



SPREP

South Pacific Regional Environment Programme

*International
Conventions
relating to
Marine Pollution
activities*

Meeting Report

Apia, Samoa
2 - 6 December, 1996

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Contents

Acronyms	vi
1. Introduction	1
2. Country papers	2
2.1 Australia	2
2.2 Ipukarea Society – Cook Islands	5
2.3 Cook Islands	11
2.4 French Polynesia	16
2.5 Federated States of Micronesia	17
2.6 Kiribati	18
2.7 Marshall Islands	20
2.8 Niue	24
2.9 Papua New Guinea	26
2.10 Solomon Islands	28
2.11 Tuvalu	29
2.12 New Zealand	30
2.13 Palau	32
2.14 Wallis & Futuna	33
2.15 Guam	34
2.16 Responses to oil spills in Guam	34
2.17 Western Samoa	35
3. Summary of international conventions – Prof. Martin Tsamenyi	40
3.1 The Law of the Sea Convention 1982	40
3.2 London Dumping Convention	40
3.3 Differences between SPREP protocol and London	42
3.4 MARPOL 1973/78	43
3.5 A practical guide to the implementation of environmental treaties/conventions	44
3.6 MARPOL Article 17: Promotion of Technical Cooperation	45
3.7 Law Of the Sea, Article 202: Scientific and Technical Assistance to Developing States	45
3.8 Law Of the Sea, Article 203: Preferential Treatment of Developing States	46
3.9 Approaches to international conventions at domestic level	46

4. The role of UNEP in implementing environmental law – Mr Lal Kurukulasuriya	47
4.1 Role of UNEP	47
4.2 UNEP’s programme in the area of waste management and marine pollution management	47
4.3 Activities of UNEP’s Regional Office for Asia and the Pacific (ROAP)	48
4.4 What can UNEP offer SPREP countries in areas of waste management and marine pollution management?	48
4.5 Contemporary approaches to waste management and pollution control	48
4.6 Contemporary approach in the new context of sustainable development	48
4.7 Global Environment Facility (GEF)	49
5. Recommendations	52
Annex 1: Agenda – Meeting on International Conventions Relating to Pollution Activities	53
Annex 2: Participants list	56

Acronyms

AusAID	Australian Agency for International Development
CITC	Cook Islands Trading Corporation
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CLC	International Convention on Civil Liability for Oil Pollution Damage
COLREGS	Convention on the International Regulations for Preventing Collisions at Sea
COMEMIS	Coastal and Marine Environment Management Information System
CWC	Chemical Weapons Convention
DEC	Division of Environment and Conservation
DED	Deutscher Entwicklungsdienst (German Volunteer Service)
DLSE	Department of Lands, Surveys and Environment
EARL	East Asia Response Limited
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
FAO	Food and Agriculture Organization
FSM	Federated States of Micronesia
GEF	Global Environment Fund
GRSL	Guam Response Services Ltd
IAEA	International Atomic Energy Agency
IMDG	International Maritime Dangerous Goods Code
IMO	International Maritime Organization
IOPC	International Oil Pollution Compensation Fund
IRPTC	International Register of Potentially Toxic Chemicals
MARPOL	International Convention for the Prevention of Pollution from Ships
MOT	Ministry of Transport
NEMS	National Environmental Management Strategy
NGO	Non-governmental organisation
NZODA	New Zealand Official Development Assistance
OECD	Organization for Economic Cooperation and Development
OPA 1990	Oil Pollution Act 1990 (US)
PCB	Polychlorinated biphenyl
PIC	Pacific island country
PNG	Papua New Guinea
RMI	Republic of the Marshall Islands
RMIEPA	Republic of the Marshall Islands Environmental Protection Agency
ROAP	Regional Office for Asia and the Pacific
SDC	Sustainable Development Commission
SIDS	Small Island Developing States
SOPAC	South Pacific Applied Geoscience Commission
SPARTECA	South Pacific Regional Trade and Economic Cooperation Agreement
SPC	Secretariat of the Pacific Community
SPREP	South Pacific Regional Environment Programme
STCW	International Convention on Standards of Training, Certification and Watchkeeping for Seafarers
TWG	Technical Working Group
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNCLOS	United Nations Convention on the Law of the Sea
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UK	United Kingdom
US	United States
USAKA	United States Army Kwajalein Atoll
USEPA	United States Environmental Protection Agency
WHO	World Health Organization

1 Introduction

The region served by the South Pacific Regional Environment Programme (SPREP; fig. 1) is situated in the middle of the largest continuous marine habitat on the planet, the Pacific Ocean. Marine mammals (whales, dolphins, porpoises, dugongs and seals) range throughout much of this huge region. Of the world's approximately 120 living marine mammal species, three-quarters occur in the Pacific (cf. Rice, 1977a). Of the 90 or so Pacific species, perhaps a third are known to be resident in the SPREP region or at least to visit it seasonally or occasionally. However, due to the vastness of the region and the relative lack of research activity in it, very little is known about the marine mammals in the SPREP region. Much of what is known about the distribution and seasonal occurrence of large whales has come from 19th century American, French and British commercial whalers (cf. Townsend, 1935) and from researchers working in conjunction with modern Japanese whaling operations (cf. Miyashita et al., 1995a). Much of what is known about the smaller whales, dolphins and seals comes from the non-systematic, often opportunistic efforts of individual scientists. Dugongs have been studied relatively intensively in some areas because of international concern about their endangered status.

In 1991 the SPREP organised a workshop in Vanuatu on biodiversity of the South Pacific. A marine mammal conservation plan was developed and proposed at this workshop (Stone et al., 1992). The plan identified the following projects as priorities:

- preparation of a review document covering published and unpublished information on marine mammals of the region;
- compilation of information from knowledgeable sources in various countries of the region;
- throughout the region, the creation and distribution of education programmes, including

an identification guide, poster and reporting form;

- establishment of a database at SPREP for collecting, storing and analysing marine mammal sighting and stranding data;
- identification of threats to marine mammals in the region including directed fisheries, by-catch in fisheries, habitat loss or degradation, environmental catastrophes (e.g. nuclear explosions, volcanic eruptions) and pollution; and
- despite the acknowledged lack of information on marine mammals in the SPREP region at the time of the meeting, several programmes were proposed for immediate action, including humpback whale surveys, further assessments of dugong populations and threats, and the development of a stranding response network.

Since the Vanuatu meeting, implementation of various elements in the plan has begun. The present report is intended as a response to the first item on the above list. It should be clear to any reader that the current state of knowledge about marine mammals in the SPREP region is far from adequate. Before a proper assessment can be made of the conservation status of the various species, more field work is needed to document distributions and movements, stock relationships and abundance. At the time of the Vanuatu workshop in 1991, it was acknowledged that one of the biggest obstacles for marine mammal conservation in the SPREP region was this shortage of basic information. It is hoped that the present report, essentially a review of the literature with some additional unpublished information, will serve as a useful starting point for further investigations.

Annex 1 provides a concise summary of the species found in the SPREP region.

2 Materials and methods

We made an extensive bibliographic search for literature related to the scope of this project. We also consulted with numerous colleagues, many of whom gave us unpublished data or provided us with citable documents containing relevant information. We wish to acknowledge, in particular, the contributions of Hal Whitehead, Jean-Pierre Sylvestre, M. Michael Poole, Fujio Kasamatsu and Porter V. Turnbull. Hal Whitehead, Pam Stacey, Toshio Kasuya, Michael Bryden, Richard Sears, John Calambokidis, Fujio Kasamatsu, Nobuyuki Miyazaki, Barbara Curry, Graham Ross, Peter Corkeron, Peter Arnold, John Bannister, Nick Gales, Scott Baker and Mike Donoghue reviewed portions of an earlier draft and provided useful input. We are also grateful to Randi Olsen for help with technical preparation of the manuscript.

Unpublished data from a cruise by Leatherwood, 14 March–10 April 1990, from Easter Island to Tahiti (and Moorea), Tuamotus and Marquesas then returning to Tuamotus and Tahiti, are included in this report.

The specimen inventory involved two primary consultations: one (by post and fax) with N. Miyazaki and T.K. Yamada at the National Science Museum (NSM) in Tokyo; the other (in person) with J.G. Mead at the United States National Museum (USNM), Smithsonian Institution, Washington, D.C. Miyazaki and Yamada provided us with their Catalogue of Marine Mammal Specimens in the NSM. Mead provided us with a printout of his own inventory of specimens in the USNM and other major collections in the world. We used Mead's list as a guide to the specimens as well as to the literature in which the relevant specimens are cited. For those instances in which no literature was available, we attributed the record to Mead as a personal communication, with his explicit permission (in litt., 10 February 1996).

No comprehensive attempt was made to use the vast amount of data from the SPREP region contained in commercial whaling logbooks and journals (cf. Du Pasquier, 1982; Langdon, 1984).

3 Results and discussion

3.1 Annotated checklist of species

3.1.1 Mysticete cetaceans

Only one species of mysticete cetacean, the Bryde's whale (two forms or subspecies), is known to be a year-round inhabitant of the SPREP region. Three or four additional species—one or both of the southern hemisphere minke whales, the humpback whale and the blue whale—are regular seasonal migrants to at least certain portions of the region. The sei whale and fin whale have also been reported but apparently are not common (see Rice, 1979, 321; Balcomb, 1987, 6; Miyashita et al., 1995a). Historically, the southern right whale may have occasionally migrated into the southern fringes, and the northern right whale and possibly the gray whale into the northwestern fringes, of the region. The pygmy right whale is a possible rare visitor to the southern edges of the SPREP region.

Minke Whales, *Balaenoptera acutorostrata* Lacépède, 1804 and *Balaenoptera bonaerensis* (Burmeister, 1867)

Minke whales occur in marine waters worldwide, at virtually all latitudes (Stewart and Leatherwood, 1985; Horwood, 1990). For many years, cetacean systematists recognised only one species, *B. acutorostrata*, while acknowledging the existence of two or three morphologically distinct “forms” of minke whale. Minke whales in the northern hemisphere generally have white flipper bands while many of those in the southern hemisphere do not (Best, 1985). The latter are often referred to in the literature as the “dark-shouldered” or the “*bonaerensis*-type” of minke whale. The minke whales in the southern hemisphere that do have white flipper bands are consistently smaller than the other two forms (i.e. northern hemisphere animals with white flipper bands and southern hemisphere “dark-shouldered” animals) (Best, 1985; Arnold et al., 1987). Recent genetic studies support the hypothesis that northern hemisphere and southern hemisphere (“dark-shouldered”) minke whales are separate species—*B. acutorostrata* and *B. bonaerensis*, respectively (Wada and Numachi, 1991; Árnason and Gullberg, 1994; van Pijlen et al., 1995; also see IWC, 1994a, 101).

Little is known about the winter distributions of the large populations of minke whales (apparently all, or at least primarily, *B. bonaerensis*) that move into Antarctic waters during the summer feeding season. Judging by population estimates from sighting and marking cruises, Areas V (130°E–170°W) and VI (170°W–120°W) may have the largest numbers of minke whales in the entire Antarctic (IWC, 1991, 117; 1993, 114). If, as is assumed, these whales move essentially north–south during their seasonal migrations, this would mean that relatively large numbers of minke whales use the SPREP region or waters immediately south of it for breeding, calving and calf rearing.

Recent observations by Japanese researchers were compiled to identify likely breeding grounds and routes of southbound migrations (Kasamatsu et al., 1995). The highest encounter rates in the SPREP region during October–December, ranging between 4 and 6 whales per 1000 nautical miles searched, were at the eastern end of the Tuamotu Archipelago (10–20°S, 130–140°W) and from American Samoa and Niue east to Tahiti (10–20°S, 150–170°W). These areas had some of the highest minke whale encounter rates found anywhere in the Southern Ocean during this period, the early part of which overlaps the estimated breeding season (August–October).

Kasamatsu et al. (1995) inferred from an apparent hiatus in distribution between 120°W and 130°W that the minke whale breeding area in the western South Pacific (centred at 150–170°W) is distinct from that in the eastern South Pacific. However these authors acknowledged that evidence from catch distributions, mark-recapture, morphological comparisons, isozyme analyses and DNA indicated substantial mixing of minke whales in the Antarctic feeding grounds. They also concluded that southern minke whales may not assemble in discrete breeding areas but rather are probably dispersed in open waters during the breeding season. This would distinguish these whales from right, humpback and gray whales, all of which migrate between nearshore breeding (or calf-rearing) concentration areas and more oceanic feeding areas. Mother–calf pairs of minke whales were observed in only two areas in or near the SPREP region: the northeastern Coral Sea and at ca. 19°S between Niue and the Cook Islands. It is important to emphasise that the search effort in the study by Kasamatsu et al. (1995) covered only the period of austral spring and summer (October to March).

