.1-27.4	0:20	0	0	0	0	9:05	2	2	0	0	1,3:20	
31	Eiao to Nuku Hiva	81.3-81.8	27.4-27.7	1:10	0	0	41	42	6:20	0	0	1	2		
Jan. 5	Ua Pou	81.3	27.4	0:45	0	0	0	0	8:25	0	0	0	0		
6	Ua Pou	82.3	27.9	0:00	0	0	0	0	3:30	0	0	0	0		
9	Nuku Hiva	81.3	27.4	0:40	0	0	0	0	3:05	0	0	2	2		
10	Nuku Hiva	81.8-82.8	27.4-28.2	1:29	0	0	87	125	7:21	3	5	6	8		
11	Nuku Hiva	81.8-82.3	27.7-27.9	1:07	0	0	54	79	7:14	3	4	0	0		
15	Nuku Hiva	82.3-82.8	27.9-28.2	1:15	0	0	56	59	5:15	0	2	3	4		
16	Nuku Hiva	81.3-82.3	27.4-27.9	0:43	0	0	39	42	5:37	0	0	0	2		
18	Nuku Hiva	81.8-82.3	27.7-27.9	0:00	0	0	0	0	0:50	0	0	0	0		
19	Nuku Hiva	81.8-82.3	27.7-27.9	0:57	0	0	53	56	5:23	0	1	0	0		
20	Nuku Hiva	81.8-82.3	27.7-27.9	0:38	0	0	0	0	3:57	1	2	0	1		
21	Nuku Hiva	81.8-82.3	27.7-27.9	0:31	0	0	34	47	7:09	0	1	0	0	1,7:09	
24	Nuku Hiva	82.3	27.9	1:10	0	0	7	7	3:50	3	4	0	1	1,3:50	
25	Nuku Hiva	82.3	27.9	1:20	6	9	16	19	2:55	5	8	1	4		
27	Nuku Hiva	82.3	27.9	0:00	0	0	0	0	4:30	0	2	0	0		
28	Nuku Hiva	82.3	27.9	0:55	0	0	210	217	2:35	0	0	0	0		
29	Nuku Hiva	82.3	27.9	0:32	0	0	0	0	5:58	1	3	0	1		
Feb. 2	Nuku Hiva	82.3	27.9	0:48	0	0	55	55	5:02	0	0	5	7		
6	Nuku Hiva	82.3-83.3	27.9-28.5	0:00	0	0	0	0	8:30	0	0	1	6	8,4:40	
7	Nuku Hiva	83.3	28.5	0:00	0	0	0	0	5:35	2	5	0	0	9,5:35	
8	Nuku Hiva to Ua Pou	82.8-83.3	28.2-28.5	0:00	0	0	0	0	9:10	5	11	0	4	), 2:10; 10,7:00	
9	Ua Pou	83.3	28.5	0:00	0	0	0	0	5:40	3	5	0	0	10,0:15; 6,4:15; 5,1:10	
10	Ua Pou to Ua Huka	83.3	28.5	0:00	0	0	0	0	10:10	4	1	1	4	10,10:10	
11	Ua Huka	82.8-83.3	28.2-28.5	0:00	0	0	0	0	6:55	4	19	9	12	10,2:10	
13	Nuku Hiva	82.8-83.3	28.2-28.5	0:00	0	0	0	0	8:35	0	0	11	17	10,2:10; 5,1:15	
14	Nuku Hiva	82.8-83.3	28.2-28.5	0:00	0	0	0	0	9:40	0	3	1	3	9,9:40	
15	Nuku Hiva	83.3	28.5	0:00	0	0	0	0	8:20	3	10	1	1	8,8:00; 1,0:20	
16	Nuku Hiva	82.8-83.3	28.2-28.5	0:00	0	0	0	0	10:25	1	8	9	13	6,7:55; 2,2:30	

APPENDIX TABLE 9. (continued)

Date	Location	Sea-surface temperature		Bait fishing					Jig fishing				Jig lines		
				Time	Yellowfin		Skipjack		Time	Yellowfin		Skipjack			
					Tagged	Total	Tagged	Total		Tagged	Total	Tagged		Total	
Feb. 18	Nuku Hiva	83.3-83.8	28.5-28.8	0:00	0	0	0	0	0	8:50	2	2	5	15	7,2:30; 8,6:20
19	Nuku Hiva	83.3	28.5	0:00	0	0	0	0	0	11:30	5	11	1	13	9,11:30
21	Nuku Hiva	83.3	28.5	0:00	0	0	0	0	0	2:35	0	2	0	6	8,2:35
23	Nuku Hiva	83.3-84.3	28.5-29.1	1:05	0	0	49	51	0	3:25	0	0	0	0	
25	Nuku Hiva	80-83	26.7-28.3	1:15	0	0	1	1	0	2:05	0	0	0	1	
26	Nuku Hiva	83	28.3	2:45	0	0	7	7	0	2:50	0	0	0	1	
Mar. 2	Nuku Hiva	83	28.3	0:50	0	0	60	65	0	3:25	0	0	0	1	
3	Nuku Hiva	83.5	28.6	0:00	0	0	0	0	0	0:50	0	0	0	0	
5	Nuku Hiva	83	28.3	1:45	0	0	57	66	0	4:35	0	0	0	1	
8	Nuku Hiva	83.5	28.6	1:10	0	0	190	230	0	5:30	0	4	0	0	
9	Nuku Hiva	83.5	28.6	0:00	0	0	0	0	0	0:45	0	0	0	0	
10	Nuku Hiva	83-84	28.3-28.9	0:00	0	0	0	0	0	1:20	0	0	0	0	
13	Nuku Hiva	83-84	28.3-28.9	1:30	0	0	3	3	0	8:15	0	5	0	2	
15	Nuku Hiva	83.5-85	28.6-29.4	0:00	0	0	0	0	0	7:10	0	0	0	0	
17	Nuku Hiva	85-85.5	29.4-29.7	0:50	0	0	91	91	0	6:10	0	0	0	0	
18	Nuku Hiva	84-85	28.9-29.4	1:25	0	0	135	135	0	5:05	0	0	0	0	
21	Nuku Hiva	85	29.4	0:00	0	0	0	0	0	2:05	0	0	0	0	
22	Nuku Hiva	85	29.4	0:00	0	0	0	0	0	1:30	0	0	0	0	
25	Nuku Hiva	84	28.9	0:10	0	0	0	0	0	4:50	0	6	0	0	
27	Nuku Hiva	84	28.9	0:15	0	0	0	0	0	6:15	7	11	0	0	
28	Nuku Hiva	84	28.9	0:40	0	0	33	43	0	7:30	0	1	0	2	
30	Nuku Hiva	84	28.9	0:40	0	0	15	15	0	7:05	1	8	0	0	
Apr. 1	Nuku Hiva to Ua Pou	84	28.9	0:55	0	0	0	0	0	6:40	1	2	0	0	
2	Ua Pou to Nuku Hiva	84-84.5	28.9-29.2	0:00	0	0	0	0	0	9:30	0	1	0	2	
5	Nuku Hiva	84	28.9	0:00	0	0	0	0	0	1:30	0	0	0	0	
7	Nuku Hiva	84-84.5	28.9-29.2	0:00	0	0	0	0	0	1:40	0	0	0	0	
8	Nuku Hiva	85	29.4	0:00	0	0	0	0	0	2:15	0	0	0	0	
10	Nuku Hiva	84.5-85	29.2-29.4	0:15	0	0	0	0	0	7:00	0	0	0	0	
11	Nuku Hiva	84-84.5	28.9-29.2	0:05	0	0	0	0	0	9:05	0	5	0	0	
12	Nuku Hiva	84-84.5	28.9-29.2	1:00	0	0	73	73	0	5:00	1	1	0	0	
14	Nuku Hiva	84.5	29.2	0:35	0	0	7	8	0	1:05	0	0	0	0	
15	Nuku Hiva	84.5-85	29.2-29.4	0:00	0	0	0	0	0	5:10	0	0	0	0	

