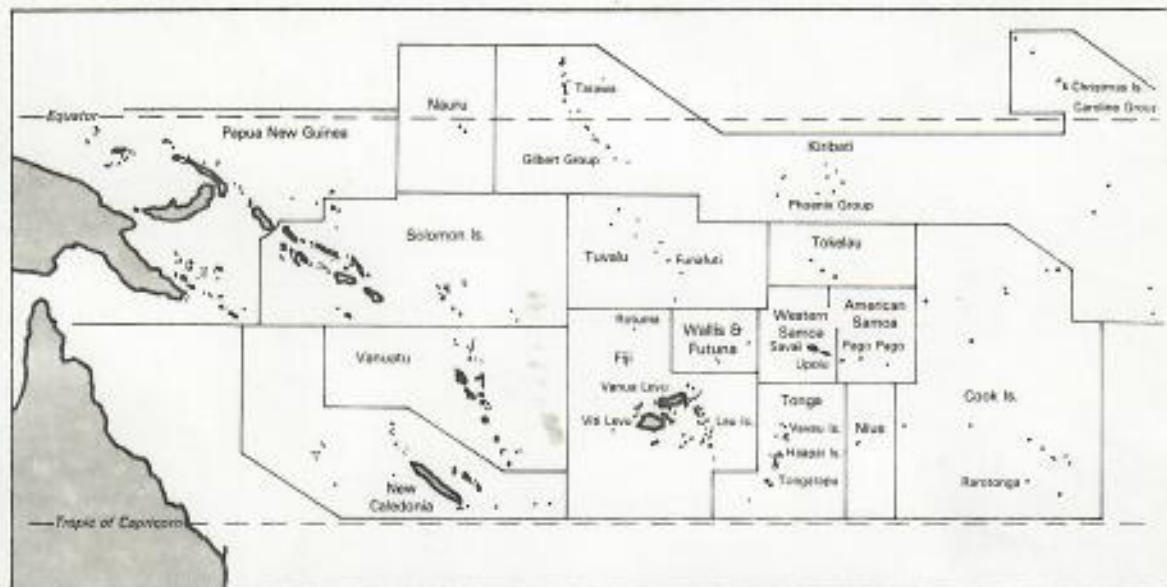


The energy crisis and Pacific island fisheries: problems in paradise

by Leon P. Zann*



The new South Pacific. (Lines do not represent territorial boundaries but do indicate relative sizes of exclusive economic zones.)

FISHING everywhere has been seriously affected by rising fuel prices. In Australia distillate costs have risen by 400 per cent in six years, causing considerable concern in the industry (Ref. 1). Top fishing nations like Japan have even been forced to review their distant fisheries.

But the problems of the large-scale commercial fisheries of the developed countries pale beside those of small, undeveloped third-world nations such as Australia's Pacific neighbours. In the Pacific Islands distances are vast, islands are scattered,

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islanders are dependent on sea transport and on fish for their survival, and fuel is very expensive. Few islands have any potential natural resources or alternative fuels; most newly-independent nations depend completely on foreign aid.

Liquid fuel, the main import, exceeds 30 per cent of most island nations' total imports (Ref. 2). Prices would give Australian fishermen nightmares; petrol costs from A40¢ a litre duty-free in Samoa and Fiji to 95¢ in the remote Tuvalu and the northern Cook Island atolls — and then is not always available.

Soaring fuel costs have affected the prices of all imported goods, inter-island transport, and fish, the protein staple. Whereas rising prices may be absorbed by the Western

consumer, albeit with difficulty at times, rising commodity costs have been a crippling burden to the poorer consumer in the Pacific.

Survey of island fisheries

Pacific islanders formerly were renowned for their fine canoes, seamanship and fishing skills, and their idyllic, independent way of life. However a century of European influence has eroded many of their traditional skills and made them dependent on the outside world. Frequently outboards have replaced sails, while fresh and canned fish are among the major imports to all islands.

To assess the changes in traditional fisheries and fishing vessels, and to project the effects of the fuel crisis, a survey has

been conducted in several of the newly independent 'micro-nations' of the region.