Peter Arnold of the Museum of Tropical Queensland in Townsville, Australia (in litt., 28 July 1995) considers the dwarf minke whale to be an as-yet unnamed subspecies of *B. acutorostrata* (also see Pastene et al., 1994). He has been studying the dwarf minke whales that occur regularly in austral winter on the Ribbon Reefs (15–16°S) in the northern Great Barrier Reef. A dwarf minke whale was photographed by a diver in New Caledonia, and another minke whale was photographed at Marion Reef in the Coral Sea in August (Arnold et al., 1987). Arnold (in litt., 28 July 1995) has photographic documentation of a consistent colour pattern in dwarf minke whales from southern Africa, the east and west coasts of Australia, New Zealand, New Caledonia and Brazil.

Although we do not have sufficient information to describe seasonal and spatial differences between the two types of southern hemisphere minke whale in the SPREP region, we can at least be certain that both forms occur there. Also, the northern hemisphere form of *B. acutorostrata* might occur in the northwestern sector of the SPREP region, but we have no firm evidence of its presence there.

Bryde's Whale, *Balaenoptera edeni*
(Anderson, 1878)

Bryde's whales have a pantropical distribution and are common in much of the tropical Pacific (Masaki, 1972; Wada, 1975; Miyazaki and Wada, 1978a; Rice, 1979). The range map published by Cummings (1985, 146) which indicates a hiatus in the distribution of Bryde's whales across the Pacific between approximately 20°N and 20°S is badly outdated and misleading. The monthly indices provided by Miyashita (1995a), as individuals sighted per 10 000 nautical miles of search effort, give a much more reliable impression of Bryde's whale distribution.

The Bryde's whale apparently is the most abundant mysticete in the SPREP region. Rice (1979) encountered Bryde's whales more frequently than any other species of cetacean during a research cruise in the equatorial Pacific between Central America and Clipperton Island (ca. 110°W), and he noted that they were widely distributed in the open ocean as well as in coastal areas (also see Wade and Gerrodette, 1993, their fig. 18). At least some populations of Bryde's whales are migratory, with movement into higher latitudes in summer and into lower latitudes in winter. Several individuals marked with Discovery tags north of New Guinea and in the general vicinity of Nauru, for example, were later killed on the pelagic whaling grounds east of southern Japan at 25–30°N (Ohsumi, 1978a,

279; 1979a; 1980a, fig. 1). Generally, Bryde's whales are not found in areas where the surface water temperature is less than 15°C (Nemoto, 1959, 247; Ohsumi, 1977). Sightings in the western North Pacific in 1993–95 were interpreted as suggesting that the 20°C isotherm defined the northern limit of Bryde's whales in winter (Miyashita et al., 1995b).

The question of Bryde's whale stock boundaries in the southern hemisphere was tentatively resolved, for management purposes, by designating the whales south of the equator between 130°E and 150°W as a western South Pacific stock and those east of 150°W as an eastern South Pacific stock (IWC, 1982, 95). In addition, a Solomon Islands stock was recognised on the basis of the small size distribution of the animals (all < 12.2 metres total length) taken in the Japanese scientific permit catch (Donovan, 1991, 43–44). This stock is now called the Solomon Islands/Southeast Asia dwarf-form stock (IWC, 1996). A separate Peruvian stock was also recognised in the far eastern South Pacific around the equator (Donovan, 1991). The whales killed near the Solomon Islands during the Japanese "experimental" catches in the 1970s were all sexually mature at a smaller body size than "normal" Bryde's whales and had other distinctive features. Genetic analyses indicate that they should probably be assigned to a separate, but as yet undescribed, species (Wada and Numachi, 1991).

In spite of the evidence that Bryde's whales occur in equatorial waters and cross the equator, the tendency has been to treat North Pacific and southern hemisphere Bryde's whales separately, at least for management purposes within the IWC context. The boundary between the IWC's eastern and western North Pacific stocks of Bryde's whales at 160°W was, as Donovan (1991, 48) put it, "somewhat cryptically agreed" at the 1978 annual meeting of the Scientific Committee (IWC, 1979). The Bryde's whales in the East China Sea are considered to be a separate stock (Donovan, 1991, fig. 5; IWC, 1996). Due to the stock boundaries assigned by the IWC, which are not necessarily consistent with all of the biological evidence (see IWC, 1982, 95; IWC, 1996), most reports on distribution, stock identity, population size and exploitation of Bryde's whales in the Pacific fall into two arbitrary categories—North Pacific and southern hemisphere (often encompassing data from both the South Pacific and Indian oceans). We adopt the IWC's terminology here, in the hope that our doing so will minimise the confusion for readers. Stock definition and systematics of Bryde's whales in the Indo-Pacific are obviously in need of further refinement.

Bryde's Whales in the North Pacific

The western North Pacific stock has been interpreted to include the whales hunted by Japan, Taiwan, the Philippines and the Soviet Union in waters west of 160°W. At least some of the whales in this stock move seasonally into the western parts of the SPREP region (cf. Ohsumi, 1978a, 1979a; 1980a, fig. 1). Coastal whaling for Bryde's whales off Japan increased after the Second World War, and pelagic whaling for this species began in the western North Pacific in 1970 (Ohsumi, 1977; Tillman, 1977, 1978; Tillman and Grenfell, 1980). Bryde's whales in the North Pacific have been legally protected since 1986. The main pre-1986 whaling areas are shown by Ohsumi (1980a, fig. 1). The IWC Scientific Committee invested considerable time in assessing the status of this stock from the late 1970s to mid-1980s (e.g. IWC, 1977, 1979, 1980, 1982, 1983, 1985, 1986, 1988); a critical analysis of the assessments through 1984/85 was provided by Holt (1986). Many estimates of stock size have been made, using different approaches and assumptions (e.g. Tillman, 1977, 1978, 1981; Tillman and Grenfell, 1980; Miyashita and Kasamatsu, 1985; Miyashita, 1986). References to the "recruited" or "exploitable" population presumably mean the component of the total stock consisting of animals at least 35 feet (10.7 metres; shore-based whaling) or 40 feet (12.2 metres; pelagic whaling) long, as these are the minimum length limits established for Bryde's whales in the IWC Schedule of Whaling Regulations. Estimates of the exploitable component of this stock have ranged from as low as about 13 000 to as high as a few tens of thousands. Virtually all assessments have indicated a decline in the stock size since 1946, although the severity of the decline has been a matter of controversy.

The most recent estimate, based on Japanese sightings data, is 23 751 (CV = 0.20) for the western North Pacific stock, which includes much of the northwestern corner of the SPREP region (IWC, 1996; also see Miyashita, 1986).

"Sei" whales observed from a tuna vessel in the Micronesia/Marshall Islands area during June 1982 (at 8°39'N, 151°32'E, 27 June, 5°01'N, 162°13'E, 6 July, and 6°56'N, 172°02'E, 23 July; Patterson and Alverson, 1986) were probably Bryde's whales.

Bryde's Whales in the Southern Hemisphere

The exploitation of Bryde's whales within the parts of the SPREP region south of the equator has been very limited, consisting primarily of catches by Japanese whalers under special scientific permits during the late 1970s. Most of the information on distribution and relative abundance comes from Japanese catch, tagging and sighting data obtained during the late 1970s and early 1980s. In January–March 1975–1977 relatively high densities of Bryde's

whales were observed in equatorial waters between 130°E and 180° (Ohsumi, 1978a). During 20 January–19 March 1976 they were seen mainly in the areas of the Manus and Solomon islands and Nauru (Miyazaki and Wada, 1978a). In October–November 1976 a Japanese whaling expedition took Bryde's whales in the Solomon Sea and in an area just south of the SPREP region between New Zealand and Fiji (Ohsumi, 1978b). Scouting boats associated with the expedition also sighted Bryde's whales in the area between New Caledonia and Fiji (Ohsumi, 1978b). The Bryde's whale stomachs that were sampled contained euphausiids exclusively (Kawamura, 1977). These whales were found to have an appreciably smaller filtering area on their baleen than do Bryde's whales in the North Pacific (Kawamura, 1978). In late October and early November 1977 Japanese whalers observed, marked and killed Bryde's whales in a large area between the Tuamotu Archipelago and Fiji, in waters between the southern border of the SPREP region and northwards to 10°S (one observation was made as far north as about 6°S) (Ohsumi, 1979b, 269, fig. 1). After additional sightings and catches in 1978–1979, Ohsumi (1980b) concluded that the stock of Bryde's whales in the South Pacific west of 120°W ("western South Pacific stock") totalled close to 60 000, and that a diminutive morph centred in the Solomon Sea ("Solomon stock") consisted of about 1800 whales. These estimates generated considerable debate in the IWC Scientific Committee (IWC, 1980). Although Ohsumi (1981) estimated total populations of more than 80 000 for the southern hemisphere stock between 20°E and 120°W (excluding the Solomons area) and 2800 for the Solomon stock (also see Shimada and Pastene, 1995), the Scientific Committee subjected the same data to a different analytical method giving an estimate of about 16 500 (exploitable component: 11 000) for the western South Pacific stock (IWC, 1981, 125, table 3).

Ivashin (1980) referred to "noticeable concentrations" of Bryde's whales in the areas 10–28°S, 157–177°E and 21–30°S, 179°E–170°W, citing Ohsumi (1978a or 1978b, 1979) as the authority.

Humpback Whale, *Megaptera novaeangliae* (Lesson, 1828)

Humpback whales move seasonally between high latitude feeding areas and low latitude breeding and calving areas (Dawbin, 1966b). At least six well-defined breeding stocks of humpbacks in the southern hemisphere were classically described by Mackintosh (1942, 1965). Some modifications to Mackintosh's model were made by Dawbin (1959, 1964, 1966b), based mainly on a large-scale mark and recovery programme in which thousands of whales were tagged in the Antarctic and along the coasts of Australia, New Zealand, Tonga, Fiji,

Norfolk Island, New Caledonia and Vanuatu (New Hebrides). This marking programme failed to link many of the proposed migratory destinations, however, and much refinement remains desirable (see IWC, 1994a, 105–106). The principal wintering grounds of southern hemisphere humpbacks are along continental coastlines and near island groups in tropical and subtropical latitudes. A rough estimate of the current total number of humpback whales summering south of 30°S is 15 000 (CV = 0.4) (Borchers, 1994).

Nineteenth-century whalers hunted humpbacks mainly around Tonga and the Northern Mariana Islands and in an area of the eastern Coral Sea to the west of the northwest corner of New Caledonia (Townsend, 1935). Importantly, it needs to be understood that the positions shown on Townsend's maps reflect the mapmaker's avoidance of overlaying dots signifying catches made in the same area. Thus, for example, the impression of a whaling ground around Tonga some 400 nautical miles in diameter is misleading. Most catches there were made within 30 nautical miles of the island groups (IWC, 1996). Scammon (1874) reported that the season for humpback whaling in Tonga (21°S, 174°W) was August–September and that the large females taken there produced an average of 40 barrels of oil, with yields ranging as high as 73 barrels. He also noted that most of the whales in Tonga were white on the undersides of the body and flippers.

A recent review of records from eastern Australia and the southwestern Pacific indicates that humpbacks may be present, at least in small numbers, in Torres Strait year-round and from New Caledonia east to the Society Islands seasonally (non-summer months) (P. Corkeron, pers. comm.; also see Australian National Parks and Wildlife Service, 1985). Dawbin (1972) stated that before they were severely depleted, humpbacks occasionally visited the Gulf of Papua and reached the vicinity of New Britain; however, he had no evidence of their presence along the north coast of New Guinea.

Several sites within the SPREP region have been identified as present-day wintering grounds for humpbacks presumed to belong to southern hemisphere stocks. The Area V Antarctic stock of humpbacks has two migratory "streams", one passing the east coast of Australia (the "east Australia group") and the other passing New Zealand and Norfolk Island, the latter thought to winter near Tonga and Fiji (the "New Zealand group") (Dawbin, 1966b; Bryden et al., 1990). Sightings of humpbacks have been reported throughout the islands of Polynesia, north of Tonga in Fiji, Samoa, Niue and the Cook Islands from January to October. The apparently considerable east–west movement by humpbacks in this region

has been said to "confuse the overall picture" of stock identity (Anonymous, 1981, 204). Dawbin (1966b, 154) in fact concluded, based on tag returns, that there was "enough interbreeding among stocks that pass New Zealand, Fiji, Norfolk Island, eastern Australia and western Australia to preserve the racial homogeneity of the stocks as a whole throughout this sector". He went on to suggest that such homogeneity might exist throughout the southern hemisphere due to "progressive exchanges between adjacent groups". In a worldwide study of mitochondrial DNA variation and population structure, Baker et al. (1993, 1994) found significant genetic differences between populations from the west coast of Australia and those from the east coast of Australia and Tonga, combined. No significant differences were found between eastern Australia and Tonga, although sample sizes were small. One humpback tagged in Tonga was later killed in the Bellingshausen Sea, directly south of Cape Horn in Antarctic Area I (0°–120°W) (Dawbin, 1966b). Also, a photo identification match has been made of a whale observed in Tonga and Queensland (NE Australia) (P. Corkeron, pers. comm., 1995).