APPENDIX TABLE 9. (continued)

Date	Location	Sea-surface temperature		Bait fishing				Jig fishing				Jig lines		
				Time	Yellowfin		Skipjack		Time	Yellowfin			Skipjack	
					Tagged	Total	Tagged	Total		Tagged	Total		Tagged	Total
Apr. 16	Nuku Hiva	84	28.9	0:00	0	0	0	0	1:00	0	0	0	0	
17	Nuku Hiva	84	28.9	0:25	0	0	0	0	5:50	0	1	0	0	
19	Nuku Hiva	84-85	28.9-29.4	0:00	0	0	0	0	1:40	0	0	0	0	1,0:30
20	Nuku Hiva	84	28.9	0:39	0	0	0	0	7:21	0	3	0	1	
21	Nuku Hiva	84-85	28.9-29.4	1:00	0	0	4	5	5:00	0	1	0	2	
22	Nuku Hiva	84-84.5	28.9-29.2	0:00	0	0	0	0	8:10	1	5	0	0	
24	Nuku Hiva	84	28.9	2:25	0	0	9	9	2:40	0	1	0	0	
25	Nuku Hiva	84	28.9	0:55	0	0	0	0	5:50	0	2	0	0	
27	Nuku Hiva	84	28.9	0:00	0	0	0	0	2:35	0	0	0	0	
28	Nuku Hiva	84.5-85	29.2-29.4	0:05	0	0	0	0	4:55	0	1	0	1	
30	Nuku Hiva	84.5	29.2	0:00	0	0	0	0	2:10	0	0	0	0	
May 2	Nuku Hiva	84	28.9	0:45	0	0	27	28	4:20	0	0	0	0	
3	Nuku Hiva	84	28.9	0:00	0	0	0	0	1:45	0	0	0	0	
4	Nuku Hiva	84	28.9	0:50	0	0	179	196	5:00	0	0	0	0	
5	Nuku Hiva	84	28.9	0:30	0	0	60	61	2:15	0	0	0	0	
6	Nuku Hiva	84	28.9	0:00	0	0	0	0	2:05	0	0	0	0	
7	Nuku Hiva	84	28.9	0:00	0	0	0	0	1:00	0	0	0	0	
11	Nuku Hiva	84	28.9	0:45	0	0	164	174	2:15	0	0	0	0	
16	Nuku Hiva	84-84.5	28.9-29.2	0:00	0	0	0	0	7:30	0	0	0	0	
Totals				40:34	8	11	1,816	2,009	410:37	65	190	58	141	

APPENDIX TABLE 10. Summary of schools of fish sighted during Cruise 5003.