Fiji

(Melanesian) Fiji, one of the largest and richest of the independent island nations, consists of two continental islands and over 300 smaller ones. The population is about 600 000, comprising the descendants of Indian immigrants and indigenous Fijians. The economy is buoyant, with sugar, tourism, fisheries, gold and timber the major revenue earners, but energy demands are high: 1980's fuel bill was about \$100 million, while 1981's promises to be 60 per cent higher.

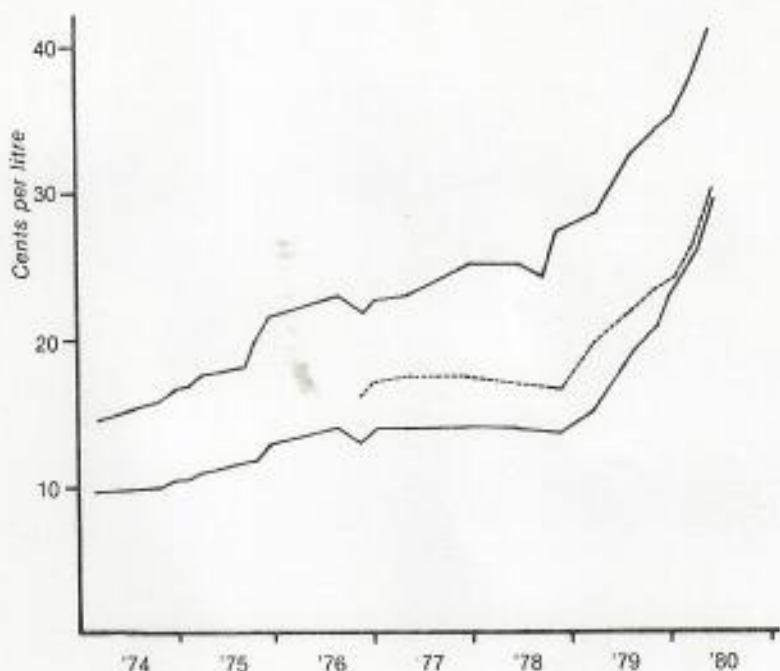
Exports of skipjack tuna landed by the IKA corporation, a Fijian-Japanese joint venture, and tuna from Korean and Taiwanese long-liners, were worth about \$12 million in 1980. However imports of cheap Japanese canned mackerel and New Zealand frozen fish were nearly as high: about \$11.5 million. Despite a high local demand for fresh fish, the local artisanal fishery is poorly developed.

Punts (introduced by Indian immigrants) and outboards have replaced the traditional sailing outrigger, the 'takia' or 'camakau'. Today there are fewer than 100 outriggers in Fiji (mainly confined to the isolated Lau Group), while there are about 4 000 to 5 000 outboard punts. Fiji imports 1 000 outboard motors every year, mainly OMC and Yamahas in the 11 to 26 kW (15-35 hp) range.

The narrow punts, usually seven to nine metres long, although suitable for protected waters, are not ideal fishing craft. Outboards are increasingly expensive to run and few fishermen have any mechanical knowledge: troublesome motors are often discarded. Mechanics visiting outer islands to repair motors have found that many only require clean or new spark



Outboard-powered punts have replaced traditional outriggers in Fiji.



Rising fuel prices in Fiji: wholesale prices of petrol (upper); pre-mix for outboard fuel (middle); and distillate. Increased duty on distillate has brought it to parity with duty-free petrol-oil fuel, poor long-term planning.

plugs! Motors sent for repair from remote islands to the capital, Suva, may take several months to return.

In the artisanal fishery petrol costs may equal 30 to 60 per cent of the gross value of the catch. An outboard punt fishing the Bligh Waters Reefs may make

three or four 120-nautical-mile trips a week because of limited ice storage and carrying capacity. For a weekly catch of 300 kg, worth \$300, fuel may cost \$150 and gear, ice and marketing expenses \$50. Then the profits are shared five ways among three crewmen, the boat owner and

motor owner. The main fishing techniques are drop lining, gill netting and trolling.