Paterson (1991) pointed out that there was still some uncertainty about the destination(s) of humpbacks that migrated northward along the east coast of Australia during the autumn. Simmons and Marsh (1986) concluded that most of them wintered in the Great Barrier Reef lagoon, where some calving occurred. However a connection between eastern Australia and New Caledonia was documented through photo identification in the early 1990s (Garrigue and Gill, 1994). Observations at New Caledonia and the Loyalty Islands, spanning the period from late June to early December (peak August–September), indicate that these areas are probably calving and breeding grounds for the Area V stock (Garrigue and Gill, 1994; Gill et al., 1995). Humpbacks seen in recent years in Vanuatu may be a part of this stock as well (Garrigue and Gill, 1994). A dead 7.3-metre humpback was found floating in a canal near Nouméa, New Caledonia, in early June 1989 (observed by B. Richer de Forges and N. Baillon, *vide* J.-P. Sylvestre, in litt.).

Females with small calves, and consorting adults, have been observed off Savu Savu, Fiji, in recent years (J. Moody, pers. comm., October 1991). A photograph of a breaching humpback whale off Kandavu Island, Fiji, was published by Lever (1964), and a lone humpback was observed and photographed as it swam southwestward through the Koro Sea, Fiji, in 1984 (C.R. Knowles, in litt., August 1987). The whales in Fiji are presumably Area V humpbacks (Dawbin, 1964).

The nearshore waters around Tonga are used for mating and calving by the New Zealand group of the Area V stock (Dawbin, 1964; Keller, 1982;

Abernethy et al., 1993). Sightings in Tongan waters span the months June–November, with a clear peak in August–September (Anonymous, 1981). In 1979 and 1980 approximately 200–400 humpbacks were estimated to visit Tongan waters during the winter (Anonymous, 1981; Keller, 1982). Reports of recent non-systematic surveys indicate that numbers remain low (C.S. Baker and M. Donoghue, pers. comm., May 1995).

Humpbacks arrive in American Samoa from the south between June and December, with peak numbers present during September–October (Craig, 1995). This area is probably another calving and mating ground for the New Zealand group of Antarctic Area V humpbacks.

Although it was seriously depleted by whaling up until 1962, the east Australian portion of the Area V humpback stock has made a strong recovery since it was given protection in 1962 (Paterson and Paterson, 1989; Bryden et al., 1990; Paterson, 1991). The annual rate of increase has been estimated at about 11 percent, with size of the Australian portion of the population in 1992 being about 1900 whales (Paterson et al., 1994). Recent evidence suggests that these figures need revision because of an imbalance between the numbers of males and females in the migrating population (Brown et al., 1995). By contrast with the situation for the east Australia group, there is no evidence of a substantial recovery of the New Zealand group (Abernethy et al., 1993), which continued to be exploited through 1963 (Paterson et al., 1994).

Poole (1993) documented the occurrence of humpbacks at 18 islands in French Polynesia during July–October. Their behavior, featuring “surface-active groups” and singing, and the presence of recently born calves indicate that this is a mating and calving ground, presumably for whales of the Area VI Antarctic stock.

Large whales, thought to be humpbacks, are observed close to shore (inside the lagoon) at Mangareva, Gambier Islands, during August–September (Tihoni Reasin, Rikitea, Mangareva, in litt., 10 January 1992). Local people at Tubuai, Austral Islands, told Leatherwood (unpub. data, 1990) that they see humpbacks regularly in July–October; one is said to have stranded there in July 1986. People at Kauehi, Tuamotus, told Leatherwood (unpub. data, 1990) that they see two kinds of whale: one grey with “knobs” on its head (presumably humpback) and one large with wrinkled black skin and teeth (presumably sperm). The humpbacks visiting the Gambier and Austral islands and the Tuamotu Archipelago would likely be part of the Area VI stock.

Leatherwood (unpub. data, 1990) was told by the local people at Hakahetau, Ua Pou, Marquesas Islands, that they see approximately one humpback each year near the island. This may represent the northern extreme of the winter distribution of the Area VI stock.

One northern hemisphere stock of humpbacks uses the northwestern part of the SPREP region in winter. The normal winter range of whales from the Ryukyuan stock (Nishiwaki, 1959) includes the Bonin (Ogasawara) Islands (Miyashita et al., 1996). At least one whale, thought to be an adult male, has been documented to switch wintering grounds, using the Ogasawara area in one year and Hawaii the next (Darling and Cerchio, 1993). Although results of a cruise in February 1993 led Ohizumi et al. (1993) to conclude that the Ryukyuan (or Asian) stock of humpbacks normally goes only as far south as Iwoto Island (24°45'N, 141°40'E) in winter, some animals move south to the Northern Mariana Islands, including Saipan and Guam. A group of three was photographed off Saipan in February 1991 (Darling and Mori, 1993), and sightings have also been reported in Guam in January and February (Eads, 1991; Anonymous, 1996; David Aldan, pers. comm.), including a mother and calf off the east coast of Rota in late February 1991 (Derek Stinson, CNHI Div. Fish & Wildlife, pers. comm.).

The Asian stock of humpback whales (wintering in the Ryukyu and Ogasawara islands) was estimated in the early 1990s to be at least in the high hundreds (Darling and Mori, 1993). More than 400 individual humpbacks were photo identified at the Ogasawara Islands during 1987–93 (Sato et al., 1995). Although it may be recovering, this stock is probably still well below its pre-exploitation level.

Sei Whale, Balaenoptera borealis
(Lesson, 1828)

Sei whales have a worldwide distribution but are found mainly in cold temperate to subpolar latitudes rather than in the tropics or near the poles (Horwood, 1987). Reports in the literature from any time before the mid-1970s are suspect because of the frequent failure to distinguish sei from Bryde's whales (cf. Mead 1977, Rice, 1979, Horwood, 1987, 15, 21; Shimada and Pastene, 1995), particularly in tropical to warm temperate waters where Bryde's whales are generally more common than sei whales.

The southernmost confirmed sightings and catches of sei whales in the eastern North Pacific are from 18°30'N (Rice, 1977). In the western North Pacific sei whales have been taken during March and April as far south as the Bonin (Ogasawara) Islands (Horwood, 1987, 29) and sighted in the area 20–25°N, 165–170°E (data from various Japanese

sighting cruises summarised by Horwood, 1987, 32). Also, two sei whales that were tagged in the general vicinity of the Northern Mariana Islands in January were later killed a few hundred kilometres south of the western Aleutian Islands in summer (Horwood, 1987, 57-58). In the eastern South Pacific sei whales occur at least as far north as 5°S, where they were taken by whalers based at Paita, Peru.

In the southern South Pacific most observations have been south of 30°S, but sei whales apparently do occur at least occasionally in the SPREP region (Horwood, 1987, 39; cf. Kasuya and Wada, 1991). If the presumed winter distribution as shown by Horwood (1987, 45-46) is correct, then sei whales regularly migrate into at least the southern and northern fringes of the SPREP region.

Fin Whale, *Balaenoptera physalus*
(Linnaeus, 1758)

Fin whales are more nearly cosmopolitan in their distribution and more predictable in their seasonal movements than sei whales. Although it is generally believed that fin whales make poleward feeding migrations in summer and move towards the equator in winter, few actual observations of fin whales in tropical and subtropical waters have been documented, particularly in the Pacific Ocean away from continental coasts (Mackintosh, 1942). In general, fin and blue whales were not found in large concentrations along continental coasts in the southern hemisphere in winter. Nor were they found anywhere else in large winter concentrations comparable to those observed in the Antarctic during summer. From this evidence, Mackintosh (1942, 250) inferred that these species became widely dispersed in winter, with some possibly migrating into tropical waters, many being scattered in the open ocean in subtropical and sub-Antarctic waters, and some remaining in the Antarctic. He was convinced that if major concentrations formed during winter, they would have been observed at least occasionally.

K.C. Balcomb (1987, 6) observed a group of 8-12 large fin whales some 460 kilometres south of Honolulu on 20 May 1966, in a feeding aggregation with many seabirds and small cetaceans. The lack of observations by Japanese whaling and scouting vessels during cruises for Bryde's and sperm whales in the western tropical Pacific (see references cited in Bryde's whale account, above) can be interpreted to indicate that fin whales are uncommon in the SPREP region. However it should also be kept in mind that relatively little of the search effort has been in low latitudes (between 20°N and 20°S) and that most of the effort has been limited to the austral spring and summer months of October-March (cf. Kasuya and Wada, 1991; Kasamatsu et al., 1995). A search of the scattered data and

literature on catches, sightings and taggings, comparable to those done by Horwood (1987) for sei whales and by Kasamatsu et al. (1995) for minke whales, would be a useful start investigating the fin whale's status in the tropical and subtropical Pacific.

Blue Whale, *Balaenoptera musculus*
(Linnaeus, 1758)

Various authors have suggested that blue whales which summer in high latitudes move into the subtropics and tropics in winter (Harmer, 1931; Mackintosh, 1942, 1966; Wheeler, 1946; Yochem and Leatherwood, 1985). Non-migratory populations may also be present in certain highly productive low-latitude areas (e.g., over the Costa Rican Dome west of Central America—Wade and Friedrichsen, 1979; Reilly and Thayer, 1990). Blue whales aggregate seasonally around Baja California (Rice, 1974; Reilly and Thayer, 1990), near the Galápagos (Reilly and Thayer, 1990), and near the coasts of Ecuador and northern Peru (Donovan, 1984; Reilly and Thayer, 1990). They have been recorded acoustically off Oahu and Midway, Hawaiian Islands (Northrop et al., 1971; Thompson and Friedl, 1982), but no direct observations of blue whales have been documented in Hawaiian waters. Elsewhere in the central and western tropical Pacific, evidence of blue whales is almost entirely lacking except near the Solomon Islands.

Twenty-one groups (41 individuals) of blue whales were observed in the vicinity of the Solomon Islands during a Japanese sighting survey in August 1957 (Ohsumi and Shigemune, 1993; Shimada and Pastene, 1995; IWC, 1996). This included one mother-calf pair in the western part of the Solomon Islands. None were seen during cruises to the same area in November-December 1993 and September-October 1994. It was suggested that this could reflect either the fact that the recent cruises were too late in the year or that blue whales have been further depleted since 1957 (IWC, 1996). As is now well known, the Soviet Antarctic whaling fleet continued to kill "protected" whales, including large (but previously unreported) numbers of blue whales, throughout the 1960s and until the International Observer Scheme was put in place in 1972 (Yablokov, 1994; Zemsky et al., 1995; IWC, 1996).

A single SPREP-region sighting was reported in the Japanese sightings programme between 1965 and 1993 (Kato et al., 1995). This was at the equator at about 170°E. We have been unable to locate any other definite evidence of the blue whale's occurrence within the SPREP region. The severe depletion of southern hemisphere stocks of blue whales due to commercial over-exploitation means that even in areas where they may have been common historically, these whales are unlikely to

occur in high densities at present (cf. Butterworth et al., 1995).

Zemsky and Sazhinov (1982) mapped the distribution of the pygmy blue whale (judged to be a subspecies, *Balaenoptera musculus brevicauda*, or, by some authors, a separate species, *Balaenoptera brevicaudis*) as encompassing not only much of the Indian Ocean but also extending into the Java, Banda and Tasman seas. These authors were informed primarily by data from Soviet whaling expeditions. Considering the known warm-water distribution of the pygmy blue whale, it is possible that this morph occurs more regularly in the SPREP region (e.g. the Solomon Islands area) than the “true” blue whale (see Shimada and Pastene, 1995; Kato et al., 1995).

Right Whales: Southern, *Eubalaena australis* (Desmoulins, 1822), and Northern, *Eubalaena glacialis* (Müller, 1776)

Cawthorn (1983b) reported sightings by weather station personnel at Raoul Island, Kermadec Group (ca 28°30'S, 177°30'W) of southern right whales “migrating past the island” (season not specified). Campbell Island and the Aucklands (both south of New Zealand) are areas of right whale concentration. Cawthorn (1983b) had no evidence confirming the area of dense October–November concentrations plotted by Townsend (1935) east of the Kermadec Islands, “even though shipping has passed regularly through that area en route to French Polynesia”. If right whales do occur in the southern margins of the SPREP region, such occurrence is likely now rare.

Northern right whales are known to have occurred as far south as the East China Sea and Bonin (Ogasawara) Islands in the western Pacific, the Hawaiian Islands in the central Pacific and the coast of Baja California, Mexico, in the eastern Pacific (Scarff, 1991). It is therefore possible that an occasional vagrant would reach the northern edges of the SPREP region, but we have no evidence of this.

