**Problems of drift-net fisheries
in the South Pacific**

by

Andrew H.Richards
FFA Research Coordinator

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Summary

Drift-nets are specialised gill nets, which when allowed to drift with winds and currents, gill, entangle and enmesh a wide range of living marine organisms. Though drift-net fishing has been used for some time in other areas of the world, it only commenced in the South Pacific in the mid-1970s. In the North Pacific, drift-nets have been mainly used in fisheries for squid, salmon and albacore tuna, while in the South Pacific, squid, sharks and albacore tuna have been the target species. Objections to high drift-net by-catch levels of non-target species, catches of marine mammals, and in some cases, hazards to shipping, led fisheries authorities in Australia, New Zealand and Papua New Guinea to introduce measures which eventually led to the cessation of drift-net fishing activities in areas under national jurisdiction

The rapid expansion of the large-scale pelagic drift-net fishery for South Pacific albacore tuna and the magnitude of drift-net catches, engendered concern at a regional and international level for specific resources and the marine environment generally. Swift action by regional fisheries agencies and Pacific Island countries resulted in the 1989 call for the cessation of drift-net fishing in the South Pacific, in the form of the Tarawa Declaration. The Declaration's resolutions were addressed by the drafting of the Wellington Convention, essentially the establishment of a series of obligations directed towards banning drift-net fishing in the region.

These developments in the South Pacific helped to energise international action, which eventually resulted in the adoption by the UN General Assembly of three resolutions on drift-net fishing. The most recent resolution (46/215 of 20 December 1991) established a moratorium on drift-net fishing in all of the world's oceans. Korea, Japan and Taiwan have responded to this regional and international pressure by withdrawing their drift-net fishing vessels from the South Pacific region. Though it is reported that there have been recent minor infringements of the moratorium in the North Pacific, it is unlikely that large-scale drift-net fishing will re-commence in the South Pacific. It is assumed that stocks of those species formerly taken by drift-nets in the South Pacific are recovering, as a direct result of the cessation of drift-netting.

Introduction

Fishing with long drift-nets rapidly achieved South Pacific regional and international notoriety in the mid to late 1980s, culminating in the adoption by the United Nations (UN) General Assembly of resolution 46/215 on December 20, 1991. This resolution established a moratorium on drift-net fishing in all of the world's oceans, including enclosed and semi-enclosed areas, by December 31, 1992 (Anon., 1993a). The drift-net issue has become a model for concerted international action at the diplomatic and political level (Swan, 1991). The problems of drift-net fisheries in the South Pacific, and the measures developed to deal with them, played a major role in that process.

Drift-nets as a special case of gill-nets, and their use in fishing

When is a gill-net a drift-net?

Gill-nets are made of either multi-filament twine or mono-filament nylon, woven into netting designed to lock behind the gill covers of bony fish or the gill slits of sharks. Gill-nets have been in world-wide use in inshore waters for many centuries, though it wasn't until the 1950s that use of lightweight, synthetic fibres allowed the technology of very long nets, extending to 50-60 km, which could be used for drift-net fishing. Net length varies depending on the number of multi-filament nylon panel units that are connected together, and the length of each unit (Swan, 1991).

Drift-net fishing is a passive practice, by which the surface layer of the ocean is fished with nets allowed to drift with winds and currents. Drift-nets are held open in a vertical position by the tension exerted between numerous floats on the floatline and a weighted leadline. Marine organisms become gilled, entangled or enmeshed in the netting. Large mesh drift-nets can entangle large fish because they are loosely hung, lightly weighted and slightly buoyant. This type of gear is designed specifically to capture living marine organisms of a wide range of sizes and species, and is consequently less selective by species than gill-nets which have been staked to the sea-bed or tightly hung (FAO, 1990).