Kiribati

The Micronesian Republic of Kiribati (formerly the Gilbert Islands) consists of the equatorial Gilbert, Phoenix and Line Atolls. Scattered over 3 700 km of ocean, the sandy islands have an area of only 720 km² (half of which is Christmas Island) but encompass vast territorial waters of 3.5 million km². The population is 57 000, 30 per cent living on urban South Tarawa, the capital.

The economy formerly depended on Ocean Island phosphate but this was depleted shortly after independence in 1979. Exports, mainly copra, are worth only about \$2.5 million a year, compared with imports of about \$12 million. Kiribati has a subsistence fishing economy; the diet in rural areas comprises mainly coconut (meat and toddy) and fish, with breadfruit, babai (taro) and pandanus.

Despite its vast territorial waters the commercial fisheries are undeveloped. While several hundred Korean and Taiwanese vessels are licensed for long-lining, Kiribati Fisheries operates a single live-bait skipjack vessel (with limited success to date).

Because it is against the islanders' customs to sell fish, commercial artisanal fisheries are confined to urban Tarawa where about 40 outboard speed boats regularly pole-and-line for skipjack and 90 smaller outboard dinghies fish near-shore waters.

Fuel consumption is high: skipjack boats, powered by 30 kW (40 hp) motors, travel at least 200 nautical miles a week, using about \$150 of petrol to catch about 200 kg of tuna worth some \$300. There is evidence that the fishing effort is decreasing because of high fuel costs; some fishermen are reluctant to use fuel when fish may be scarce and they do not have the necessary capital reserves to cover days of low catches.



The sailing canoe 'te wa' has been refined since Western contact in Kiribati. Outboards are confined mainly to the capital, Tarawa.

The large subsistence fishery is based on the outrigger canoe 'te wa', a fast, lightweight vessel carved planked and lashed together with coconut string in the traditional manner. No metal fastenings are used. While the lack of suitable timbers once limited canoe building, it has increased since imported timbers became available. Today there is about one canoe for every 10 people in the outer islands.

The main types of subsistence fishing include drop-lining on shallow and deepwater reefs (to 250 m), trolling for tuna, pole-and-lining skipjack, flare-fishing for flyingfish, trapping and netting on reefs and lagoons, spearfishing, and foraging for molluscs and shellfish.

Tuvalu

Formerly the Ellice Group in the Gilbert and Ellice Islands Protectorate, Polynesian Tuvalu consists of eight small inhabited coral islands with a land area of only 26 km², supporting a population of 7 500, scattered in territorial waters of 1.3 million km². Sole exports are copra (about \$60 000 a year) and postage stamps (about \$83 000), while imports exceed \$2.5 million.

Although 140 Korean vessels are licensed for long-lining, Tuvalu has no commercial fishery. Sale of fish is against custom in rural areas but a small outboard fleet in the capital village, Funafuti, provides wage-earners with fresh fish. About 70 small aluminium and bondwood dinghies (four to six metres long and powered by 13.5 to 30 kW motors) regularly fish for skipjack, the most popular food, as well as other tunas and reef fish. Fuel costs are high — about 85c a litre. An average dinghy may use more than \$70 in fuel each week to catch fish worth \$120. Because of high fuel costs fresh tuna in Funafuti retails at \$1.80 a kg, and canned fish imports are high.

The subsistence fishery of the outer islands is based on some 750 Tuvaluan dugout outriggers, or 'vakas', and imported Gilbertese canoes. There are relatively few outboards, about 30 in all, and these belong to salaried workers or families with someone working overseas.

Because some islands lack lagoons, pelagic fish are most important. The staple is flyingfish, but a variety of tuna and other pelagics, and reef fish, are also important. The



A canoe-builder at work on Nanumea Island, Tuvalu.

Tuvaluans are among the finest blue-water fishermen of the Pacific and frequently catch billfish from their small canoes.

Tonga

The Polynesian Kingdom of Tonga consists of three groups of mainly low coral islands with a total area of only 668 km² and a fast-growing population of 96 000. Although the economy is mainly agricultural, foodstuffs comprise 30 per cent of all

imports. The balance of trade is adverse: in 1978 imports were \$22.3 million while exports were \$4.6 million; fish imports were worth \$215 000 and fish exports \$126 000.