Gray Whale, *Eschrichtius robustus* (Lilljeborg, 1861)

Historically the western Pacific stock of gray whales migrated southward along the Asian coast to at least Formosa (Taiwan) Strait and the northern South China Sea (Wang, 1984; Omura, 1988; Henderson, 1990). Thus some occasional straying into the northwestern extremes of the SPREP region may have occurred at one time. The depleted status of this whale stock makes it very unlikely that a gray whale would wander into the SPREP region today.

Pygmy Right Whale, *Caperea marginata* (Gray, 1846)

The pygmy right whale is very poorly known but is thought to have a circumpolar distribution in the southern hemisphere, approximately between the 5°C and 20°C isotherms (Baker, 1985). Its range could at least occasionally extend into the southern parts of the SPREP region.

3.1.2 Odontocete cetaceans

At least 19 species of odontocete cetacean have been documented from the SPREP region, and several other species are likely to occur there at least occasionally.

Sperm Whale, *Physeter macrocephalus* (Linnaeus, 1758)

Sperm whales are cosmopolitan and occur throughout the SPREP region (see Rice, 1989, for a review of the species). They are the most abundant large cetaceans in the region, with the possible exception of Bryde’s whales. Maps showing the 19th century whaling grounds demonstrate the far-flung, high-density occurrence of sperm whales (e.g. Townsend, 1935; Lever, 1964; Bannister and Mitchell, 1980). The most important whaling ground in the central Pacific was “on the line”, i.e. along the equator. The Tuamotu archipelago was another well-recognised whaling ground for sperm whales. Some sperm whales were also taken in New Guinean waters, but this area was never a major sperm whaling ground (Dawbin, 1972). Sperm whales were frequently observed and hunted in Samoan waters during the late 1820s to late 1840s (Richards, 1992). Most of these were small animals encountered in small groups (Richards, 1992, 16).

Sperm whaling continued in parts of the SPREP region until well into the 20th century, and whaling in Australia and the Antarctic, on animals that may have belonged to the same stocks as those in the SPREP region, continued until 1980 when sperm whaling in most of the southern hemisphere was banned by the IWC. Berzin (1972, 164–165) speculated, apparently on the basis of a literature review, that “tropical waters promising for [modern sperm] whaling” would include: the New Guinea coast between 140°E and 146°E, New Ireland (from St. George Cape to St. Mary Cape), the east coast of New Britain, to the north of the Solomons, along the equator from 168°E to 175°E, the south side of the Ellice Islands, to the north of the Fiji Islands, and from Fanning Island (atoll) at 4°N, 159°W to the southeast as far as Christmas Island. Berzin (1972, 165) also summarised observations by Soviet “research whalers” in the 1960s during the northern hemisphere spring/summer period: groups of up to 200 sperm whales off Nauru and Malden islands;

groups of 100–200 off New Ireland, the Solomon Islands and Vanuatu (New Hebrides). Most of the whales in these exceptionally large aggregations were said to have been females with young, although “there were also many large males” among them. Sightings have been reported in Kimbe Bay (north coast of New Britain; Anonymous, 1995c) and the western Bismarck Sea (Bailey, 1991) and near the Solomons (Shimada and Pastene, 1995).

Japanese shore-based whalers took a few sperm whales in the vicinity of the Northern Mariana Islands during the early 1980s, although their main grounds, as well as those of 19th century American whalers (the Japan Ground), were generally north of the SPREP region’s northwest border (Kasuya and Miyashita, 1988, see especially their figs. 4 and 5). Japanese whalers observed sperm whales in waters south of 21°S, from approximately Fiji in the west to the area between Niue and Rarotonga in the east, while hunting primarily Bryde’s whales in late October to early November 1977 (Ohsumi, 1979b, their table 2). Sightings were made during May–July in the 1980s in the southern Philippine Sea (small animals) and around Guam (large animals) (Kasuya and Miyashita, 1988, fig. 6).

Rice (1977b) noted that the 19th century whalers had taken sperm whales near the equator all across the Pacific, year-round. He took this as suggesting “that they represent a stock separate from the breeding stocks at higher latitudes”. An alternative hypothesis, not mutually exclusive with the first, would be that the equatorial populations consist of northern hemisphere animals during the boreal winter and of southern hemisphere animals during the austral winter (Rice, 1977b). Catches and observations of sperm whales around Samoa, as recorded in Richards (1992), occurred in all months except February and March (mid-December to late March is the hurricane season at Samoa).

The extensive stock assessment work of the IWC during the 1970s and 1980s centred primarily on sperm whales in the North Pacific and the Antarctic and along the coasts of southern Africa, Peru and Australia (e.g. Donovan, 1980). Relatively little direct attention was given to the SPREP region, *per se*, although it should be recognised that whales from these other stocks may well move seasonally into and out of the region. Three of the nine IWC stock divisions for sperm whales in the southern hemisphere overlap the SPREP region: Division 6, 130°E–160°E; 7, 160°E–170°W; and 8, 170°W–100°W (Donovan, 1991). Kasuya and Miyashita (1988) considered various hypotheses of stock relations in the North Pacific and concluded that stock boundaries in the west are latitudinal as well as longitudinal in orientation, defined at least partly by the movements of oceanic currents. Most of the catch, sighting and tagging data used in their

analysis was from areas north of the SPREP region, and there is no basis, with the evidence currently available, for a comparably thorough investigation of stock relations in the tropical and South Pacific.

Hal Whitehead and his associates (in litt., 12 May 1995) have been examining the stock relations of sperm whales in the equatorial and temperate South Pacific, using photo identification, comparisons of acoustic characteristics (codas; the name for short, patterned series of clicks) and genetics. The lack of photographic matches between animals in the western Pacific (SPREP region) and eastern Pacific (e.g. Galápagos, northern Peru, Ecuador) was interpreted as suggesting that mixing, if it occurs, is infrequent (Dufault and Whitehead, 1995). The analyses of codas suggested distinct populations of sperm whales in different parts of the South Pacific, although the whales around Christmas Island and the Phoenix Islands (both areas encompassed by the “On the Line” whaling grounds) had similar coda repertoires (Weilgart et al., 1993). Studies of stock structure by reference to mtDNA were still in progress in mid-1995 (H. Whitehead, in litt., 12 May 1995).

Dawbin (1972) reported that individuals and small groups of sperm whales were “a not uncommon sight” in deep waters off New Guinea. Strandings have been reported in recent years in Guam (Kami and Lujan, 1976) and Ponape (Pohnpei; Ashby 1995), sightings and strandings at New Caledonia (Delauw, date unknown; Das, 1993) and American Samoa (R. Volk, in litt., 2 December 1991; Grant, 1995). Single sperm whales were sighted from a tuna purse seiner in Micronesia at 5°11’N, 150°38’E (28 June 1982) and 2°18’N, 168°42’E (4 August 1982); two were seen west of the northern Line Islands at 4°00’N, 163°11’W, 24 October 1983 (Patterson and Alverson, 1986). A group of six sperm whales was photographed at Boro Island, near Bikini Atoll, Marshall Islands, in July 1947 (J.G. Mead, pers. comm.). Thirty sperm whales were seen near the Tongatapu Group, Tonga, during vessel surveys in 1979 (Anonymous, 1981, fig. 2). During an acoustic survey in 1992 sperm whales were recorded in the vicinity of the Tuamotus (11 August; male), the southern Line Islands (5 September; male), Tahiti (8 September), Christmas Island (11–13 September; females and males), Jarvis Island (25 September; male), the Phoenix Islands (1–4 October; females and males), Tokelau (8 October; male), Tonga islands (20 October–7 November; females and males) (H. Whitehead, in litt., 12 May 1995; also see Dufault and Whitehead, 1995).

Trade in sperm whale teeth, perhaps originally from strandings but later and on a larger scale from the whaling industry, has been a major feature in Fijian culture (see 3.3.1, below).

Pygmy Sperm Whale, *Kogia breviceps*
(de Blainville, 1838)

A 2.9-metre specimen stranded at Guam in February 1989 (letter from T. Sherwood to G. Nitta, 29 December 1989). Two stranded specimens have been reported from southwestern New Caledonia, one in December 1974 (Robineau and Rancurel, 1981) and the other in September 1985 (identified from photographs by Sylvestre, 1988).

Dwarf Sperm Whale, *Kogia simus*
(Owen, 1866)

This small whale is rarely observed at sea in most areas but is apparently abundant in some. Its distribution, as inferred mainly from strandings, is worldwide in tropical and temperate waters (Nagorsen, 1985). There are stranding records from at least Guam (Kami and Lujan, 1976) and New Caledonia (Robineau and Rancurel, 1981). Two specimens in the US National Museum were obtained from Guam (see 3.2.2, below).

Short-finned Pilot Whale, *Globicephala macrohynchus* (Gray, 1846)

The short-finned pilot whale is another very widely distributed species. It ranges throughout tropical and warm temperate waters in all the oceans, often in sizeable herds. The species' distribution within the SPREP region is not known in any detail, but we assume that it is widespread and common in many areas.

Kami and Hosmer (1982) described this as the most frequently observed cetacean species around Guam, although this claim was questioned by Donaldson (1983). A group of more than 30 individuals was photographed in late April 1977 off the northwest coast of Guam (Birkeland, 1977). A small group was seen northwest of Truk, Micronesia, at 9°49'N, 149°22'E, on 26 June 1982 (Patterson and Alverson, 1986). About 18 pilot whales were reported to have stranded at Polowat Atoll, Truk, in March 1995 (M.S. Trianni, in litt., 17 May 1995, via S. Pultz, US Fish and Wildlife Service, Honolulu). Several sightings were made during Japanese whale sighting cruises in the area of 23–25°N, 142–144°E, i.e. to the north of the Northern Mariana Islands (Miyashita et al., 1995a). Sightings of groups of pilot whales were made from commercial tuna seiners in October and November near and to the west of the northern Line Islands (Patterson and Alverson, 1986).

Pilot whales are sighted "frequently" around Fiji and are present around the Solomon Islands and the north coast of New Guinea (Dawbin, 1974). Several schools were observed in the Solomon Sea during a whale sighting cruise in late November and early December 1993 (Shimada and Pastene,

1995). Dawbin (1972) noted that pilot whales were common in Astrolabe Bay, southern Bismarck Sea, an area from which some had been live-captured for Australian oceanaria, and they were described as common in Kimbe Bay on the north coast of New Britain during November–December 1994 (Anonymous, 1995c). Rancurel (1973a, 1973b) referred to single strandings of *Globicephala* at Vanuatu (Efate) and Tahiti (Mahina). A mass stranding of 52 animals occurred at Ouvéa Island, Loyalty Islands, on 22 May 1977 (J.G. Mead, pers. comm.; Das, 1993). A group of 20–30, including several calves, was photographed during the Fijian summer near the mouths of Savusavu and Wainunu bays (C.S. Knowles, in litt., August 1987).

Groups of 50–100 pilot whales were observed twice during surveys around Moorea, French Polynesia, January–February 1994 (J.C. Sweeney, in litt., 21 February 1995). Observations have also been reported from American Samoa (R. Volk, in litt., 2 December 1991), Palau (N. Idechong, pers. comm.) and the Austral, Gambier and Society islands and the Pitcairn group (Leatherwood, unpublished). Leatherwood (unpub. data) was told that pilot whales were seen occasionally near Ua Pou, Marquesas Islands, and he found a piece of pilot whale cranium on the beach at Raroia, Tuamotus.

Killer Whale or Orca, *Orcinus orca*
(Linnaeus, 1758)

The killer whale has a cosmopolitan distribution and occurs, at least sporadically or seasonally, in many parts of the SPREP region. Observations reported during the 1950s to early 1960s by Japanese tuna longline fishermen suggested the widespread and year-round presence of killer whale pods in Pacific equatorial waters (Iwashita et al., 1963). These reports, however, are not sufficiently well documented to be taken at face value (see section 3.6, below). Observations from Japanese whaling or whale sighting vessels are more credible (Miyashita et al., 1995a). These indicate large concentrations of killer whales (>101 individuals per 10 000 nautical miles) east of the Phoenix Islands and north of the Northern Mariana Islands and smaller concentrations between the Phoenix and Tonga islands and in the vicinity of the Cook–Society–Austral islands triangle in November; a large concentration near Samoa in October; and another to the west of Samoa in March. The lack of search effort in most months means that any conclusions about seasonal movements by the whales, or about their absence in many parts of the SPREP region, should not be made solely on the basis of the Japanese data.

A 5.7-metre, badly decomposed specimen came ashore in Guam in August 1981 (Kami and Hosmer, 1982). A pod of four killer whales was photographed in Palau in early April 1993 (Rock, 1993). In the

newspaper article reporting that incident, reference is also made to unconfirmed reports of killer whales near Guam, Yap and Palau “for years” (Rock, 1993). R. Volk (in litt., 2 December 1991) reported that killer whales are seen “on occasion” near American Samoa. Dawbin (1972) stated: “In Papua New Guinea waters the most frequent sightings reported (of killer whales) are those from off the coast of northwest New Guinea”. Small groups of killer whales, including mother–calf pairs and an adult male, were sighted in May, July and August 1994 in Kimbe Bay, PNG (approx. the centre of the north shore of New Britain) (Anonymous, 1995c). The whales were observed feeding on hammerhead sharks (probably *Shyrna lewini*) and tuna. A pod of five was seen off the southeastern end of the Solomon archipelago in late November or early December 1993 (Shimada and Pastene, 1995). Das (1993) reported that a pair of killer whales accompanied by a calf had been observed regularly outside the lagoon at La Foa, New Caledonia, apparently during the early 1990s.