It should be noted that there is a clear distinction between the use by artisanal fishermen of small gill-nets inshore or near-shore, and large-scale off-shore drift-netting. The difference is partly one of degree, since many small nets are equivalent to one set of a very large net. For example, passively set gill-nets in near shore areas may have serious impacts on migratory target species. In the Western Province of Papua New Guinea, the coastal fishery for barramundi (*Lates calcarifer*) is under threat from the use of small-mesh gill-nets to catch juvenile barramundi migrating to inland fresh water rivers and lakes, thus causing an unquantified amount of growth over-fishing (Augustine Mobiha, Fisheries Biologist, pers.comm.). Fish stocks are under threat in Tarawa Lagoon, Kiribati where the rapid increase in numbers of passively set gill-nets may have subjected stocks to a level of fishing effort that cannot be supported indefinitely (Yeeting and Wright, 1989).

Diversity of drift-net fisheries

A wide variety of gill-nets and set or entangling nets, fishing for pelagic fish on the surface, and demersal fish, crustaceans and cephalopods close to the bottom, are currently used inshore. The nets typically have not exceeded several hundred metres per boat. Northridge (1991) provides a comprehensive account of drift-net fisheries throughout the world.

Recent examples of "long" drift-net fisheries in the Pacific include: the high-seas salmon (principally chinook salmon, *Oncorhynchus tshawytscha* and coho salmon, *O. kisutch*) drift-net fishery in the North Pacific; the squid (principally neon flying squid, *Ommastrephes bartrami*) drift-net fishery in North Pacific; and the large mesh drift-net fishery, initiated in the North Pacific in the mid-seventies and in the South Pacific from the mid-eighties, which targeted albacore tuna (*Thunnus alalunga*) (Northridge, 1991).

Problems of drift-net fisheries

The rapid expansion of drift-net fleets in the South Pacific from 1988 was a cause of deep concern to South Pacific countries and territories because of doubts about the ability of the albacore stock to sustain increased catches by foreign fleets, (drift-netting can provide an economically viable return even when target stocks have been significantly depleted), and the impact of drift-net fishing on non-target marine species and the marine environment (Wright & Doulman, 1991). The concerns associated with drift-nets in the North Pacific (Anon., 1989a) are strikingly similar to those in the South Pacific.

Though most forms of pelagic fishing incur some form of incidental or by-catch, the by-catch problems caused by drift-net fishing are of particular concern because of the range of species affected, the lack of technological or management solutions which might reduce the impacts, and the scale upon which the practice affects non-target species. In the North Pacific, a wide range of non-target species is represented in the catch of the salmon drift-net fishery, including mammals, birds, fish and squid (Northridge, 1991). In the South Pacific, Sharples *et al.* (1991) recorded a broad range of non-target fish species taken by albacore tuna drift-net operations, in addition to turtles, cetaceans and seabirds. They recorded a minimum of 46 species including 5 cetacean species in 2 cruises of the Japanese research vessel *Shinhoyo Maru*. In a survey of albacore tuna drift-net operations in the same region, Coffey and Grace (1990) identified more than 15 non-target species, 2 of which were mammals.

Drift-nets lost or discarded at sea which continue to catch fish and other marine species for an indefinite period have been termed “ghost nets”. Though the evidence for “ghost fishing” is largely anecdotal, there are strong suggestions that ghost drift-nets were common in the South Pacific during the mid 1980s (Anon., 1991).

Both actively fished and lost nets pose a hazard to small and large merchant vessels alike. Anon. (1991) states that despite international requirements for improved marking of drift-nets and some progress in this regard, the low aspect of surface floats for drift-nets makes the nets very difficult to detect.

If a drift-net is retrieved in heavy seas, as much as 40 per cent of the targeted fish caught can be lost through netted fish dropping out of the net, which is known as “drop-out” (Swan, 1991). In the South Pacific, visible drop-out of fish as drift-nets were lifted clear of the water and brought on board a research vessel was estimated by Sharples *et al.* (1991) to be 4-9 per cent. The reasons for variable drop-out may relate to differences in weather conditions during hauling, differences in fish size in relation to mesh size, and other factors (Anon., 1991).

Drift-net fisheries for shark and squid in the South Pacific

Although drift-net fishing has been in use for some time in other areas of the world, its use in the South Pacific region is a relatively recent development. Experimental and large-scale pelagic drift-nets have been used in the South Pacific since the mid-1970s.