The local commercial fishery is undeveloped. Trials with two Government-owned Japanese skipjack pole-and-liners and a long-liner (supplied from Australian aid) have been disappointing; total landings are only about 100 tonnes a year.

The artisanal fleet consists of 420 small lagoon dugouts or 'popaos', 200 outboard dinghies, 50 sailing boats and nine launches. Dinghies (four to seven metres) are well constructed in carvel or clinker planks. Also used are whalers (nine to 11 m), little changed since their introduction a century ago.

Because of the failure of large-scale fishing trials, Tonga's Fisheries Division is now promoting the artisanal fishery. In the next five years 60 motor-sailing vessels of about 10 m are to be built locally and sold on easy terms to fishermen. Also slipways, ice plants and freezers are to be located on the main islands. A range of vessels is now under construction and trial.

Western Samoa

Independent Polynesian Western Samoa is made up of two volcanic islands, Upolu and Savai'i, with an area of 2 000 km² and a rapidly expanding population of about 160 000. With copra and tourism the sole industries, Samoa's economy is hard pressed; it has the lowest per capita income in the region and soaring inflation.

Until recently fish imports were very high but a United Nations promotion of the artisanal fishery has successfully increased skipjack landings. An 8.5-m outboard catamaran named *Alia* was developed in 1975 and several hundred have since been sold to fishermen on easy terms. Tuna aggregation rafts, strategically placed in deep water near fishing villages, have greatly increased catches as well as saved fuel.

The traditional lagoon canoe, the 'paopao', remains important in the subsistence fishery, but the bonito canoe, the 'va'a alo', is being replaced by the outboard *Alia* type.

Cook Islands

Independent but in free association with New Zealand, the Polynesian Cook Islands are a chain of volcanic islands and atolls with an area of 230 km²,

lost in 2.3 million km² of sea. The permanent population is 18 000, while a similar number lives in New Zealand.

Tourism, citrus fruits and pearl oysters provide the main industries but the economy remains dependent on New Zealand. Half its foodstuffs, including fish, are imported.

With the exception of a small fleet of *Alia*-type vessels fishing from Rarotonga, commercial fisheries are unexploited. The traditional dugout canoe is still used in sheltered lagoons but a small lightweight ply outrigger has evolved for nearshore dropline tuna fishing. Outboard powered alloy dinghies are common in the atolls although petrol is prohibitively expensive; for instance, it is 90c a litre in Manihiki. Money for fuel comes mainly from remittances sent by relatives in New Zealand, pearl shell and copra.

Problems in fisheries development

The newly-independent Pacific island nations face a dilemma in fisheries development. Anxious to achieve economic independence, they have looked to their vast, recently-declared exclusive economic zones but most islands lack the capital, the shore facilities, and the mechanical, fishing and managerial skills needed for large-scale off-shore fisheries. The rising price of fuel, threatening established fisheries world-wide, promises to be the major constraint to development (Ref. 3).

The artisanal (small-scale commercial and subsistence) fishermen are even more seriously disadvantaged, because many replaced their traditional craft with mechanised introduced vessels during the era of development and cheap fuel between about 1950 and 1973.

In the more developed islands, in particular, outboards revolutionised fishing and communications. Convenient, cheap, easily-installed and easily-



Whaleboats, introduced by the Cook family, are still widely used in Tonga for transport.



The *Alia* catamaran has revitalised the skipjack fishery in Samoa.