A single adult male was sighted off Baker Island in March 1995 (Stephen Bailey, pers. comm.), and a small pod (5–8 individuals) was reportedly seen during the Fiji International Billfish Tournament in 1994 (Anonymous, 1995a).

False Killer Whale, *Pseudorca crassidens* (Owen, 1846)

False killer whales occur in tropical, subtropical and warm temperate seas worldwide (Stacey et al., 1994). They mass strand relatively often, and it is not unusual for several hundred animals to be involved in such events.

Dawbin (1972) mentioned that false killer whales had been taken between Papua New Guinea and Australia and that they had been sighted north of the island of New Guinea. Miyazaki and Wada (1978a) reported two small groups of false killer whales in the SPREP region: 10–20 animals southeast of Palau at 4°52'N, 138°35'E, on 27 January; 20–30 animals near New Ireland at 2°37'S, 153°01'E, on 6 March. Dawbin (1974) included the false killer whale among the species taken in the drive hunt at Malaita, Solomon Islands, and we have confirmed records of sightings from Budi-Budi, Laughlin Islands (extreme southeastern PNG), and Rabaul, New Britain, in 1986. Two groups totalling 17 individuals were observed off the Pacific side of the Solomons in early December 1993 (Shimada and Pastene, 1995). Leatherwood (unpub. data) saw a group of 8 near Rangiroa Island, Tuamotus, on 1 April 1990. A group of 15 was seen in the northern part of the Tonga archipelago, on 12 October 1992 (H. Whitehead, in litt., 12 May 1995). Judging from their documented distribution and relative abundance in well-studied tropical areas, false killer

whales can be expected to occur throughout much of the SPREP region, year-round.

Melon-headed Whale, *Peponocephala electra* (Gray, 1846)

The circumglobal, tropical to subtropical distribution of this species is clearly evident from the records plotted by Perryman et. al. (1994, figure 1). Melon-headed whales are at least locally abundant around certain oceanic islands. There are numerous records from the SPREP region.

Specimens from the Bismarck Archipelago, Papua New Guinea, were in the Zoological Museum, Hamburg, Germany, but were destroyed during the Second World War (J.G. Mead, pers. comm.). A small pod (identification not confirmed) spent several weeks during September–October 1994 near Restorf Island in Kimbe Bay, PNG (north coast of New Britain) (Anonymous, 1995c). Two sightings were made off the Pacific side of the Solomon Islands in early December 1993, totalling 105 individuals (Shimada and Pastene, 1995).

A group of four melon-headed whales washed onto the beach at Palmyra Atoll, Line Islands, in 1964, and one skull was later obtained for the US National Museum (J.G. Mead, pers. comm.). W.F.J. Mörzer Bruyns observed whales, “most probably” belonging to this species, between the Society and Marquesas Islands in January 1968 (15 animals) and in other years (months and numbers of animals not stated) (Van Bree and Cadenat, 1968, 195). A French cinematographer reported observing a large concentration of melon-headed whales below the cliffs at Nuku Hiva, Marquesas Islands, in December 1995–January 1996 (Bertrand Loyer, in litt., 29 January 1996). Roughly 1000 animals, in groups of 50–100, seemed to make daily inshore-offshore movements in this area. Large herds, numbering up to 200–300 animals, often associated with Fraser’s dolphins, were seen near Moorea, French Polynesia, during surveys in January–February 1994 (J.C. Sweeney, in litt., 21 February 1995).

Rancurel (1973a, 1973b, 1974a) described and illustrated a mass stranding of at least 231 melon-headed whales at Malekula Island, Vanuatu (New Hebrides), in November 1972. Other strandings have been documented in Guam (Kami and Hosmer, 1982; Donaldson, 1983) and Palau (Donaldson, 1983). Five melon-headed whales swam into the lagoon at Kwajelein Atoll, Marshall Islands, in November 1993. After 1–2 weeks they began to strand. All were consumed by local people (J.G. Mead, pers. comm.).

One immature female from a herd of about 20 animals, including several calves, was collected north

of Nauru on 20 February 1976 (Miyazaki and Wada, 1978a). This group of melon-headed whales was swimming with a herd of 400–500 Fraser's dolphins.

The difficulty of distinguishing among whales of the genera *Peponocephala*, *Feresa* and *Pseudorca* (especially young individuals) is generally acknowledged (see Bryden et al., 1977; Perryman et al., 1994).

**Pygmy Killer Whale, *Feresa attenuata*
(Gray, 1874)**

This small blackfish has a circumglobal distribution in tropical and subtropical waters (Ross and Leatherwood, 1994). The sighting near New Ireland of a herd of 150–200 pygmy killer whales on 6 March 1976 (Miyazaki and Wada, 1978a, 1993) was overlooked by Ross and Leatherwood (1994) in their review of the species. Dawbin (1972) cited a stranding record from Bogia on the north coast of New Guinea. Although we have found no other confirmed records of pygmy killer whales in the SPREP region, there is every likelihood that they do occur in many areas.

Pygmy killer whales occur in relatively small herds, usually of 50 or fewer animals and only occasionally of a few hundred (Ross and Leatherwood, 1994). The difficulty of distinguishing the pygmy killer whale from the melon-headed whale, and even the false killer whale, means that reports of at-sea observations should be subjected to critical consideration before acceptance (see Bryden et al., 1977; Perryman et al., 1994, table 1).

**Risso's Dolphin, *Grampus griseus*
(G. Cuvier, 1812)**

Risso's dolphins are cosmopolitan animals that prefer tropical to warm temperate waters. They can be expected virtually anywhere in the SPREP region. Miyazaki and Wada (1978a) reported six sightings of small groups (usually <10 individuals), mainly in equatorial waters north of New Guinea. One sighting was near Guam (14°04'N, 144°56'E; 13 March). A group of 30 Risso's dolphins were taken in the drive hunt at Malaita, Solomon Islands, in 1964 (Dawbin, 1966a), and nine were taken in a purse seine off Honiara (capital of the Solomons) in July 1990 (Akimichi, 1992). A group of three was seen in the Solomon Sea in early December 1993 (Shimada and Pastene, 1995). Leatherwood (unpub. data) was told that Risso's dolphins are seen regularly near Ua Pou, Marquesas Islands.

Small groups (10–20 individuals) were sighted off Moorea, French Polynesia, during January–February 1994 (J.C. Sweeney, in litt., 21 February 1995). In the western North Pacific, sightings were

made in winter 1993–95 around the Northern Mariana Islands and Guam (Miyashita et al., 1996).

Bottlenose Dolphin, *Tursiops truncatus* (Montagu, 1821)

The bottlenose dolphin has a cosmopolitan distribution in tropical to warm temperate marine waters. Extensive geographical variation in the genus has led to taxonomic uncertainty (Curry and Smith, 1997). In most areas where it has been studied at least two allopatric, or in some cases parapatric, forms, designated as coastal and offshore, have been documented (e.g. eastern North Pacific—Walker, 1981; western South America—Van Waerebeek et al., 1990; southeastern United States—Hersh and Duffield, 1990; Mead and Potter, 1995). Morphological differences among geographically separate populations of *Tursiops* have yet to be investigated in the SPREP region.

Bottlenose dolphins are seen far offshore in the eastern tropical Pacific (Scott and Chivers, 1990), and this is likely the case in the SPREP region as well. Scott and Chivers (1990) documented sightings near Tuamotu and the Marquesas islands, and Patterson and Alverson (1986) reported sightings of groups of bottlenose dolphins near the northern Line Islands (Washington, Fanning and Jarvis) during October 1983. H. Whitehead (in litt., 12 May 1995) reported sighting 30 animals near Christmas Island in September 1992. Two bottlenose dolphins were found stranded at Canton Island, Phoenix Islands, in 1976, and another stranded (alive?) on the same island in early August 1978 (J.G. Mead, pers. comm.). At least two specimens in the US National Museum were collected near the Equator in the general vicinity of the Line and Phoenix Islands (J.G. Mead, pers. comm.).

Miyazaki and Wada (1978a) observed bottlenose dolphins around the Solomon Islands and New Ireland, and they collected a lactating female off the northwest corner of New Ireland. A group of about 500 bottlenose dolphins was seen from a tuna seiner north of New Ireland at 1°12'N, 155°18'E, and herds were seen "daily" during September–October 1983 in the area 3°N–3°S, 155–170°E (Patterson and Alverson, 1986).

Bottlenose dolphins are considered common in American Samoa (R. Volk, in litt., 2 December 1991). Leatherwood has observed them from Fiji to Papua New Guinea and near the Marquesas and Tuamotu islands, both near shores or reefs and in pelagic waters. This includes six animals observed just north of Rapa, Austral Islands, on 25 March 1990. In April 1986 off western Malaita the dolphins were associated with pilot whales (Leatherwood, unpublished), an association well known from other areas (e.g. the eastern tropical Pacific; Scott and

Chivers, 1990). Dawbin (1972) described bottlenose dolphins as “fairly common” along the north coast of New Guinea. They definitely occur along the south coast as well (G.J.B. Ross, in litt., 14 May 1995).

In New Caledonia, bottlenose dolphins are said to be present near La Foa (Ouanou Island), and a neonate stranded on a beach near Noumea (Magenta) on 26 July 1993 (Das, 1993).

J.C. Sweeney (in litt., 21 February 1995) reported observing a “resident” group of bottlenose dolphins at Rangiroa atoll, Tuamotu archipelago. This group, numbering up to 30 individuals, was usually sighted within 500 metres of the barrier reef. Other small groups (up to 15 animals) were seen 1–15 or more kilometres offshore of the atoll. On three occasions Sweeney saw a group of about 15 bottlenose dolphins swimming with melon-headed whales.

Dolphins of the Genus *Lagenorhynchus* **(Peale, 1848)**

The only known record of dolphins of the genus *Lagenorhynchus* anywhere in the SPREP region involved a sighting of a small group off Palmerston Atoll, western Cook Islands (18°10'S, 163°20'W), on 25 March 1988 (Leatherwood et al., 1991a). Experts who examined the photographs tentatively identified the dolphins as Peale's dolphins, *Lagenorhynchus australis*. The question remains whether there is a hitherto unknown tropical species of this genus, or if this observation merely represents an anomalous occurrence of known species from South America (*Lagenorhynchus australis* or possibly *Lagenorhynchus obscurus*) or New Zealand (*Lagenorhynchus obscurus*).

Indo-Pacific Humpbacked Dolphin, *Sousa chinensis* (Osbeck, 1765)

The taxonomy of this genus is uncertain. In the most recent review, Ross et al. (1994) tentatively recognised the humpbacked dolphins in the western Pacific Ocean as a separate species from those in the Indian and southeastern Atlantic oceans. Humpbacked dolphins are coastal animals and are usually observed in waters less than 20 metres deep. They are present along the east coast of Australia and in the Arafura Sea close to the Australian coast (G.J.B. Ross, in litt., 14 May 1995) and in parts of Indonesia and China, but there are no published records from New Guinea. Dawbin (1972) considered it “likely” that humpbacked dolphins inhabited New Guinean waters, as does P. Corkeron (pers. comm., 1995) who reports that they have been seen in Torres Strait during recent aerial surveys of dugongs.

Finless Porpoise, *Neophocaena phocaenoides* **(G. Cuvier, 1829)**

This small porpoise has a mainly coastal, estuarine and riverine distribution in the Indo-Pacific region (Kasuya, in press). In Japan, where it has been most closely studied, it is seen mainly within two kilometres of shore and only occasionally as much as a few kilometres from shore. Kasuya (in press) concluded after reviewing all available evidence that the species is absent in Sulawesi, Halmahera, and Timor (Indonesia) and in northern Australia. Recent sightings of small groups off the north coast of Palawan Island, Philippines (Dolar and Perrin, 1996), and in shallow water (<55 metres) of the Yellow/East China Sea some 240 kilometres from the coast (Miyashita et al., 1995b) indicate that finless porpoises occur fairly close to the western margins of the SPREP region. Nevertheless, the finless porpoise has not been documented in the SPREP region and, considering its known distribution, it is probably somewhat less likely than the Indo-Pacific humpbacked dolphin to occur there.