Date	Location	Sea-surface temperature		Time	Schools of fish
		F	C		
Dec. 29	Eiao	81.8	27.7	3:45	YF, 5; YF, 5; mixed, 2.5
30	Eiao	80.8-81.3	27.1-27.4	9:05	?, ?
31	Eiao to Nuku Hiva	81.3-81.8	27.4-27.7	6:20	SJ, 1; SJ, 1; SJ, 1
Jan. 5	Ua Pou	81.3	27.4	8:25	
6	Ua Pou	82.3	27.9	3:30	
9	Nuku Hiva	81.3	27.4	3:05	SJ, 0.5
10	Nuku Hiva	81.8-82.8	27.4-28.2	7:21	mixed, 0.5; YF, 2; SJ, 1; SJ, 2.5
11	Nuku Hiva	81.8-82.3	27.7-27.9	7:14	YF, 8; SJ, 2; YF, 3
15	Nuku Hiva	82.3-82.8	27.9-28.2	5:15	?, 0.5; YF, 3; SJ, 1
16	Nuku Hiva	81.3-82.3	27.4-27.9	5:37	SJ, 1.5; SJ, 1; SJ, 2
18	Nuku Hiva	81.8-82.3	27.7-27.9	0:50	
19	Nuku Hiva	81.8-82.3	27.7-27.9	5:23	YF, 4; SJ, 1.5-3
20	Nuku Hiva	81.8-82.3	27.7-27.9	3:57	SJ, 2; YF, 50-100
21	Nuku Hiva	81.8-82.3	27.7-27.9	7:09	YF, 25-40; YF, 25-40; YF, large; YF, large; YF, large; SJ, 1.5; SJ, 10
24	Nuku Hiva	82.3	27.9	3:50	mixed, 5; SJ, 5-6; YF, 5-7; SJ, 5; SJ, 1; mixed, 2.5; mixed, 20
25	Nuku Hiva	82.3	27.9	2:55	SJ, 2; SJ, 5; mixed, 20
27	Nuku Hiva	82.3	27.9	4:30	
28	Nuku Hiva	82.3	27.9	2:35	SJ, 9
29	Nuku Hiva	82.3	27.9	5:58	SJ, 2; YF, 4; mixed, 30; YF, 25
Feb. 2	Nuku Hiva	82.3	27.9	5:02	SJ, 1; mixed, 7; SJ, 1; SJ, 2
6	Nuku Hiva	82.3-83.3	27.9-28.5	8:30	SJ, 7; SJ, 7; YF, 15
7	Nuku Hiva	83.3	28.5	5:35	YF, 15; YF, 15; YF, 4
8	Nuku Hiva to Ua Pou	82.8-83.3	28.2-28.5	9:10	YF, 30; mixed, 20; YF, 3-20
9	Ua Pou	83.3	28.5	5:40	YF, 10
10	Ua Pou to Ua Huka	83.3	28.5	10:10	YF, 10-20; YF, 10-20; YF, 10-20; YF, 10-20; YF, 10-20
11	Ua Huka	82.8-83.3	28.2-28.5	6:55	SJ, 7.5; mixed, 10; YF, 2; YF, 100; SJ, 30; SJ, 20
13	Nuku Hiva	82.8-83.3	28.2-28.5	8:35	SJ, 10; SJ, 5
14	Nuku Hiva	82.8-83.3	28.2-28.5	9:40	SJ, 1; YF, 5; SJ, 5
15	Nuku Hiva	83.3	28.5	8:20	SJ, 1; YF, 3; YF, 4
16	Nuku Hiva	82.8-83.3	28.2-28.5	10:25	SJ, 4; SJ, 5; YF, 2; YF, 2; mixed, 10; mixed, 10
18	Nuku Hiva	83.3-83.8	28.5-28.8	8:50	mixed, 10; YF, 5; SJ, 50; SJ, 15; SJ, 15; SJ, 10
19	Nuku Hiva	83.3	28.5	11:30	SJ, 2; mixed, 5; mixed, 20; ?, 2; ?, 2; SJ, 75

APPENDIX TABLE 10. (continued)

Date	Location	Sea-surface temperature		Time	Schools of fish
		F	C		
Feb. 21	Nuku Hiva	83.3	28.5	2:35	SJ, 100
23	Nuku Hiva	83.3-84.3	28.5-29.1	3:25	SJ, 30; SJ, 5; SJ, 5; SJ, ?
25	Nuku Hiva	80-83	26.7-28.3	2:05	SJ, 20
26	Nuku Hiva	83	28.3	2:50	SJ, 2; SJ, 2; SJ, 8; SJ, 7; SJ, 10
Mar. 2	Nuku Hiva	83	28.3	3:25	SJ, 10
3	Nuku Hiva	83.5	28.6	0:50	
5	Nuku Hiva	83	28.3	4:35	SJ, 100
8	Nuku Hiva	83.5	28.6	5:30	SJ, 40
9	Nuku Hiva	83.5	28.6	0:45	
10	Nuku Hiva	83-84	28.3-28.9	1:20	
13	Nuku Hiva	83-84	28.3-28.9	8:15	YF, 12; mixed, 50; YF, 40
15	Nuku Hiva	83.5-85	28.6-29.4	7:10	?, 20; SJ, 25
17	Nuku Hiva	85-85.5	29.4-29.7	6:10	SJ, 5; SJ, 1; SJ, 3
18	Nuku Hiva	84-85	28.9-29.4	5:05	mixed, 2; SJ, 4
21	Nuku Hiva	85	29.4	2:05	
22	Nuku Hiva	85	29.4	1:30	
25	Nuku Hiva	84	28.9	4:50	mixed, 10; mixed, 15; YF, 20
27	Nuku Hiva	84	28.9	6:15	YF, 10-20; YF, 10; YF, 10
28	Nuku Hiva	84	28.9	7:30	SJ, 10; YF, 5
30	Nuku Hiva	84	28.9	7:05	YF, 20; SJ, 2
Apr. 1	Nuku Hiva to Ua Pou	84	28.9	6:40	YF, 5; YF, 0.5; YF, 30; SJ, 5
2	Ua Pou to Nuku Hiva	84-84.5	28.9-29.2	9:30	
5	Nuku Hiva	84	28.9	1:30	
7	Nuku Hiva	84-84.5	28.9-29.2	1:40	
8	Nuku Hiva	85	29.4	2:15	
10	Nuku Hiva	84.5-85	29.2-29.4	7:00	YF, 15; YF, 10
11	Nuku Hiva	84-84.5	28.9-29.2	9:05	YF, 30; YF, 50; YF, 10
12	Nuku Hiva	84-84.5	28.9-29.2	5:00	YF, 7; YF, 5; SJ, 10
14	Nuku Hiva	84.5	29.2	1:05	SJ, 1; SJ, 2
15	Nuku Hiva	84.5-85	29.2-29.4	5:10	?, 10; YF, 10
16	Nuku Hiva	84	28.9	1:00	
17	Nuku Hiva	84	28.9	5:50	SJ, 25; YF, 10
19	Nuku Hiva	84-85	28.9-29.4	1:40	

APPENDIX TABLE 10. (continued)