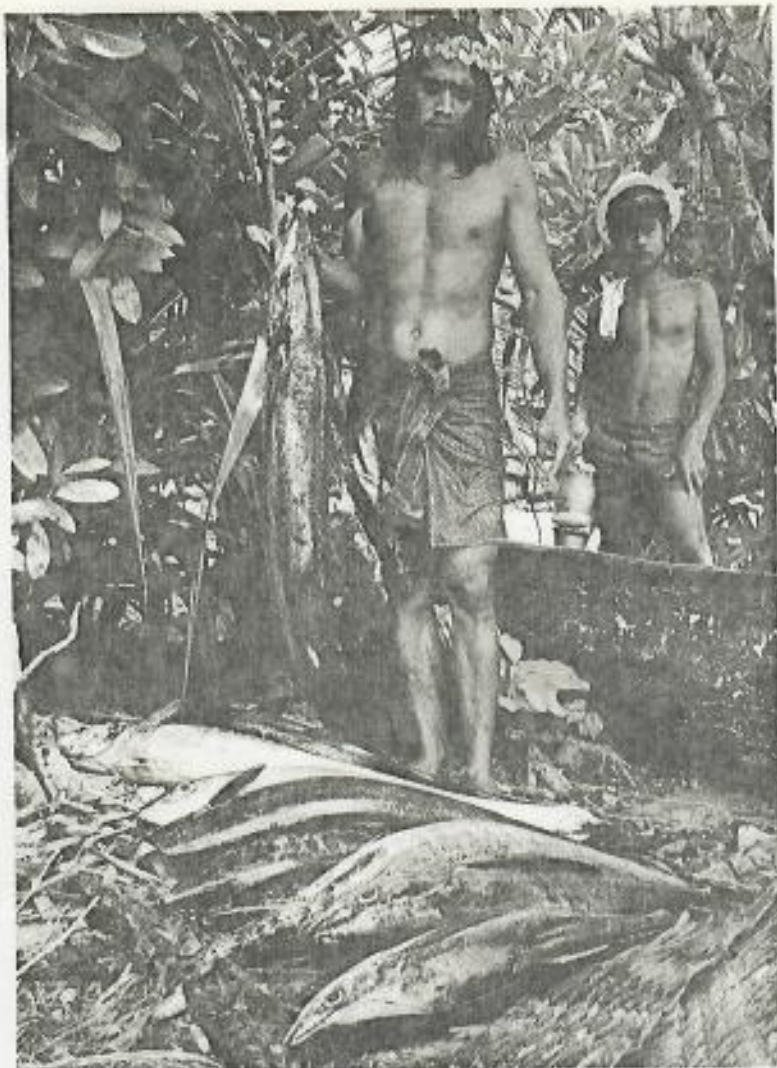
maintained, and with a good power-weight ratio, outboard motors were widely promoted by governments and fishing advisory agencies as being suitable for third-world fishermen.

There has been a second side to the outboard revolution: islanders remain mechanically naive, motors are poorly maintained, spare parts are difficult to obtain in remote islands, traditional building and sailing skills have been lost, and outboards designed mainly for recreational use have proved unsuitable for hard, sustained operation. But their greatest fault, in the context of the

Pacific Islands, is their high fuel consumption.

Despite mechanisation, the domestic fisheries have not kept pace with the increasing demand for fish resulting from an expanding population, urbanisation, and the growth of the cash economy. There has been a decline in fishing craft and catch effort: no Pacific island nation is self-sufficient in fish.

The diesel launch, the logical alternative to the outboard, has not been widely adopted in the Pacific, probably because few islanders can afford \$10 000 or more for an eight-metre launch.



Blue-water fishermen on Nanumea.

An eight-metre punt and 18 kW (25 hp) outboard costs only \$1 100 in Fiji: the difference could buy a lot of fuel and replacement motors! Launches also are heavier, slower, deeper-drafted and more difficult for beach launchings, while diesel mechanics are more difficult, and distillate is expensive and dutiable. Pacific fishermen are generally unaware of their greater carrying capacity, range, seaworthiness (increasing fishing time), reliability and fuel economy.

There are other problems in fisheries development. The resource is probably limited:

Australian Fisheries, March, 1982

Central Pacific waters are not highly productive; islands lack continental shelves; and, although coral reefs are highly productive oases, their high species diversity and topography make them difficult to fish on a large scale. The islanders themselves also lack the profit motive of foreign commercial fishermen; life styles are simple and it is relatively easy to catch enough fish to live on.

Promotion of artisanal fisheries

Island nations are only slowly recognising that their artisanal

fisheries must be established before large-scale export fisheries can be contemplated. Over the past five years alternative fishing craft, low-interest loans, and improved marketing facilities have been promoted by fisheries bodies (FAO, SPC and ICLARM), aid agencies and regional fisheries divisions.