Arafura Sea shark fishery

The most extensively studied drift-net fishery in the South Pacific region is the large-scale pelagic drift-net fishing by Taiwanese vessels for sharks (mainly black-tip sharks, *Carcharhinus tilstoni* and sorrah sharks, *C. sorrah*), Spanish mackerel (*Scomberomorus* spp.) and long-tail tuna (*Thunnus tonggol*) which began in 1974 in the waters of the Arafura Sea north of Australia. In 1976 there were 67 vessels licensed to operate in the fishery, but this was reduced to 30 in 1979, increased to 38 in 1984 and fixed at 18 in mid-1985, prior to the termination of the fishery in 1986 (Northridge, 1991). Several species of small cetaceans were taken incidentally in this fishery, mainly bottlenosed dolphin (*Tursiops truncatus*) and spinner dolphin (*Stenella longirostris*), together with smaller numbers of spotted dolphin (*S. attenuata*). Single specimens of Indo-Pacific humpbacked dolphin (*Sousa chinensis*) and false killer whale (*Pseudorca crassidens*) were also taken (Harwood & Hembree, 1987).

Between 1975 and 1978, average catches were over 17,000 mt, with sharks representing 70 per cent of total weight (Walter, 1981 in Nichols, 1993), the catch being landed in Taiwan.

Taiwanese gill-net catches reportedly peaked at over 20,000 mt in 1978, although some of this may have come from waters now within the Indonesian 200 mile Exclusive Economic Zone (EEZ) (Lyle & Timms, 1984).

When the Australian Fishing Zone (AFZ) was declared in November 1979, the Australian Government imposed management measures on the northern shark fishery, including restriction of Taiwanese gill-netting to specific offshore areas within the AFZ, closure of the area within 24 km of the coast and a catch quota of 7,000 mt processed weight of shark (Branford, 1984 in Nichols, 1993). This was further reduced to 6,000 mt annually in 1985, due to concern over dropping catch per unit of effort (CPUE) for sharks in the fishery and increasing involvement of Australian vessels in the fishery (Lyle, 1987).

Analysis of the Taiwanese catch and effort data indicates a concerted attempt to maintain total catch; average net length increased from 8 km in 1979 to around 16 km in 1986, with effort doubling between 1982 and 1983. During this period, CPUE declined from 16 kg.km⁻¹ hr⁻¹ to about 7 kg.km⁻¹ hr⁻¹. Other signs of over-fishing included a steady decline in average length of the dominant shark species over the years (Nichols, 1993).

In 1986, the Australian Government banned the use of pelagic gill-nets over 2.5 km length, a measure which resulted in many of those Taiwanese vessels operating under foreign access arrangements leaving the northern shark fishery, due to such short nets being considered uneconomic for their operations. The Taiwanese fishery in the AFZ closed the same year. The ban was instituted largely as a result of the by-catch of small cetaceans, which Harwood & Hembree (1987) estimated to be in the order of 14,000 animals for the period June 1981 to December 1985 (3,100 per year).

Following the ban on their operations in Australian waters, the Taiwanese fleet appears to have moved to Indonesian waters. Northridge (1991) reports that in 1987, a drift-net fishery involving at least 48 Taiwanese drift-net vessels continued to operate in the Arafura Sea in the Indonesian EEZ. Though information on non-target catches is unavailable, it is expected that the cetacean catch rates would be similar to those recorded in northern Australian waters. Occasional illegal operations of these vessels in the Torres Strait Protected Zone (TSPZ) between Papua New Guinea (PNG) and Australia are a continuing source of concern to both countries.

Gulf of Papua shark fishery

Commercial drift-netting for sharks in PNG waters began as a result of favourable fishing trials conducted 30 km offshore in the western Gulf of Papua during late 1976 and early 1977. In 1980, licences were issued to a Taiwanese fishing company operating in a joint-venture with a PNG registered company, to commence commercial shark fishing using gill nets. Five vessels, using drift-nets averaging nine kilometres in length operated during 1981, but this was reduced to two in 1982. Either 1 or 2 vessels were active in the fishery from 1982 until the end of 1992, licensed to fish with short gill-nets of 1.6 km in length (Anon., 1990 in Nichols, 1993).