Date	Location	Sea-surface temperature		Time	Schools of fish
		F	C		
Apr. 20	Nuku Hiva	84	28.9	7:21	YF, 15; YF, 15; YF, 15; SJ, 15; YF, 50; YF, 25; YF, 10; YF, 10
21	Nuku Hiva	84-85	28.9-29.4	5:00	SJ, 20; SJ, 5
22	Nuku Hiva	84-84.5	28.9-29.2	8:10	YF, 6
24	Nuku Hiva	84	28.9	2:40	SJ, 1-2; YF, 5; SJ, 20
25	Nuku Hiva	84	28.9	5:50	'many large YF schools'; YF, 10
27	Nuku Hiva	84	28.9	2:35	
28	Nuku Hiva	84.5-85	29.2-29.4	4:55	YF, 10
30	Nuku Hiva	84.5	29.2	2:10	
May 2	Nuku Hiva	84	28.9	4:20	YF, 4; SJ, 15
3	Nuku Hiva	84	28.9	1:45	
4	Nuku Hiva	84	28.9	5:00	SJ, 20
5	Nuku Hiva	84	28.9	2:15	SJ, 2
6	Nuku Hiva	84	28.9	2:05	
7	Nuku Hiva	84	28.9	1:00	
11	Nuku Hiva	84	28.9	2:15	SJ, 25
16	Nuku Hiva	84-84.5	28.9-29.2	7:30	
Totals				410:37	

APPENDIX TABLE 11. Schools of fish encountered and their response to chumming during Cruise 5004. The meanings of the symbols at the heads of the columns are as follows: S, small schools (less than 11 metric tons or 12 short tons); M, medium schools (11 to 30 metric tons or 12 to 33 short tons); L, large schools (more than 30 metric tons or 33 short tons); Unk., schools of unknown size; N, negative; T, fish caught by trolling only; PP, positive poor; PM, positive medium; PG, positive good; NC, conserving bait. The values for fishing time in parentheses refer to less intensive searching during periods when there was no intention to fish because the vessel had no bait or because the bait was being conserved for use elsewhere.

Date	Location	Fishing time	School size				Response					
			S	M	L	Unk.	N	T	PP	PM	PG	NC
Dec. 13	Society Is.	(9)	2	6	4	0	-	-	-	-	-	-
21	Tuamotus to Marquesas	(11)	5	0	2	0	-	-	-	-	-	-
22	Marquesas Is.	12	7	7	0	0	6	4	1	3	0	0
23	Marquesas Is.	6	5	4	0	0	2	0	2	1	4	0
24	Marquesas Is.	8½	2	4	1	0	1	0	1	2	3	0
25	Marquesas Is.	10	2	7	3	0	4	0	1	5	2	0
26	Marquesas Is.	9	2	6	2	0	2	0	1	6	1	0
27	Marquesas Is.	8	4	4	2	0	4	0	2	2	2	0
28	Marquesas Is.	7	1	3	1	0	0	0	1	2	2	0
30	Marquesas Is.	6	1	2	1	0	2	0	2	0	0	0
31	Marquesas Is.	4½	0	3	1	0	1	0	3	0	0	0
Jan. 4	Marquesas Is.	3	0	1	2	0	1	0	1	0	1	0
5	Marquesas Is.	6	0	3	5	0	1	0	2	3	2	0
6	Marquesas Is.	6	0	2	2	0	1	0	1	0	1	1
7	Marquesas Is.	6½	9	0	0	0	3	0	4	1	1	0
8	Marquesas Is.	10	1	5	2	0	2	0	2	2	2	0
9	Marquesas Is.	3½	0	0	1	0	0	0	0	1	0	0
10	Marquesas Is.	2½	0	0	1	0	0	0	1	0	0	0
11	Marquesas Is.	6	0	4	1	0	1	0	0	2	2	0
12	Marquesas Is.	4	1	1	2	0	1	0	2	1	0	0
13	Marquesas Is.	4	0	4	0	0	2	0	0	2	0	0
14	Marquesas Is.	3 3/4	0	2	1	0	0	0	1	0	2	0
15	Marquesas Is.	9	7	1	2	0	6	0	1	2	1	0
16	Marquesas Is.	7	6	2	0	0	5	0	1	0	2	0
17	Marquesas Is.	3½	2	0	0	0	1	0	0	0	1	0
18	Marquesas is.	3	4	2	0	0	3	0	2	1	0	0
19	Marquesas Is.	2	3	1	0	0	2	0	1	1	0	0

APPENDIX TABLE 11. (continued)

Date	Location	Fishing time	School size				Response					
			S	M	L	Unk.	N	T	PP	PM	PG	NC
Jan. 20	Marquesas Is.	6½	7	1	0	0	6	0	0	2	0	0
21	Marquesas to Tuamotus	2 (10)	1	2	5	0	1	0	0	0	1	6
22	Tuamotu Is.	(11)	8	4	1	1	-	-	-	-	-	-
23	Tuamotu Is.	(7)	7	4	6	0	-	-	-	-	-	-
28	Societies to Tuamotus	(6)	2	0	2	0	-	-	-	-	-	-
29	Tuamotu Is.	(1¼)	0	1	4	0	-	-	-	-	-	-
30	Tuamotu Is.	(11½)	4	3	4	0	-	-	-	-	-	-
31	Tuamotu Is.	(11½)	2	4	4	0	-	-	-	-	-	-
Feb. 1	Tuamotu Is.	11	0	1	0	0	-	-	-	-	-	-
2	Tuamotu Is.	11½	0	0	0	0	-	-	-	-	-	-
3	Pitcairn Is.	10½	4	1	0	0	4	0	1	0	0	0
4	Pitcairn Is.	10	5	4	0	0	4	0	0	5	0	0
5	Pitcairns to Gambiers	11½	0	1	0	0	0	0	1	0	0	0
6	Gambier Is.	6½	4	1	0	0	5	0	0	0	0	0
7	Gambiers to Tuamotus	12	0	2	0	0	2	0	0	0	0	0
8	Tuamotu Is.	10	2	0	0	0	2	0	0	0	0	0
9	Tuamotu Is.	0	-	-	-	-	-	-	-	-	-	-
10	Tuamotu Is.	8	1	1	0	0	0	0	1	1	0	0
11	Tuamotu Is.	11	3	4	0	2	6	0	1	2	0	0
12	Tuamotu Is.	9	4	5	0	1	5	0	2	1	2	0
13	Tuamotu Is.	3	8	0	0	0	2	1	2	3	0	0
14	Tuamotus to Societies	5½(6½)	2	0	0	0	2	0	0	0	0	0
16	Society Is.	11½	1	3	0	0	3	0	0	1	0	0
17	Society Is.	12½	1	0	0	0	1	0	0	0	0	0
Totals	Society Is.	24 (9)	4	9	4	0	4	0	0	1	0	0
	Societies to Tuamotus	5½(12½)	4	0	2	0	2	0	0	0	0	0
	Tuamotu Is.	63½(42¼)	39	27	19	4	15	1	6	7	2	0
	Tuamotus to Marquesas	2 (21)	6	2	7	0	1	0	0	0	1	6
	Marquesas Is.	157¼	64	69	30	0	57	4	33	39	29	1
	Pitcairn Is.	20½	9	5	0	0	8	0	1	5	0	0
	Pitcairns to Gambiers	11½	0	1	0	0	0	0	0	0	1	0
	Gambier Is.	6½	4	1	0	0	5	0	0	0	0	0
	Gambiers to Tuamotus	12	0	2	0	0	2	0	0	0	0	0