The low cost Samoan *Alia* (\$2 500 in ply and \$5 000 in alloy, complete with motors) successfully revived fishing there and has been introduced into several other countries. An 8.5-m diesel launch, also developed for Samoa, has been successfully introduced into Fiji, where 50 have been sold (\$5 000 complete, subsidised by Japanese aid). In Tonga a range of motor-sailers eight to 10 m long (\$5 000 to \$10 000 subsidised) is being developed. Tuvalu and Kiribati may promote motor-sailer catamarans for artisanal fishing, while a more innovative W-hulled, junk-rigged motor-sailer has been developed in New Caledonia.

Although it is inevitable that the Pacific must suffer seriously in the energy crisis, the early development of energy-saving diesel motor-sailers, aggregation rafts, efficient cold-storage, preservation and marketing facilities, and more innovative fishing methods, should soften the impact and lead to self-sufficiency.

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In this issue

A hard year

Many sectors of the Australian fishing industry had another hard year in 1981 as most of the economic and marketing problems faced in the previous year continued. An article beginning on page 2 explains what went wrong and looks at prospects for this year.

BAE fisheries role

Commonwealth responsibility for research into the economics of the fishing industry has been transferred from the Fisheries Division to the Bureau of Agricultural Economics. An article beginning on page 14 outlines what the move will mean for the fishing industry.

Problems in paradise

Fishing everywhere has been seriously affected by rising fuel prices, but the problems faced by Australia's small, undeveloped Pacific Island neighbours are particularly acute. University of the South Pacific scientist Dr Leon Zann examines those problems and the steps being taken to overcome them in an article beginning on page 26.

Trawling for profit

The Tober family of Portland in Victoria are proving that fish-trawling can be profitable — but they have developed a special formula for success. See pages 30-33.

Handling fish

A conference in the United States last year looked at the basics of fish handling and at advances in the technology of chilling, freezing, processing, storage and transport, both at sea and ashore. CSIRO food technologist Stephen Thrower, who attended the conference, describes some developments that may have an application in Australia in an article beginning on page 36.

Queensland oysters

At the turn of the century the oyster industry was southern Queensland's largest fishery but today it is one of the smallest. On pages 42-45 Glen Smith, a technician with the Queensland Department of Primary Industries' Fisheries Research Branch, examines the reasons for the industry's decline.

Front cover

Fisherman Dieter Shuelein cleaning a day's catch of snapper and bream at Seal Rocks (NSW). Photo by Jeremiah S. Sullivan.

Australian Fisheries

Volume 41 Number 3 March 1982

Special features

- 1981 another hard year for fisherman 2
- Tasmanian fisheries production up 9
- 'Brit' a vital food supply in SE Tasmanian waters 10
- BAE to carry out fisheries economic research 14
- The energy crisis and Pacific Island fisheries 24
- Tober's turning a profit from trawling 30
- Handling fish — US conference looks at basics and beyond 36
- What happened to the Queensland oyster industry? 42
- What do participants want from fisheries seminars? 48
- Liferaft procedures 54

Regular features

News net

- Aqua Enterprise nets orange roughy off Portland 17
- NZ boats to get one-third of orange roughy catch 18
- Giant UK trawlers bought by NZ to boost deepwater catch 18
- More roughy caught off Tasmania 19
- Joint venture critic 19
- Indonesian export boost 19
- Tuna tag reward 19
- Tuna catch up in SA 19
- Spawning blue grenadier caught off Tasmania 20
- NZ sashimi price 20
- Shark Bay net restrictions 20
- New packing plant for Eden 22
- US to take part in Law of the Sea Conference 22
- New restrictions in Coral Sea Islands 22
- US speaker for Sydney forum 23
- NT appoints ex-FAS as adviser 23
- More squid, tuna mesh-netting trials 23
- Review of coastal surveillance needs 55

Boats and gear

- US-built seiner for New Zealand 46
- Hydraulic priority valves 46
- High-performance vessel from Precision Marine 47
- Two more JRC radars for small boats 47
- Slip-resistant deck coating 47

Publications

- Mathematical models and their use in fishery management 52
- Tropical processing 53
- Angling volumes 53