Striped Dolphin, *Stenella coeruleocalba* **(Meyen, 1833)**

This dolphin occurs in tropical and warm temperate waters worldwide. In oceanographic terms, its range is more similar to the common dolphin's than to those of the spinner dolphin and pantropical spotted dolphin (the short-beaked form of common dolphin is presumably intended for this comparison; see *Common Dolphins* section, below). Striped dolphins and common dolphins prefer areas with large seasonal changes in surface temperature and thermocline depth as well as seasonal upwelling, while spinner and pantropical spotted dolphins are more tied to tropical surface water typified by extensive stable thermocline ridging and relatively little annual variation in surface temperature (Perrin et al., 1994a). The distribution mapped by Perrin et al. (1994a) suggests that striped dolphins are widely distributed in the SPREP region. Published sightings or collections are from 04°02'N, 155°41'E in March 1976 (Miyazaki and Wada, 1978a), 05°21'N, 136°37'E in November 1981 (Cawthorn, 1983), 02°N, 142°20'E (Alverson, 1981), and Enewetok Atoll, Marshall Islands (Reese, 1987). Unpublished records cited by Wilson et al. (1987) include one from Guam, one from the Marshall Islands, and one from near the Gilbert Islands. A recent sighting of a herd of about 150 dolphins was made near 18°13'N, 150°21'E, on 26 February 1993 (Ohizumi et al., 1993). Several sightings were made in winter to the north and west of the Northern Mariana Islands, just outside the SPREP region (Miyashita et al., 1996).

Striped dolphins have been taken by the Solomon Islanders. They were said to catch groups of up to

30 animals approximately once every three years (Dawbin, 1974).

Pantropical Spotted Dolphin, *Stenella attenuata*
(Gray, 1846)

As its name implies, this species has a pantropical distribution in both coastal and oceanic waters. The species was redescribed by Perrin et al. (1987) whose analysis included a small sample of specimens from the Solomon Islands. These were collected by W.H. Dawbin who found during a visit to Malaita in the mid-1960s that large numbers of spotted dolphins were taken in a drive hunt (Dawbin, 1966a). Dawbin (1974) stated that spotted dolphins occurred “in very large schools ranging from the southern portion of the Solomon group through to the northern coast of New Guinea” (also see Shimada and Pastene, 1995). Their documented range in the mid Pacific is from the Hawaiian Islands in the north to at least the Marquesas in the south (Perrin and Hohn, 1994). They are said to be seen regularly around Ua Pou, Marquesas (Leatherwood, unpub. data). The actual range in the SPREP region is undoubtedly much greater than indicated by the many specimen localities illustrated by Gilpatrick et al. (1987) and Perrin and Hohn (1994) and tabulated by Patterson and Alverson (1986).

As indicated above under the striped dolphin, pantropical spotted dolphins are largely sympatric with spinner dolphins. Referring to the eastern Pacific, Au and Perryman (1985) defined the spotted dolphin as an inhabitant of the tropical, equatorial and southern subtropical water masses, characterised by a sharp thermocline at less than 50 metres depth, surface temperatures greater than 25°C and salinities less than 34 parts per thousand. There it is often found in aggregations that include spinner dolphins, yellowfin tuna (*Thunnus albacares*), skipjack tuna (*Katsuwonus pelamis*) and various oceanic bird species.

Spotted dolphins are considered common in American Samoa (R. Volk, in litt., 2 December 1991). J.C. Sweeney (in litt., 21 February 1995) reported two sightings of 200–500 spotted dolphins near Moorea, French Polynesia, in January–February 1994. The animals showed a strong avoidance response to the survey vessel.

Leatherwood’s (unpub. data) observations include:

- 2 April 1990—two large groups (225–275 in one, 100–125 in the other) between Rangiroa, Tuamotus and Ua Pou, Marquesas, approx. 11°26’S, 142°53’W;
- 3 April 1990—a group of 60–70 (with a large number of spinner dolphins) at 9°38’S, 140°33’W, near Ua Pou, Marquesas; and

- 10 April 1990—a large group (with spinner dolphins) about 25 kilometres NW of Papeete, Tahiti.

A dolphin specimen from the Phoenix Islands, described and illustrated by Peale (1848) and assigned to the nominal species *Delphinus albirostratus* Peale, 1848, was identified by Perrin (1975, 22) as a spotted dolphin. A group of about 20 spotted dolphins was seen at 01°20’S, 174°22’W, north of the western Phoenix Islands in early October 1992 (H. Whitehead, in litt., 12 May 1995). Additional sightings made in late September during the same cruise were just below the equator at about 161°W (ibid.).

Sightings in the Philippine Sea, just outside the northwestern border of the SPREP region, were reported by Miyashita et al. (1996).

Spinner Dolphin, *Stenella longirostris*
(Schlegel, 1841)

In an initial review of the distribution and taxonomic history of spinner dolphins, Perrin (1975, 135–137) referred to populations, *inter alia*, in the eastern Pacific, Hawaii, and western Pacific. In a subsequent analysis Perrin et al. (1979) described a “southern” stock of spinner dolphins centred in the eastern Pacific south of the Galápagos. Southern spinner dolphins are modally different from “whitebelly” spinner dolphins to the north but similar to “Hawaiian” spinner dolphins. Perrin et al. (1979, 182) referred to several specimens collected in French Polynesia (Marquesas and Tuamotus) by R. Costello and J.D. Bryant in 1970. Based on photographs and sketches of these animals, Perrin et al. concluded that these animals were “in some characters intermediate between the typical whitebelly and Hawaiian states”. Perrin (1990) later referred these and specimens from elsewhere in the SPREP region (including the Line and Marshall islands, southern Micronesia, and the New Guinea and Solomon archipelagoes; see 3.2.2, below) to the subspecies *Stenella longirostris longirostris* (Gray, 1828).

The spinner dolphin probably has a much wider distribution throughout the SPREP region than is indicated by the available specimen and sighting records (Patterson and Alverson, 1986; Gilpatrick et al., 1987; Perrin and Gilpatrick, 1994). The comments concerning the range and habitat preferences of the pantropical spotted dolphin (above) apply to the spinner dolphin as well. Spinner dolphins have been described as especially abundant, observed in herds of hundreds and sometimes thousands, along the north coast of New Guinea, including Manus and New Britain and the southern part of the Solomon Sea (Dawbin, 1972; also see Anonymous, 1995c). Four schools, totalling 665

individuals, were observed on both the Solomon Sea and Pacific sides of the Solomon Islands during a whale sighting cruise in late November to early December 1993 (Shimada and Pastene, 1995).

Poole (1993) reported that spinner dolphins were present year-round in French Polynesia, having been documented near 16 islands, in or near reef passes and in bays. At Moorea spinner dolphins enter nearshore waters to rest and socialise during the day, tending to remain seaward of the 10 metre contour but preferring passes through the barrier reef and the seaward portions of bays. They generally avoid the deep, dark blue waters of the open ocean until evening hours when they head out to sea, presumably to feed (Poole, 1991a). Some exchange occurs between the spinner dolphin community at Moorea and that around Tahiti (Poole, 1991b). A photograph at sea near Huahine, Society Islands was published by Sylvestre (1986). Spinner dolphins are common around American Samoa (R. Volk, in litt., 2 December 1991), and they at least occasionally enter the lagoon at Enewetak Atoll, Marshall Islands (Reese, 1987). A group of more than 30 spinner dolphins became trapped in Erakor Lagoon, Port Vila, Vanuatu, during December 1994–January 1995. Some individuals from this group, which included newborn calves, were “rescued” and returned to the open sea (Decloitre, 1995).

In our experience spinner dolphins are the cetaceans most likely to be seen around oceanic islands throughout the SPREP region. They are also seen in pelagic areas far from land.

Leatherwood’s (unpub. data) observations include the following:

- 28 March 1990—a large group seen outside the reef west of Maeva Beach, Papeete, Tahiti;
- 1 April 1990—two groups seen while leaving Rangiroa Island, Tuamotus, in and just outside Tiputa Passage at 4°57’S, 147°34’W and 4°58’S, 147°33’W. (Tourists from the hotel at Rangiroa often swim with spinner dolphins in this area.);
- 3 April 1990—a large group (>1000 animals), associated with a smaller number of spotted dolphins, between Rangiroa, Tuamotus and Ua Pou, Marquesas, at 9°38’S, 140°33’W (no pink belly, classic Marquesan form);
- 3 April 1990—groups of 30–40 and 30 animals, respectively, at 12 and 2 kilometres off Hakahetau, Ua Pou, Marquesas. The people at Ua Pou reported seeing this species regularly; it was formerly killed in a drive fishery there;

- 4 April 1990—groups of 20, 45, 25 and 50–70, respectively, at Atikea Bay, Anaho Bay, Hatihau Bay and Hane Bay, all in the Marquesas;
- 5 April 1990—groups of 15 and 8–10, respectively, in Bordelais Channel and Autona Bay, Marquesas;
- 6 April 1990—a group of 65 at the entrance of Virgin Bay, Fatu Hiva, Marquesas; and
- 10 April 1990—a large group (with spotted dolphins) about 25 kilometres NW of Papeete, Tahiti.

H. Whitehead (in litt., 12 May 1995) reported sightings near Christmas Island and elsewhere in the Line Islands during mid-September and near the Phoenix Islands in early October 1992.

Winter (boreal) sightings of spinner dolphins just outside the SPREP region to the west, at about 3–4°N, 128–129°E, and north, at about 23°N, 141–142°E, were reported by Miyashita et al. (1996).

Common Dolphins: Short-beaked Form, *Delphinus delphis* Linnaeus, 1758, and Long-beaked Form, *Delphinus capensis* (Gray, 1828)

The cosmopolitan genus *Delphinus* was recently reviewed by Heyning and Perrin (1994), who recognised the two morphologically distinct forms in the eastern North Pacific as separate species. The approximate world distributions as mapped by these authors, based on specimen and sighting records, indicate that short-beaked common dolphins inhabit waters around New Caledonia while long-beaked common dolphins, which are generally more coastal, are not confirmed to be present anywhere in the SPREP region. Since long-beaked common dolphins do occur off southern Japan and around Taiwan, however, they may be present in some parts of the SPREP region. Moreover, the offshore occurrence of short-beaked common dolphins in the eastern tropical Pacific, in an area bounded by 20–40°N and 140–170°W, and from the central American coast seaward in equatorial waters to as far west as about 135°W, points to the possibility that they are distributed more widely in the SPREP region than only near New Caledonia. Miyashita et al. (1995b) reportedly identified both short- and long-beaked common dolphins in the East China Sea. H. Whitehead (in litt., 12 May 1995) reported a sighting of about 40 common dolphins on 7 November 1992 at 25°27’S, 177°42’W, southwest of Tonga and just outside the southern boundary of the SPREP region.

Fraser’s Dolphin, *Lagenodelphis hosei* (Fraser, 1956)

Perrin et al. (1994b) described Fraser's dolphin as a tropical species. Its documented distribution is skewed towards the eastern Pacific, which may reflect the intensity of research associated with the tuna fishery rather than an actually higher density of occurrence there than in other tropical regions. The first record in the central Pacific was a herd of about 400 animals observed and photographed on the equator at 165°W, northeast of the Phoenix Islands, 11 August 1966 (Perrin et al., 1973). Additional sightings (not mentioned by Perrin et al., 1994b) were reported by Miyazaki and Wada (1978b) at 01°33'–03°00'N, 141°55'–142°04'E (herds of 40–50 animals) and 01°43'N, 164°53'E (a herd of 400–500 animals, associated with melon-headed whales), between New Guinea and Micronesia in February 1976. A school of 30 animals was sighted in the Solomon Sea, off the southeastern end of the Solomon archipelago, in early December 1993 (Shimada and Pastene, 1995). Sightings near the western (approx. 08–09°N, 127–128°E) and northern (approx. 23°N, 143°E) borders of the SPREP region were reported by Miyashita et al. (1996).

A photograph from the 1930s documents the occurrence of this species in the Fiji Islands (Baker, 1983, 114). Specimens in the US National Museum are from the Marquesas and Line islands (see 3.2.2, below).

Groups of 50–100 Fraser's dolphins were sighted several times off Moorea, French Polynesia, in January–February 1994, always in association with melon-headed whales (J.C. Sweeney, in litt., 21 February 1995).

Irrawaddy Dolphin, *Orcaella brevirostris*
(Gray, 1866)

Its common name refers to a large river in Southeast Asia, but this dolphin also occurs in other rivers, estuaries and coastal marine waters from approximately the Bay of Bengal in the west to the east coast of Australia in the east (Marsh et al., 1985). Within the SPREP region the Irrawaddy dolphin is known to occur only near the coasts of New Guinea, where it ascends rivers to distances of at least 16 kilometres from the sea (Mitchell, 1975b, fig. 12). Dawbin (1972) reported that it was taken accidentally in fishing nets in the Gulf of Papua, but he had no direct evidence of its occurrence on the north coast of New Guinea. Some utilisation of Irrawaddy dolphins in the Purari delta, Gulf of Papua, was suggested by Pernetta and Hill (1981), citing Liem (1983). No details are provided, however, in the latter paper which lists Irrawaddy dolphins among the species used for food, in the context of both the subsistence and cash economies of the delta region.