APPENDIX TABLE 12. Catches of tunas and numbers of tunas tagged by area and date during Cruise 5004. None of the troll-caught or handline-caught fish were tagged.

Date	Location	Sea-surface temperature		Bait-caught						Troll- and handline-caught				
		C	F	Skipjack		Yellowfin		Bigeye		Bullet		Skipjack	Yellowfin	Dogtooth
				Tagged	Total	Tagged	Total	Tagged	Total	Tagged	Total			
Dec. 22	10°51'S-141°40'W	29.1	84.4			0	1					1	3	
	10°47'S-141°34'W	29.3	84.7	59	74							1		
	10°37'S-141°24'W	29.3	84.7									1		
	10°33'S-141°18'W	29.3	84.7										1	
	10°30'S-141°17'W	29.3	84.7	69	77	46	56	1	1			2		
	10°29'S-141°11'W	29.4	84.9	75	99	65	84						1	
	10°26'S-141°08'W	29.4	84.9			0	1							
	10°23'S-141°03'W	29.4	84.9			0	1							
23	9°50'S-139°37'W	28.8	83.8	204	252									
	9°51'S-139°37'W	28.8	83.8	8	8							1		
	9°50'S-139°37'W	28.8	83.8	134	165							9		
	9°52'S-139°37'W	28.8	83.8	25	29									
	9°55'S-139°37'W	29.1	84.4	215	255	5	8							
	10°00'S-139°33'W	29.1	84.4	39	56							1		
	10°02'S-139°30'W	29.1	84.4	406	490	42	54							
24	8°57'S-140°25'W	28.7	83.7	51	57									
	8°58'S-140°15'W	28.7	83.7	244	284							1		
	9°00'S-140°12'W	28.7	83.7	86	94							1		
	9°04'S-140°11'W	28.7	83.7	383	423									
	9°00'S-140°08'W	28.8	83.8	657	738							2		
	9°02'S-140°11'W	28.8	83.8	22	27									
25	9°00'S-140°17'W	28.6	83.5	32	35									
	9°01'S-140°18'W	28.6	83.5	47	49									
	9°01'S-140°17'W	28.6	83.5									1		
	9°14'S-139°59'W	28.6	83.5	54	67	1	1							
	9°16'S-139°57'W	29.2	84.6									1		
	9°16'S-139°56'W	29.1	84.4	845	985							3		
	9°13'S-140°01'W	28.9	84.0	128	169							1		
	9°09'S-140°05'W	28.8	83.8	147	167									
	9°10'S-140°04'W	?	?	548	688									
	9°05'S-140°06'W	28.6	83.5	25	28									
26	9°10'S-140°10'W	28.6	83.5	237	318							2		
	9°11'S-140°09'W	28.6	83.5	40	50									

APPENDIX TABLE 12.(continued)

Date	Location	Sea-surface temperature		Bait-caught						Troll- and handline-caught				
		C	F	Skipjack		Yellowfin		Bigeye		Bullet		Skipjack	Yellowfin	Dogtooth
				Tagged	Total	Tagged	Total	Tagged	Total	Tagged	Total			
Dec. 26	9°15'S-140°08'W	28.6	83.5	70	96									
	9°14'S-140°00'W	28.7	83.7	100	144							2		
	9°07'S-140°07'W	28.8	83.8	53	71									
	9°05'S-140°09'W	28.8	83.8	121	165							1		
	9°01'S-140°08'W	28.8	83.8	61	85							2		
	9°00'S-140°08'W	28.8	83.8	16	19									
27	9°05'S-140°08'W	28.5	83.3	947	1,081							1		
	9°04'S-140°09'W	28.7	83.7									1		
	9°03'S-140°10'W	28.7	83.7	10	10							1		
	9°03'S-140°11'W	28.7	83.7	288	333									
	9°04'S-140°13'W	28.7	83.7	491	681									
	9°01'S-140°10'W	28.7	83.7										1	
	9°01'S-140°07'W	28.6	83.5	40	45	1	1						1	
28	8°53'S-140°21'W	28.8	83.8	386	454								1	
	8°51'S-140°21'W	28.8	83.8	356	382								1	
	8°53'S-140°20'W	28.8	83.8	120	138									
	8°54'S-140°20'W	28.8	83.8	168	196								1	
	8°55'S-140°20'W	28.8	83.8	11	16									
30	9°01'S-140°16'W	28.7	83.7	5	6	4	4						1	
	8°54'S-140°16'W	28.7	83.7	28	31								1	
31	9°01'S-140°09'W	28.5	83.3	19	20									
	9°02'S-140°11'W	28.4	83.1	36	40								1	
	9°03'S-140°09'W	28.4	83.1	54	64									
Jan. 4	9°00'S-140°05'W	28.7	83.7	441	532									
	9°04'S-140°04'W	28.7	83.7	27	28								1	
5	8°59'S-140°04'W	28.6	83.5	6	7									
	9°05'S-140°09'W	28.8	83.8	420	467									
	9°08'S-140°06'W	28.9	84.0	210	236									
	9°13'S-140°07'W	28.9	84.0	29	29									
	9°15'S-140°06'W	29.1	84.4	105	122								1	
	9°13'S-140°03'W	29.0	84.2	468	554									
	9°10'S-140°04'W	?	?	307	348									
6	8°54'S-140°17'W	28.7	83.7	697	799									2
	8°53'S-140°19'W	28.8	83.8	8	8									