Reliable data for this fishery are only available for 1981 and 1982 (Chapau & Opnai, 1983; Anon., 1982 in Nichols, 1993). The fishery yielded a total of 810 mt of sharks in 1981 and 405 mt in 1982; average catches rates were 1.01 mt.day⁻¹ in 1981 and 0.80 mt.day⁻¹ in 1982. The catch was dominated by the scalloped hammerhead shark (*Sphyrna lewini*) which accounted for 40 per cent by weight. An incidental catch of pelagic species of bony fish, principally barred Spanish mackerel (*Scomberomorus commerson*) was reported to account for approximately 8 per cent by weight. No information was recorded regarding other components of the incidental catch, though anecdotal information from Papua New Guinean crew members on the drift-net vessels suggests that cetaceans and turtles were frequently entangled in the nets.

PNG fisheries authorities received many complaints from captains of prawn trawlers operating in the Gulf of Papua, regarding the navigation hazards caused by drift-net vessels

fishing with drift-nets 4 to 5 times longer than the 1.6 km allowed in their licences. Though the vessel's licences precluded them from fishing west of 144° 30'W in the Gulf of Papua, there were many sightings and several apprehensions of the vessels in the TSPZ by PNG fisheries enforcement officers. Improved enforcement of the licence conditions and close scrutiny of the fishery in light of moves throughout the South Pacific to take action against the practice of drift-net fishing in the region (Stewart, 1990), resulted in the non-issuance of licences in 1993.

Tasman Sea squid fishery

An early (1981) drift-net fishing venture in the region was the limited and largely unsuccessful exploratory drift-net fishing for neon flying squid (*O. bartrami*) and arrow or Gould's squid (*Nototodarus gouldi*) in New Zealand waters by four Taiwanese vessels. Nets with 100 mm mesh size were used, which were similar in all other respects to those employed later in the South Pacific albacore tuna drift-net fishery. Licences were suspended soon after commencement of operations, because of unacceptably high by-catches of non-target fish (shark, tuna and mackerels) and marine mammal species (Wright & Doulman, 1991) which included common dolphins (*Delphinus delphis*) (Murray, 1989 in Wright & Doulman, 1991). Drift-net trials in Australian waters off Tasmania were halted because it was more profitable to catch the squid target species by jigging. Recent squid jigging trials by US and Japan in the North Pacific also show that jigging has economic potential in areas where formerly it was thought only drift-net fishing would be economically viable (Anon., 1991).

Drift-net fishing for South Pacific albacore tuna

Japan began conducting exploratory drift-net fishing for slender tuna (*Allothunnus fallai*) in the South Pacific region in October 1982, using vessels from the Japan Marine Fishery Resource Research Centre. From 1983/84 the Japanese vessels broadened their range of target species and areas fished to investigate the fishery potential for pomfrets (three species of the family Bramidae) and albacore tuna. In the 1985/86 season, approximately 9 Japanese vessels drift-netted South Pacific albacore tuna, mainly in the Tasman Sea (Anon., 1991).

In the mid-1980s drift-netting by mainly Japanese and Taiwanese vessels took place from November to March in high seas waters south of Tonga, French Polynesia and Cook Islands in the region of the Sub-Tropical Convergence Zone (STCZ), and west of New Zealand in the Tasman Sea. After a rapid increase in drift-net vessel numbers to at least 130, and perhaps as many as 198, in the 1988/89 season, the fleet was reduced to 32 vessels in the 1989/90 season and to 9 vessels in the 1990/91 season. These vessels were withdrawn from the fishery at the end of the 1990/91 fishing season. Nationality and estimated numbers of vessels drift-netting for albacore from 1985/86 to 1991/92 are given in Table 1 (Richards, 1993).