Processing notes

- Acceptable salted jellyfish produced in UNSW trials 34
- New factory to supply seafood to rural Victoria 35

Australian fish market prices 50

Classified advertisements 70

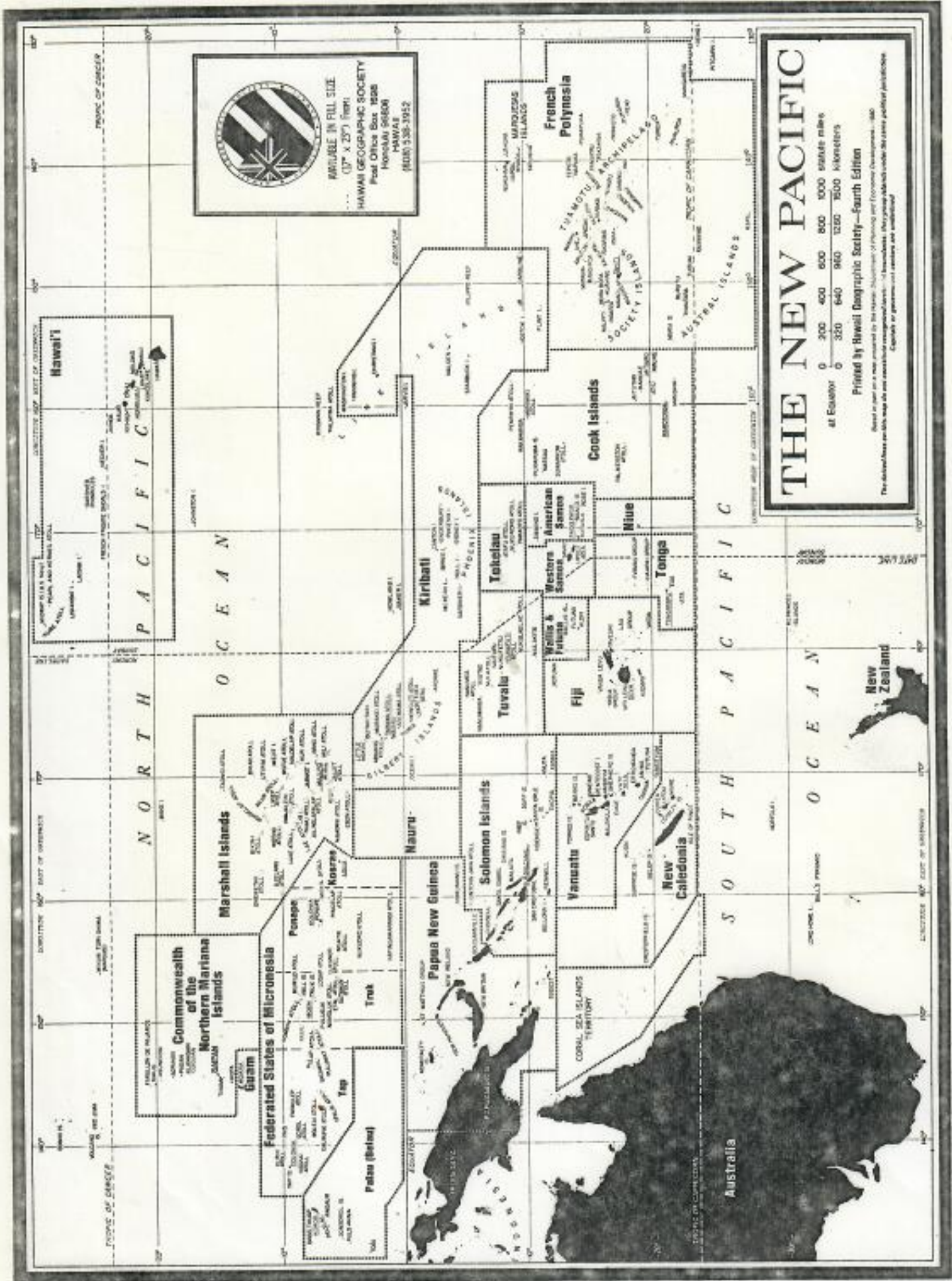
Advertisers' index 72

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