APPENDIX TABLE 12. (continued)

Date	Location	Sea-surface temperature		Bait-caught								Troll- and handline-caught						
				Skipjack		Yellowfin		Bigeye		Bullet		Skipjack	Yellowfin	Dogtooth				
				Tagged	Total	Tagged	Total	Tagged	Total	Tagged	Total							
		C	F															
Jan. 7	8°53'S-140°19'W	28.7	83.7	12	13													
	8°56'S-140°21'W	28.7	83.7	34	36													
	8°54'S-140°19'W	29.3	84.7	426	482													
	8°53'S-140°16'W	28.6	83.5	153	173													
	8°52'S-140°17'W	28.6	83.5	1	1													
	8°58'S-140°15'W	28.8	83.8	20	21													
8	8°47'S-140°18'W	28.4	83.1	5	5													1
	8°45'S-140°23'W	28.4	83.1	298	321													
	8°49'S-140°19'W	28.6	83.5	37	41													
	8°47'S-140°23'W	28.6	83.5	216	241													1
	8°52'S-140°21'W	28.6	83.5	156	184													
	8°56'S-140°17'W	28.6	83.5	148	169													1
9	9°00'S-140°16'W	28.4	83.1	449	517	3	3					1	1					
10	9°01'S-140°12'W	28.5	83.3	70	78													2
11	8°58'S-140°14'W	28.5	83.3															1
	8°57'S-140°16'W	28.5	83.3	370	423													
	8°56'S-140°18'W	28.5	83.3	188	213													
	8°56'S-140°17'W	28.5	83.3	104	115													
	8°58'S-140°19'W	28.7	83.7	107	124													
12	8°54'S-140°15'W	28.5	83.3	702	774													
	8°53'S-140°20'W	28.5	83.3	28	29													
	8°50'S-140°17'W	28.5	83.3	14	17													
13	9°02'S-140°15'W	28.7	83.7	196	213													
	9°03'S-140°06'W	28.6	83.5	91	102													1
14	9°01'S-140°06'W	28.7	83.7	405	479													
	9°02'S-140°16'W	28.7	83.7	311	373													
	9°01'S-140°15'W	28.7	83.7	53	61													1
15	9°17'S-140°05'W	28.6	83.5	122	131													
	9°14'S-140°15'W	28.4	83.1	220	253													1
	9°03'S-140°14'W	28.6	83.5	3	3													
	9°02'S-139°59'W	28.9	84.0	157	177													
16	9°00'S-139°59'W	28.7	83.7															1
	8°55'S-139°49'W	28.7	83.7	18	20													
	9°02'S-139°57'W	28.7	83.7	98	114													

APPENDIX TABLE 12. (continued)

Date	Location	Sea-surface temperature		Bait-caught						Troll- and handline-caught				
		C	F	Skipjack		Yellowfin		Bigeye		Bullet		Skipjack	Yellowfin	Dogtooth
				Tagged	Total	Tagged	Total	Tagged	Total	Tagged	Total			
Jan. 16	8°53'S-139°56'W	28.9	84.0	904	1,008					0	1	1		
17	8°53'S-139°51'W	28.6	83.5	789	908	22	27					1		
18	8°53'S-140°19'W	28.9	84.0	16	19									
	8°59'S-140°18'W	28.7	83.7	30	33							1		
	8°58'S-140°15'W	28.6	83.5	100	112									
19	8°52'S-139°57'W	28.9	84.0	158	175									
	8°49'S-139°57'W	28.6	83.5	81	87									
20	8°50'S-139°55'W	29.3	84.7	125	144									
	8°44'S-140°02'W	28.7	83.7	98	108									
21	10°22'S-141°18'W	29.8	85.6	232	274									
Feb. 3	25°03'S-130°07'W	26.3	79.3	10	10	33	34					3		
	Bounty Bay													3
4	Bounty Bay													4
	25°00'S-130°07'W	26.3	79.3	11	13	46	83							
	25°01'S-130°10'W	26.3	79.3	28	36	74	108							
	25°01'S-130°15'W	26.3	79.3	2	2	50	65	0	2					
	24°54'S-130°03'W	26.7	80.1			68	91							
	25°02'S-130°07'W	26.6	79.9	8	9	19	21					1		
	Bounty Bay													1
5	23°49'S-133°49'W	26.7	80.1	175	233	300	391	34	43	0	1			
10	15°56'S-141°02'W	28.4	83.1	183	204							1		
	15°59'S-141°32'W	28.3	82.9	9	10							1		
11	16°57'S-144°12'W	28.3	82.9	133	175									
	16°52'S-145°21'W	28.4	83.1	24	26									
	16°58'S-145°25'W	28.5	83.3			31	37							
12	16°21'S-146°57'W	28.4	83.1	47	66	181	218							
	16°21'S-146°59'W	28.4	83.1	10	14	75	86							
	15°54'S-147°00'W	28.4	83.1	60	66									
	15°46'S-146°56'W	28.5	83.3	26	35									
	15°44'S-146°55'W	28.5	83.3	259	335									
13	15°41'S-146°59'W	28.6	83.5			16	26							
	15°41'S-147°00'W	28.6	83.5									2		
	15°40'S-146°59'W	28.6	83.5	1	2	4	4							
	15°39'S-146°58'W	28.6	83.5	24	34	128	188					1		

APPENDIX TABLE 12. (continued)

Date	Location	Sea-surface temperature		Bait-caught								Troll- and handline-caught		
				Skipjack		Yellowfin		Bigeye		Bullet		Skipjack	Yellowfin	Dogtooth
		C	F	Tagged	Total	Tagged	Total	Tagged	Total	Tagged	Total			
Feb., 13	15°42'S-147°01'W	28.6	83.5	36	51	98	118							
	15°38'S-147°00'W	28.6	83.5	4	4	120	170							
16	17°46'S-150°32'W	28.6	83.5	1	1	33	41							

APPENDIX TABLE 13. Length-weight relationships of skipjack and yellowfin in the central Pacific Ocean (from Nakamura and Uchiyama, 1966: last lines of Tables 1 and 2).