In general, all offshore types of drift-net can be operated from a variety of types of vessel, and switching between gears or target species does not involve major re-fits. In the latter years of the fishery, vessels in the pelagic drift-net fleets included multi-purpose boats which carried drift-nets to target albacore tuna, and at least one other gear type for other types of fishing. A fairly high proportion of vessels, particularly in the Taiwanese fleet, were old vessels converted from other fisheries. Displacement of vessels from some foreign EEZs and existing drift-net fisheries appears to have contributed to the increased drift-net effort in

Table 1. Number and nationality of drift-net vessels believed to be operating in the South Pacific from 1985/86 to 1991/92.

	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92
Japan ¹	9	11	21	65	20	0	0
Taiwan ²	0	0	7	71	12	9	0

Korea	0	0	0	1	0	0	0
TOTAL	9	11	28	137	32	9	0

- Notes:
1. The Japanese drift-net fleet included 1 or 2 research vessels.
 2. Estimates for the number of Taiwanese drift-net vessels represent the number of vessels licensed to fish.

other areas, including the South Pacific and Indian Ocean (FAO, 1990). The rapid increase in the number of vessels involved in large-scale drift-net fishing in the South Pacific has also been attributed to drift-netting being a more cost-effective form of fishing than other tuna fishing methods. It is also possible that it was economically more attractive for fleets to re-deploy to the South Pacific during the North Pacific inter-season layoff rather than return to home ports and maintain crews on retainers (Wright & Doulman, 1991).

Most Japanese drift-net vessels were 300-400 GRT and carried a crew of 15-20. Each vessel reportedly completed 30-50 fishing days during the November to February season. The Taiwanese fleet probably employed gear and fishing techniques similar to the Japanese fleet. Vessels of both fleets also operated in the North Pacific squid drift-net fishery.

Drift-nets were set at dusk with retrieval starting at about midnight. Vessels made one set per day using 4-10 sections of net with each section being 4-6 km long, the total length of the net varying from 16 to 60 km. Mesh size of the nets ranged from 165-220 mm, the majority of the nets having meshes of 170-180 mm.

The nets were buoyed at regular intervals along their set length. Although buoyancy of the nets was adjustable for sub-surface fishing, this was only attempted in the South Pacific on an experimental basis. The Japanese reported that deployment of the net in this way resulted in no marine mammals, seabirds or turtles being retained by the nets. However, successful employment of this practice in commercial operations was never satisfactorily demonstrated (Wright & Doulman, 1991).

The total estimated drift-net catch of albacore tuna in the South Pacific rose from 2,000 mt in the early 1980s to 5,200 mt in the 1988/89 season, to 25,000-49,000 mt in the 1989/90 season, and back to 7,500 mt in the 1990/91 season. The rapid increase in the yield of the surface albacore tuna fishery, due principally to drift-net catches, was a cause of concern to South Pacific Albacore Research (SPAR) Working Group¹. In reviewing the status of the albacore stock during their second meeting in June 1989, the SPAR scientists expressed grave doubts that the total surface catch of juvenile albacore tuna was sustainable at the 1988/89 levels (Anon., 1989b). This concern was in turn expressed by coastal states of the region (Murray, 1990).

National, regional and international action regarding drift-net fishing in the South Pacific

Measures taken by individual national authorities in the Arafura Sea shark fishery, Gulf of Papua shark fishery and Tasman Sea squid fishery have already been described. In these cases, the measures applied at a national level led to the cessation of drift-net fishing activities in areas under national jurisdiction. The nature of the albacore tuna drift-net fishery, particularly its pursuance on the high seas, required concerted action at a regional and international level to address the combined threats posed by drift-nets to specific resources and the marine environment generally.