The only reasonably large population (perhaps 1000 individuals) of Irrawaddy dolphins that has been investigated inhabits the turbid, shallow (2.5–18 metres) waters of Blue Mud Bay in the western Gulf of Carpentaria, northern Australia (Freeland and Bayliss, 1989). The Irrawaddy dolphin may have a somewhat wider distribution in the SPREP region than can be documented at present. However it is not likely to occur regularly outside the coastal waters of Papua New Guinea and possibly parts of the Solomon Islands.

Rough-toothed Dolphin, *Steno bredanensis*
(Lesson, 1828)

This dolphin's distribution is worldwide in oceanic tropical and warm temperate waters (Miyazaki and Perrin 1994). Dawbin (1974) described it as being encountered "intermittently" by the dolphin hunters at Malaita in the southern Solomon Islands. Rough-toothed dolphins occur year-round in French Polynesia, often associated with aggregations of birds and near-surface fish schools (Poole, 1993). J.C. Sweeney (in litt., 21 February 1995) reported numerous sightings near Moorea, in groups of up to 21–30 individuals. They were often feeding on flying fish (*Cypselurus simus*) and on at least two occasions were feeding on 5 kg barracudas (*Sphyaena barracuda*). A sighting northeast of the Northern Mariana Islands was reported by Miyashita et al. (1996) during the boreal winter.

The range map by Miyazaki and Perrin (1994) shows records at just north of the equator near 145°E, at about 10°N, 165°E, and at several sites near the Line Islands and Marquesas. As stated by these authors (p. 4), rough-toothed dolphins are "likely to occur in most, if not all, of the tropical and subtropical waters that have not yet been thoroughly investigated". This would include much of the SPREP region. A skull at the US National Museum was collected at Rongerik Atoll, Marshall Islands, in 1946. The animal was killed in the lagoon and eaten by local people (J.G. Mead, pers. comm.).

Southern Bottlenose Whale, *Hyperoodon planifrons*
(Flower, 1882)

Although the distribution of this species has traditionally been considered to be circumpolar in the Southern Hemisphere between Antarctica and approximately 30°S, observations and photographs from the tropical and subtropical Pacific have now shown that the range of southern bottlenose whales may extend into the North Pacific (Leatherwood et al., 1982, 92–93; Balcomb, 1987, 96–97; Mead, 1989a; IWC, 1989; Urban, R. et al., 1994). K.C. Balcomb,

III, observed a group of about 25 of these whales, along with some 50 pilot whales, northeast of the Phoenix Islands at the equator, 164°W on 11 August 1966. Additional sightings have been made since then in the same general area, in the northern part of the Philippine Sea and in an area bounded by 80–170°W and 15°N–15°S (IWC, 1989, 120; Wade and Gerrodette, 1993). The SPREP region certainly comprises part of the range of this whale, which is probably *H. planifrons* but could possibly prove to be a species new to science.

Cuvier's Beaked Whale, *Ziphius cavirostris*
(G. Cuvier, 1823)

This cosmopolitan beaked whale probably occurs in deep waters throughout much of the SPREP region. Heyning's (1989) map of distribution is largely blank for the SPREP region, but he notes that gaps, such as the one in the tropical central Pacific, "are probably artificial due to a lack of data" (map legend, p. 295). The skull of a male was obtained from New Ireland (Hale, 1931); another skull from Ponape, Micronesia; and another from Sydney Island, Phoenix Islands (J.G. Mead, pers. comm.). References to a stranded specimen from Lindenhafen, New Britain, said to be in a museum in Sydney, Australia, and to a skull found at Treasury Harbour, Solomon Islands, are on file at the US National Museum (J.G. Mead, pers. comm.).

Sightings have been reported near the Nauru and Manus islands by Miyazaki and Wada (1978a), who noted the difficulty of making positive identifications because of these whales' cryptic behavior. Observations near the Mariana and Bonin (Ogasawara) islands were reported by Masaki (1972). At least three strandings have been documented in French Polynesia (Poole, 1993). Sightings have been made in many areas of the tropical South Pacific (Miyashita, pers. comm., October 1991) and off the north coast of Irian Jaya (Leatherwood, unpublished).

Beaked Whales of the Genus *Mesoplodon*

The distribution and biology of this group of oceanic species were reviewed by Mead (1989b). At least four of the 13 presently-recognized species are likely to occur within the SPREP region based on the proximity of strandings, sightings and catches. These are: Blainville's beaked whale (*M. densirostris*), the ginkgo-toothed beaked whale (*M. ginkgodens*), Longman's beaked whale (*M. pacificus*, sometimes assigned to a separate genus *Indopacetus*) and True's beaked whale (*M. mirus*). An additional six species could occur, at least as stragglers. These include Gray's beaked whale (*M. grayi*), the strap-toothed whale (*M. layardii*), Hector's beaked whale (*M. hectori*), Andrews' beaked whale (*M. bowdoini*), Hubbs' beaked whale (*M.*

carlhubbsi) and the pygmy beaked whale (*M. peruvianus*). The last-mentioned species was recently described on the basis of several stranded and caught specimens from Peru (Reyes et al., 1991). Urbán-Ramírez and Aurióles-Gamboa (1992) proposed that the pygmy beaked whale's distribution may be limited to the eastern tropical Pacific south of 25°N and north of 15°S.

Dawbin (1974) referred to a record of Blainville's beaked whale from the Solomon Islands but gave no details; this record was not cited by Mead (1989b). Poole (1993) reported seven observations of this species at Moorea, French Polynesia, during the months March–August. He has concluded that Blainville's beaked whales are relatively common in nearshore waters of Moorea (M.M. Poole, in litt., 23 February 1995). In his letter Poole refers to a sighting at Rurutu, French Polynesia, sometime before 1988, to a juvenile male that stranded at Moorea several years ago (Poole collected the skull), and to an adult male photographed while breaching between Tahiti and Moorea. J.C. Sweeney (in litt., 21 February 1995) reported three sightings of small groups of unidentified beaked whales (2–6 individuals) off Moorea in January–February 1994. He estimated their length as 5–6 metres and noted that they had "tusks"; thus they may have been Blainville's beaked whales.

J.G. Mead (pers. comm.) provided two additional unpublished records of Blainville's beaked whales in the SPREP region: a specimen stranded at New Britain on an unspecified date, the skull of which is located in the Museo di Storia Naturale di Genova, Italy; and a skeleton photographed at Rapa Iti, Tubuai Islands, French Polynesia, in 1984.

We found no other confirmed sighting or specimen records of *Mesoplodon* spp. from inside the SPREP boundaries, but this is most likely due to a paucity of reporting rather than to a scarcity of the animals in this region.

3.1.3 Pinnipeds

Pinnipeds are largely absent from the SPREP region. No species is known to be a regular inhabitant. Antarctic phocids, particularly leopard seals and certain of the subantarctic otariids (fur seals; *Arctocephalus* spp.) are perhaps the most likely pinnipeds to appear as "strays" in the southernmost island chains. Eldredge (1991) called attention to the possibility that Hawaiian monk seals (*Monachus schauinslandi*) and northern elephant seals (*Mirounga angustirostris*) could occasionally wander

far enough from their normal ranges to appear at the Marshall or Gilbert islands (cf. Bertram and Bertram, 1973, 310). However the few specimen records to which Eldredge referred were unidentified to species.

**Leopard Seal, *Hydrurga leptonyx*
(de Blainville, 1820)**

Although the leopard seal is primarily distributed in antarctic and subantarctic waters, individuals wander widely and appear as “strays” on continental and island coasts in temperate, and occasionally subtropical, latitudes (Kooyman, 1981). The northernmost records of the species are of two occurrences at Rarotonga, Cook Islands (Berry, 1960 [1961]; King, 1983, 116). In addition, an emaciated leopard seal was photographed at Tubuai, Austral Islands, in October 1981 (Dan Travers, pers. comm., March 1990; see Reeves et al., 1992, 218).

Several other records can be reported here. A leopard seal was caught in a fisherman’s net inside the lagoon on the west side of Mangareva Island (Kivimivo/Taku area), Gambier Islands, on 12 August 1983 (Tihoni Reasin, Rikitea, Mangareva, in litt., 10 January 1992). Its skin was shipped to Tahiti for sale. Local people reported that seals of this species had been caught in the area at least once previously (ibid.). Also in the early 1980s, a leopard seal repeatedly appeared near the coral pier adjacent to the village of Akurei on Rapa Island, Austral Islands. The animal behaved passively and eventually took food offered by hand and allowed itself to be touched. Its death was apparently caused by poisoning (Mayor and Councillors of Akurei, pers. comm., 24 March 1990).

All of these records are, not surprisingly, from the southern edge of the SPREP region. They are consistent with Kooyman’s (1981, 265) characterisation of leopard seals as “the greatest wanderers of the Antarctic seals”.

Southern Fur Seals, *Arctocephalus* spp.

Breeding populations of fur seals occur on the Galápagos Islands (*A. galapagoensis*), Juan Fernández Islands (*A. philippii*), southern Perú and Chile (*A. australis*), southeastern Australia (*A. pusillus* and *A. forsteri* in Tasmania), and both the South and North Island as well as many of the New Zealand subantarctic islands (*A. forsteri*) (Croxall & Gentry, 1987; Reijnders et al., 1993). Individuals from any of these populations could wander into the SPREP region. Several records have come to our attention.

Three young New Zealand fur seals (*A. forsteri*; see King, 1976) came ashore in southern New Caledonia, two in July or August 1972 and one in

September 1973. One of them was kept alive for nine months at the Nouméa Aquarium, one was found dead, and the other was killed by a fisherman. Rancurel (1973a, 1973b, 1974, 1975) reasoned, judging from the prevailing currents and wind patterns, that the animals probably originated in southern Australia or New Zealand.

Subantarctic fur seals (*A. tropicalis*), probably from Amsterdam and St. Paul islands, have occurred in increasing numbers in Australia and New Zealand (Taylor, 1992; Gales et al., 1994). Thus some subantarctic fur seals probably wander into portions of the SPREP region as well (N. Gales, pers. comm., May 1995). Most such wanderers are juveniles, and they are difficult to distinguish from other fur seal species.

A fur seal came ashore on Tubuai, Austral Islands, in 1986 and was held briefly in a fenced enclosure and then released (Dan Travers, pers. comm., 27 March 1990). It is not possible to identify the species from the photographs (in Leatherwood’s files).

3.1.4 Sirenians

The dugong is the only living sirenian that is indigenous to the South Pacific Ocean.

Dugong, *Dugong dugon* (Müller, 1776)

Dugongs were formerly widely distributed in the tropical and subtropical Indo-western Pacific, including much of Melanesia and western Micronesia (Caroline Islands) but apparently not most of central and eastern Micronesia or the Ellice and Fiji Islands (Bertram and Bertram, 1973; Nishiwaki and Marsh, 1985). Their current range is still extensive but they have been extirpated or severely depleted in many areas. A single dugong observed in Cocos Lagoon, Guam, in the mid-1970s was considered a stray from a distant population, as the species is generally absent from the Marianas (Randall et al., 1975).

Of the five world dugong populations tentatively identified by Nishiwaki et al. (1979), two occur partly in the SPREP region. The approximate boundaries of the range of Population 1 are Vanuatu on the east and 140°E on the west, and the range includes virtually all of Melanesia, Papua New Guinea, and the northeast and east coasts of Australia (south as far as New South Wales). Population 2 is centred along the northwest and west coasts of Australia, Irian Jaya, and northwards to the Philippines. There is no evidence for a hiatus in distribution along the north coast of Australia, so the two “populations” may in fact be one. The animals in Palauan waters have been described as “the most isolated dugong population in the world”, with the nearest adjacent groups in Indonesia 800 kilometres to the south

and the Philippines 850 kilometres to the west (Marsh et al., 1995).

An aerial survey in Torres Strait in November 1987 revealed especially high densities of dugongs on the extensive seagrass beds around Badu and extending north across Orman Reef around Buru Island and east to Gabba Island (09°46'S, 142°37'E) (Marsh and Saalfeld, 1988, 1991). High densities were also found around the Warrior Reef complex.

A series of “postal surveys” and aerial surveys during the 1970s and early 1980s documented the wide distribution of dugongs throughout Papua New Guinea (Hudson, 1976, 1981; Ligon and Hudson, 1976). Hudson’s (1976) informants reported that groups of 20–50 dugongs were present along the northwest coast of Bougainville Island, the northwest coast of New Britain, all round Manus Island, and along the coasts of West Sepik, East Sepik, and Madang provinces of eastern New Guinea. The occasional presence of dugongs in New Ireland was documented by Williams (1985). Although they are reported to be present in significant numbers in the Western Province of the Solomon Islands, only a few dugongs were seen during aerial surveys of the adjacent Bougainville Island area (B. Hudson in Nishiwaki and Marsh, 1985, 10).