Skipjack	<u>Length in cm</u>	<u>Length in inches</u>	<u>Weight in kg</u>	<u>Weight in pounds</u>
	40	15.75	1.20	2.64
	45	17.72	1.78	3.93
	50	19.68	2.54	5.61
	55	21.65	3.51	7.73
	60	23.62	4.70	10.36
	65	25.59	6.16	13.57
	70	27.56	7.90	17.41
	75	29.53	9.97	21.97
	80	31.50	12.39	27.31
	85	33.46	15.19	33.49
	90	35.43	18.42	40.60
Yellowfin	40	15.75	1.17	2.58
	50	19.68	2.32	5.11
	60	23.62	4.05	8.93
	70	27.56	6.49	14.31
	80	31.50	9.77	21.53
	90	35.43	14.00	30.86
	100	39.37	19.32	42.60
	120	47.24	33.74	74.39
	130	51.18	43.10	95.02

APPENDIX TABLE 14. Recaptures of tagged fish released on Cruises 5001-5004.

Species	Release				Recapture				Days free	Miles	Growth (mm)
	Cruise	Date	Area	Length (cm)	Date	Area	Length (mm)				
YF	5001	Oct. 10, 1977	9°00'S-139°59'W	61	Jun. 6, 1979	8°58'S-140°06'W	910	605	7	300	
YF	5002	Mar. 1, 1978	7°58'S-139°58'W	52	Jul. 12, 1979	11°47'N-130°25'W	?	499	1,315	?	
SJ	5002	Mar. 18, 1978	14°48'S-147°29'W	51	Jul. 14, 1978	17°10'S-149°35'W	530	119	187	20	
SJ	5002	Mar. 23, 1978	16°17'S-148°22'W	49	May 6, 1978	18°03'S-149°10'W	?	45	115	?	
SJ	5002	Mar. 23, 1978	16°17'S-148°22'W	?	Jun. 22, 1978	15°43'S-146°20'W	540	92	122	?	
SJ	5002	Apr. 2, 1978	16°26'S-151°36'W	?	Apr. 7, 1978	16°31'S-151°26'W	?	6	11	?	
SJ	5004	Dec. 22, 1979	10°29'S-141°11'W	49	Feb. 28, 1981	2°37'N-171°52'W	645	435	1,994	155	
SJ	5004	Dec. 24, 1979	9°04'S-140°11'W	47	Jan. 7, 1980	8°53'S-140°16'W	466	15	12	-4	
SJ	5004	Dec. 24, 1979	9°04'S-140°11'W	50	Jan. 9, 1980	9°00'S-140°16'W	454	17	6	-46	
SJ	5004	Dec. 24, 1979	9°00'S-140°08'W	47.5	Jan. 18, 1980	8°58'S-140°15'W	485	26	7	10	
SJ	5004	Dec. 24, 1979	9°00'S-140°08'W	48	Jan. 6, 1980	8°55'S-140°17'W	480	14	10	0	
SJ	5004	Dec. 24, 1979	9°00'S-140°08'W	48	Jan. 8, 1980	8°45'S-140°23'W	480	16	21	0	
SJ	5004	Dec. 24, 1979	9°00'S-140°08'W	51	Jan. 5, 1980	9°10'S-140°02'W	510	13	12	0	
SJ	5004	Dec. 25, 1979	9°01'S-140°18'W	47	Jan. 16, 1980	8°53'S-139°56'W	480	23	23	10	
SJ	5004	Dec. 25, 1979	9°16'S-139°56'W	45	Jan. 18, 1980	9°19'S-140°02'W	450	25	7	0	
SJ	5004	Dec. 25, 1979	9°16'S-139°56'W	48	Jan. 7, 1980	8°54'S-140°19'W	479	14	32	-1	
SJ	5004	Dec. 25, 1979	9°13'S-140°01'W	46	Sep. 21, 1980	6°40'N-171°23'W	524	272	2,104	64	
SJ	5004	Dec. 25, 1979	9°10'S-140°04'W	49	Dec. 26, 1979	9°15'S-140°08'W	489	2	6	-1	
SJ	5004	Dec. 25, 1979	9°10'S-140°04'W	47	Oct. 19, 1980	1°56'N-174°18'E	590	300	2,808	120	
SJ	5004	Dec. 27, 1979	9°05'S-140°08'W	46	Jan. 7, 1980	8°53'S-140°16'W	482	12	14	22	
SJ	5004	Dec. 27, 1979	9°05'S-140°08'W	48	Jan. 19, 1980	8°49'S-139°57'W	490	24	19	10	
SJ	5004	Dec. 27, 1979	9°05'S-140°08'W	49	Jan. 11, 1980	8°56'S-140°16'W	490	16	12	0	
SJ	5004	Dec. 27, 1979	9°05'S-140°08'W	49.5	Jan. 9, 1980	9°00'S-140°16'W	499	14	9	4	
SJ	5004	Dec. 27, 1979	9°05'S-140°08'W	50	Jan. 11, 1980	8°57'S-140°16'W	485	16	11	-15	
SJ	5004	Dec. 27, 1979	9°05'S-140°08'W	50	Jan. 7, 1980	8°55'S-140°19'W	500	12	15	0	
SJ	5004	Dec. 27, 1979	9°05'S-140°08'W	51	Jan. 7, 1980	8°55'S-140°19'W	499	12	15	-11	
SJ	5004	Dec. 27, 1979	9°05'S-140°08'W	52	Jan. 12, 1980	8°54'S-140°15'W	508	17	13	-12	
SJ	5004	Dec. 27, 1979	9°04'S-140°13'W	50	Jan. 7, 1980	8°54'S-140°19'W	488	12	12	-12	
SJ	5004	Dec. 28, 1979	8°53'S-140°21'W	46	Sep. 21, 1980	6°40'N-171°23'W	610	269	2,077	122	
SJ	5004	Dec. 28, 1979	8°51'S-140°21'W	48	Jan. 9, 1980	9°00'S-140°16'W	498	13	10	18	
SJ	5004	Dec. 28, 1979	8°51'S-140°21'W	50	Jan. 11, 1980	8°57'S-140°16'W	494	15	8	-6	
SJ	5004	Dec. 28, 1979	8°54'S-140°20'W	45	Jan. 9, 1980	9°00'S-140°16'W	459	13	7	9	
SJ	5004	Jan. 4, 1980	9°01'S-140°05'W	47	Jan. 11, 1980	8°56'S-140°18'W	460	8	13	-10	
SJ	5004	Jan. 4, 1980	9°01'S-140°05'W	47	Jan. 19, 1980	8°52'S-139°57'W	465	16	11	-5	