¹An informal group of albacore tuna scientists from the South Pacific and Distant Water Fishing Nations

Action by South Pacific nations regarding the albacore tuna drift-net fishery

The South Pacific Forum Fisheries Agency (FFA), the Tuna and Billfish Assessment Programme (TBAP) of the South Pacific Commission (SPC) and SPAR were well placed to deal with the urgent situation posed by the rapidly increasing number of drift-net vessels in the South Pacific (Swan, 1991). The first information that the drift-net fishery, already estimated by SPAR to be fishing at about the maximum sustainable yield level, was likely to increase sharply, was received toward the end of 1988. This matter was addressed in a Consultation among concerned countries, convened in Fiji by FFA in November, 1988. At the Consultation, agreement was reached on a Plan of Action which included a regional embargo on the acceptance of drift-net-caught fish by canneries and cold stores, a ban on transshipment of drift-net-caught fish within the region and a ban on support of vessels involved in drift-net fishing. The initial Consultation was quickly followed by a series of comprehensive consultations within the South Pacific region on the drift-net issue and the question of the future management of the South Pacific albacore resource (Anon., 1991). These meetings also included representatives from Japan, Republic of Korea (ROK), United States of America (USA), France, United Kingdom (UK), Canada and the European Commission.

The increasing concern of South Pacific countries and their determination to address the issue of drift-netting before lasting damage was caused to the region's marine resources, resulted in the Tarawa Declaration issued by the South Pacific Forum meeting held at Tarawa, Kiribati in July 1989. The Declaration announced South Pacific countries' resolve to implement a ban on drift-net fishing in the region and to establish a management regime for South Pacific albacore. It was endorsed by a resolution of the 29th meeting of the South Pacific Conference in Guam in October 1989. The Declaration's call for a cessation of drift-net fishing strengthened the international focus on the practice, and was taken up at the October 1989 meeting of the Commonwealth Heads of Government in Malaysia, through the Langkawi Declaration (Anon., 1991).

To address the resolutions of the Tarawa Declaration, a working group at the FFA Tenth Anniversary meeting in Solomon Islands in October 1989 prepared a draft convention to ban drift-net fishing in the region. A series of meetings in Wellington, New Zealand in November 1989 involving South Pacific countries and territories finalised the text of the "Convention for the Prohibition of Fishing with Long Drift-nets in the South Pacific".

The Convention, known as the Wellington Convention, established a series of obligations directed towards the cessation of drift-net fishing in the South Pacific region. To avoid confusion with small-scale artisanal net fisheries, the Convention defines "drift-net" as a gill-net or other net or a combination of nets which is more than 2.5 km in length, the purpose of which is to enmesh, entrap or entangle fish by drifting on the surface of or in the water.

To address the need for a mechanism by which States situated outside the Convention area could accept legally binding obligations with respect to drift-net fishing activities in the South Pacific, the Wellington meetings prepared two Protocols to the Convention, targeted at Distant Water Fishing Nations (DWFN) and Pacific Rim countries respectively. Discussions were subsequently held with Canada, Japan, ROK, Taiwan, UK and the USA on the text of the Protocols to the Convention (Anon., 1991).

Action by the United Nations General Assembly

The Wellington Convention was signed approximately four months after it was called for in the Tarawa Declaration. The value of this Convention lies in its political and diplomatic value, rather than legal effect. It helped to energise world action, such as that by the UN General Assembly, even though its own legal effect had not yet entered into force. Hewison (1993) provides a background to the construction of the common legal position held by nations and territories of the South Pacific regarding high seas drift-net fishing in the region, and an examination of this legal position.

The UN General Assembly has adopted three resolutions on drift-net fishing. In November 1989, Resolution 44/225 called for a moratorium in the North Pacific by 30 June 1992 and cessation of activities in the South Pacific by 1 July 1991. In 1990, Resolution 45/197 was adopted which commended unilateral, regional and international efforts undertaken by countries and international organisations to implement and support the objectives of Resolution 44/225. It reaffirmed Resolution 44/225 and called for its full implementation by all members of the international community (Swan, 1991). South Pacific countries were active in bringing to the attention of the international community the dangers inherent in drift-net fishing and played a prominent role in the debate leading to the consensus adoption of the United Nations Resolutions 44/225 and 45/197.

UN General Assembly Resolution 46/215 was adopted December 20, 1991. This resolution established a moratorium on drift-net fishing in all of the world's oceans including enclosed and semi-enclosed areas by December 31, 1992. The newest resolution eliminated a conservation management clause in the previous Resolution 44/225, which had provided a way around the moratorium for drift-net operators (Anon., 1993a).

Response by Korea, Japan and Taiwan

There was a mixed response by the three nations with South Pacific drift-net fishing fleets, to the regional and international pressure brought to bear upon them. In June 1989, Korea agreed to withdraw its fishery survey vessel from drift-net fishing activities in the region.

Japan, in response to the Tarawa Declaration, issued a statement in September 1989 outlining steps it would take to assist with the conservation of albacore tuna stocks. This included a reduction of the size of its drift-net fleet in the region for the 1989/90 season from 65 to 20 vessels. To avoid further criticism by the 21st meeting of the South Pacific Forum in 1990, Japan announced in June 1990 that it would cease drift-net fishing immediately in the South Pacific, pending the development of appropriate conservation and management measures for South Pacific albacore tuna. This announcement was well ahead of the date set in UN General Assembly Resolution 44/225 and was welcomed by the South Pacific leaders attending the 21st South Pacific Forum Meeting held in July 1990 in Vanuatu.

Taiwan made a commitment in 1990 to cease drift-net fishing in the South Pacific by 1 July 1991, in accordance with UN Resolution 44/225. It is thought that these actions by Japan and Taiwan assisted in paving the way for progress to be made on discussions concerning a management regime for South Pacific albacore tuna, the outstanding component of the Tarawa Declaration, which envisions a regime covering all gear types in high seas and coastal state EEZs, and includes DWFN and coastal states. A comprehensive management regime for South Pacific albacore tuna would benefit all participants in the fishery. However, progress towards conclusion of such a regime has been slow, mainly due to the very different positions taken by the region's countries and territories, and Japan (Wright & Doulman, 1991).

Under the UN moratorium on high-seas drift-netting, each country is responsible for enforcing the moratorium on its own flag vessels. The USA, Japan, Canada and Russia have set up a cooperative international patrol in the North Pacific (Anon., 1993c). The Taiwanese Government has indicated that offenders fleeing Taiwanese waters will be prosecuted in Taiwan if arrested by foreign authorities and extradited to Taiwan. In May 1993, at the request of the Taiwanese Government, the US Coast Guard returned three Taiwanese fishing vessels from the high-seas in the North Pacific, after finding evidence of drift-nets, but no evidence of fish, on board (Anon, 1993c).

Despite this recent episode in the North Pacific, it is unlikely that appreciable numbers of drift-net vessels of Korea, Japan and Taiwan will again fish in South Pacific waters. According to a recent Taiwanese Government statement, the Taiwanese fleet of 64 drift-net vessels that formerly fished in the North Pacific, has returned to Taiwan for inspection and removal of drift-net gear. Over the past 3 years, the Taiwanese Government has offered drift-net vessel owners financial incentives to give up drift-net fishing through a buy-back

programme and refitting loans. So far, a total of 23 drift-net vessels have been purchased under the buy-back programme while 50 vessel owners have applied for refitting loans (Anon., 1993b).

Current status of the South Pacific fisheries resources taken by drift-nets

Fisheries resources taken by the South Pacific drift-net fisheries discussed here are probably recovering or have already recovered. With the Taiwanese vessels removed from the Arafura Sea shark fishery, 80 per cent of the fishing effort was removed, and it is assumed that stocks are rebuilding. No management measures are considered necessary at present for this fishery (Nichols, 1993).

A review of the status of the South Pacific albacore stock by the SPAR Working Group suggests that the withdrawal of drift-net fleets from the Tasman Sea and broader south-west Pacific has considerably lessened earlier concern about the potential impact of those fleets on the stock (Garvey, 1991). At the 5th SPAR Working Group meeting held at Papeete, French Polynesia from 29 March-2 April 1993, albacore tuna scientists agreed to coordinate their involvement in monitoring programmes of the surface and longline albacore tuna fisheries, to detect any changes in stock status. The diplomatic and legal efforts of the nations and territories of the South Pacific led to the situation where drift-net fishing fleets no longer operate on the high seas in the South Pacific region. These efforts also contributed to the process which culminated in the global moratorium on high seas pelagic drift-net fishing, thereby promoting the recovery of those stocks of fisheries resources formerly taken by drift-nets.

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