APPENDIX TABLE 14. (continued)

Species	Release				Recapture				Days free	Miles	Growth (mm)
	Cruise	Date	Area	Length (cm)	Date	Area	Length (mm)				
SJ	5004	Jan. 5, 1980	9°05'S-140°09'W	46	Jan. 16, 1980	8°53'S-139°56'W	465	12	18	5	
SJ	5004	Jan. 5, 1980	9°05'S-140°09'W	49	Jan. 18, 1980	8°58'S-140°15'W	471	14	9	-19	
SJ	5004	Jan. 5, 1980	9°13'S-140°03'W	45	Jan. 12, 1980	8°54'S-140°15'W	459	8	22	9	
SJ	5004	Jan. 5, 1980	9°13'S-140°03'W	45	Jan. 7, 1980	8°54'S-140°19'W	449	3	25	-1	
SJ	5004	Jan. 5, 1980	9°13'S-140°03'W	48	Jan. 11, 1980	8°56'S-140°18'W	488	7	23	8	
SJ	5004	Jan. 5, 1980	9°13'S-140°03'W	49	Jan. 20, 1980	8°50'S-139°55'W	495	16	24	5	
SJ	5004	Jan. 5, 1980	9°10'S-140°02'W	47	Sep. 13, 1980	10°27'S-138°40'W	600	253	112	130	
SJ	5004	Jan. 6, 1980	8°54'S-140°17'W	45	Feb. 4, 1980	8°55'S-140°21'W	500	30	4	50	
SJ	5004	Jan. 6, 1980	8°54'S-140°17'W	47	Jan. 7, 1980	8°53'S-140°16'W	472	2	1	2	
SJ	5004	Jan. 6, 1980	8°54'S-140°17'W	48	Jan. 14, 1980	9°11'S-140°06'W	464	9	13	-16	
SJ	5004	Jan. 6, 1980	8°53'S-140°19'W	51	Sep. 16, 1980	5°29'S-173°34'W	600	255	1,989	90	
SJ	5004	Jan. 8, 1980	8°45'S-140°23'W	?	Feb. 8, 1980	8°55'S-139°59'W	410	32	26	?	
SJ	5004	Jan. 9, 1980	9°01'S-140°16'W	48	Jan. 18, 1980	8°58'S-140°15'W	486	10	2	6	
SJ	5004	Jan. 11, 1980	8°57'S-140°16'W	?	Feb. 1, 1980	8°54'S-140°06'W	490	22	10	?	
SJ	5004	Jan. 11, 1980	8°56'S-140°17'W	50	Jan.-May 1981	0°22'N-175°28'W	?	?	2,175	?	
SJ	5004	Jan. 14, 1980	9°01'S-140°06'W	42.5	Jan. 14, 1980	9°01'S-140°06'W	418	1	0	-7	
SJ	5004	Jan. 14, 1980	9°01'S-140°06'W	50	Mar. 2, 1981	2°06'N-168°59'W	?	414	1,851	?	
SJ	5004	Jan. 14, 1980	9°02'S-140°16'W	42.5	Dec. 2, 1980	17°33'S-149°41'W	570	324	750	145	
SJ	5004	Jan. 14, 1980	9°01'S-140°15'W	46	Jan. 18, 1980	8°58'S-140°15'W	459	5	3	-1	
SJ	5004	Jan. 16, 1980	8°53'S-139°56'W	46	May. 15, 1980	9°19'S-140°00'W	420	121	26	-40	
SJ	5004	Jan. 16, 1980	8°53'S-139°56'W	48	Jan. 28, 1980	8°54'S-140°18'W	520	13	22	40	
YF	5004	Feb. 4, 1980	24°54'S-130°03'W	75	Dec. 16, 1980	14°37'S-90°50'W	1,200	317	2,290	450	
SJ	5004	Feb. 12, 1980	15°44'S-146°55'W	48	Sep. 5, 1980	17°50'S-149°05'W	600	207	177	120	
SJ	5004	Feb. 12, 1980	15°44'S-146°55'W	47	Nov. 29, 1980	17°55'S-149°10'W	595	292	184	125	
YF	5004	Feb. 13, 1980	15°42'S-147°01'W	46	Oct. 20, 1980	17°30'S-149°40'W	?	251	187	?	
YF	5004	Feb. 13, 1980	15°42'S-147°01'W	49	Dec. 30, 1980	17°25'S-150°00'W	?	322	200	?	
YF	5004	Feb. 13, 1980	15°39'S-146°58'W	51	Mar. 15, 1981	17°25'S-149°25'W	700	397	176	190	
YF	5004	Feb. 16, 1980	17°46'S-150°32'W	83	Mar. 3, 1980	17°35'S-150°40'W	840	19	13	10	
YF	5004	Feb. 16, 1980	17°46'S-150°32'W	82	Aug. 27, 1980	17°40'S-150°40'W	600	194	10	-220	



APPENDIX TABLE 15. Persons and organizations concerned with fishing for tunas in French Polynesia. The last two addresses are of those of ship brokers.

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M. J. de Chazeaux  
Centre National pour l'Exploitation des Oceans  
Boite Postale 7004  
Vairao, Tahiti  
Telephone 71214

M. Yves Brosse  
Service de la Peche de la Polynesie Francaise  
Boite Postale 20  
Papeete, Tahiti  
Telephones 20346 and 28148

M. Maurice Bourat  
SOGENAV  
Boite Postale 2445  
Papeete, Tahiti  
Telephone 26706

M. Alain Brun  
Takamura Agency  
Boite Postale 567  
Papeete, Tahiti  
Telephone 28122

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