Nishiwaki and Marsh (1985, 9) reported that only “small numbers” of dugongs occur off New Caledonia and Vanuatu. Dugongs were said by Sylvestre and Richer de Forges (1985) to be common in the New Caledonia lagoon. The population of dugongs in New Caledonian waters was estimated at 2000–3000 in the mid 1970s (R. Martini manuscript cited by Marsh and Lefebvre, 1994). A study during 1987–1988, involving aerial surveys and a postal questionnaire survey, found dugongs to be widely distributed throughout Vanuatu (Chambers et al., 1989; Chambers and Bani, 1991). Group sizes were small (mostly <10 individuals), and sightings were mainly close to shore in association with shallow bays and fringing or platform reefs (see also Nicholson, 1996).

The estimated maximal rate of increase for a dugong population is five percent per year, but the actual rate is probably dependent upon the condition of local seagrass beds at any given time (Marsh, 1986, 1988; Marsh and Saalfeld, 1991).

Their reliance on relatively shallow seagrass beds for food limits the ability of dugongs to travel between islands and continents that are separated by extensive areas of deep water. For this reason, many island populations, including those around Vanuatu and Palau, are probably essentially isolated. Such isolation makes these groups of dugongs especially vulnerable to extinction (see Brownell et al., 1981).

3.2 Specimen inventory

Museum abbreviations are as follows:

AMM: Australian Museum, Sydney;

ANSP: Academy of Natural Sciences, Philadelphia, Pennsylvania, USA;

BMNH: British Museum (Natural History), London;

BPBM: Bernice P. Bishop Museum, Honolulu, Hawaii, USA;

MCZ: Museum of Comparative Zoology, Cambridge, Massachusetts, USA;

MONZ: Museum of New Zealand, Wellington;

NSM: National Science Museum, Tokyo;

SAM: South Australian Museum, Adelaide;

SWFC: Southwest Fisheries Science Center, La Jolla, California;

USNM: National Museum of Natural History, Washington, D.C.; and

WHD: refers to the William H. Dawbin collection at the Australian Museum (AMM).

3.2.1 Mysticete cetaceans

Balaenoptera edeni

NSM Catalogue: NSM 24569 (S of New Caledonia at 23°12'S, 168°53'E; pelvic bone). Note that numerous other pelvic (NSM 24566–24587) and nasal bone (NSM 24279–24283) specimens from this general area on the southern edge of the SPREP region are available.

Balaenoptera physalus (?)

J.G. Mead (pers. comm.): MONZ 1605 (Port Moresby, Papua New Guinea; 2 baleen plates).

Balaenoptera acutorostrata

J.G. Mead (pers. comm.): USNM 282318 (Ariikan Island, Marshall Islands; vertebra found on beach).

Megaptera novaeangliae

Mead (pers. comm.): USNM 12310, MCZ 7918 (Tonga, baleen, obtained from Charles Scammon—see Scammon 1874)

3.2.2 Odontocete cetaceans

Physeter macrocephalus

J.G. Mead (pers. comm.): MONZ 29 (Fiji; “old carcass”)

Kogia simus

J.G. Mead (pers. comm.): USNM 504324 (Guam; fetus preserved in fluid); USNM 504336 (Guam; skull).

Globicephala macrorhynchus

J.G. Mead (pers. comm.): USNM 396081 (Howland Island, near equator north of Phoenix Islands, so just outside SPREP region; skull).

Globicephala sp.

BPBM 2023 (Tuamotu Archipelago; mandible)

Pseudorca crassidens

NSM Catalogue: NSM 24772 (off NW Line Islands at 05°45'N, 162°12'W; juvenile; skeleton).

Tursiops truncatus

Miyazaki and Wada (1978a): NSM 24923 (01°55'S, 148°53'E; skeleton).

NSM Catalogue: NSM 25372 (SW of Palau at 05°14'N, 131°03'E; skull); NSM 25372 (05°14'N, 131°03'E; resting; skull).

T.K. Yamada (in litt.): NSM 29670–29675 (Kukum, Honiara, Solomon Islands; skulls).

J.G. Mead (pers. comm.): USNM 269184 (Howland Island at 00°48'N, 176°38'W; skull and skeleton); USNM 395781 (Jarvis Island, Line Islands, at 00°23'N, 160°01'W; skull, ribs, vertebrae).

Steno bredanensis

J.G. Mead (pers. comm.): USNM 282317 (Rongerik Atoll, Marshall Islands; skull).

Stenella coeruleoalba

Wilson et al. (1987): USNM 395776 (east of Marshall Islands at 09°N, 178°W—just outside SPREP region; Hubbs et al., 1973); USNM 504914 (Marshall Islands); BMNH 71.474 (Malaita, Solomon Islands); USNM 395776 (Sydney Island, Phoenix Islands, 04°30'S, 171°30'W). [Author's note: USNM 395776 appears twice, referring to separate collection localities.]

Stenella attenuata

Perrin et al. (1987) and Gilpatrick et al. (1987): BMNH 1966.11.18.2, 3, 5, 8 (4 specimens, Solomon Islands); WHD 278, 289, 440, 444, 451, 452, 456, 459 (Solomon Islands); AMM 12360–12364, 12366–12382, 12386–12397, 12384 (Solomon Islands); NSM 24924–24927 (Solomon Islands region; skeletons; Miyazaki and Wada, 1978a); NSM 25374 (02°56'N,

149°24'E; skull); NSM 25375 (04°27'N, 149°54'E; resting; skull); NSM 25377 (04°48'N, 149°54'E; skull).

NSM Catalogue: NSM 25371 (05°14'N, 131°03'E; lactating; skull); NSM 23655 (Northern Mariana Islands at 20°39'N, 149°37'E; immature; skeleton).

T.K. Yamada (in litt.): NSM 26627 (00°28'N, 141°56'E; 195 cm female; skeleton).

Stenella longirostris

Gilpatrick et al. (1987) and Perrin (1990): ANSP 19194, 19195 (Christmas Island, Line Islands); USNM 504251 (Washington Island, Line Islands); USNM 504252 (Rangiroa, Tuamotu Islands); USNM 504253 (Hiva Oa, Marquesas Islands); USNM 395404 (Enewetok Atoll, Marshall Islands); NSM 24928, 24929, 24930, 24931, 24933, 24934 (Solomon Islands region; skeletons; Miyazaki and Wada, 1978a); NSM 24932 (03°11'N, 142°07'E; Miyazaki and Wada, 1978a); NSM 25373 (01°24'S, 147°22'E; skull); NSM 25376 (04°48'N, 149°45'E; resting; skull).

J.G. Mead (pers. comm.): USNM 291958 (Arno Atoll, Marshall Islands; skull); USNM 297851 and 297852 (Ifaluk Atoll, Caroline Islands; skull and partial skeleton, respectively).

Lagenodelphis hosei

NSM Catalogue: NSM 24921 (01°33'N, 142°04'E; skeleton; Miyazaki and Wada, 1978a, 1978b).

Peponocephala electra

Perrin and Kashiwada (1989): SWFC WFP0584 (Palau).

NSM Catalogue: NSM 24922 (off Nauru at 01°45'N, 164°53'E; immature; skeleton; Miyazaki and Wada, 1978a).

J.G. Mead (pers. comm.): USNM 395785 (Palmyra Island, Line Islands; skull); USNM 504250 (Nuku Hiva, Marquesas; skull and skeleton).

Ziphius cavirostris

J.G. Mead (pers. comm.): SAM 848 (Kopo, New Ireland; incomplete skull; Hale, 1931); USNM 306284 (Ponape, Caroline Islands; skull); USNM 395775 (Sydney Island, Phoenix Islands; skull).

Mesoplodon densirostris

J.G. Mead (pers. comm.): MSNG 16 (New Britain; skull).

Unidentified cetacean

BPBM 2032 (small cetacean; Marshall Islands; partial skull and vertebrae); BPBM 2078 (odontocete whale; Teraina Island, Line Islands; partial

skeleton); BPBM 2079 (odontocete whale); Rarotonga Island, Cook Islands; tooth).

3.2.3 Pinnipeds

A specimen of *Arctocephalus* sp. that came ashore on the south side of New Caledonia in August 1972 was shipped, frozen, to the Amsterdam Museum after it died in April 1973 (Rancurel, 1975).

3.2.4 Sirenians

Dugong dugon

The skull and skeleton of a specimen caught at Palau in February 1937 was deposited in the university museum, Taihoku Imperial University, now Taiwan National University (Hirasaka, 1939).

NSM Catalogue: NSM 936 (Marukyoku, Palau; skeleton).

3.3 Traditional or local uses of marine mammals

3.3.1 Large cetaceans

The people of Tonga hunted humpback whales in nearshore waters as recently as the 1970s (Keller, 1982). Approximately 11 whaling operations were active in Tonga until a few years before 1979 (Anonymous, 1981). In the last six years of this hunt (1973–78) the total catch was 35 whales, mostly females and including 6 calves (IWC, 1980, 109). Calves were often harpooned first in order to make their mothers easier to approach and kill; it was estimated that at least three whales were struck for each one secured (Anonymous, 1981). Although the hunting of baleen whales had been illegal in Tonga for many years, it was not until 1979 that the killing of humpbacks actually stopped (Anonymous, 1981; Keller, 1982; IWC, 1989, 106). The royal ban on Tongan whaling has been in effect since 1980. A request by a Japan-based company to re-open whaling in Tongan waters was rejected in 1995 (Anonymous, 1995b).

The use of sperm whale teeth as ransom or “barter money” is said to have been introduced to Fiji, from Tonga, during the late 18th century (Derrick, 1950, 71). These teeth became so important in Fijian culture that they eventually came to define the essence of *tabua*, “the price of life and death, the indispensable adjunct to proposals (whether of marriage, alliance, or intrigue), requests and apologies, appeal to the gods, sympathy with the bereaved” (Derrick, 1950, 9). The high importance of polished sperm whale teeth in Fiji continued at least into the 1960s (Lever, 1964) and according to Akimichi (1992) whale-tooth money and

ornamentation have maintained their cultural significance in this and some other parts of Oceania. According to IWC (1994b, 17), the Fijian trade in sperm whale teeth “did not relate to a local fishery”.

A whalepot for boiling blubber was purchased from a homeward-bound whaler, apparently with the intention of setting up a shore-based whale fishery at Swain’s Island, about midway between Samoa and Tokelau, during the mid 1800s. There is no evidence, however, that this initiative ever developed beyond the planning stage (Richards, 1992, 195–196).

3.3.2 Small cetaceans

Local residents of the Solomon Islands traditionally practiced a drive hunt for small cetaceans (hereafter called “porpoise hunting”), with the primary objective of obtaining “porpoise” teeth and meat (Ivens, 1902, 1972; Pepys-Cockerell, 1965, 1973; Dawbin, 1966a, 1972; Boyd, no date; Takekawa 1996a, 1996b). Porpoise teeth are called *nifoi’a* in the Kwaio language (Akin, 1981; Takekawa 1996b). These teeth are sometimes woven into collars or headbands (*biru*) used in blood bounties (Akin, 1993, 881). Necklaces of porpoise teeth remain “essential” to the payment of bride price amongst some Malaitans. Porpoise teeth “have long served as money throughout Malaita, particularly in and around the Lau Lagoon and other areas to the north, and in ‘Are’are” (Akin, 1993, 881). In 1994 the hard-currency value of one tooth was set (at Fanalei) at Solomon \$0.5, equivalent to about US\$0.16 (Takekawa, 1996b). Akin (1981) described and illustrated several types of porpoise tooth ornaments worn on the ears, nose and neck.

Some time before World War II the Lau people stopped porpoise hunting (Boyd, no date). By the late 1950s the people of Malaita were said to have been importing porpoise teeth from Micronesia to fill the local demand. In 1959 the local hunting was “resurrected” (Boyd, no date). Takekawa (1996b) noted that porpoise hunting was “revived” at Fanalei in 1948 and was “introduced” at Walande in 1958 and at villages in northern Malaita thereafter (also see Akimichi, 1992). Porpoise hunting at Malaita underwent a further expansion beginning in 1964, apparently because the availability of Australian currency increased the market demand for the necklaces made with porpoise teeth (Pepys-Cockerell, 1965). Not only were 20 additional large canoes bought from Santa Ysabel for hunting in 1964, but the tradition of allowing an interval of several years to elapse between major hunting episodes where no porpoise hunting occurred was also forsaken beginning in 1964 (Pepys-Cockerell, 1965). As of the mid-1960s the people of Langa Langa sub-district, living on artificial islands behind reefs to the south of Auki on the west coast of

Malaita, no longer hunted cetaceans although they had done so formerly. Only the people of Lau sub-district on the extreme north and northeast of Malaita, as well as the islanders of Walande and Kwai to the south of Malaita, still hunted cetaceans (Pepys-Cockerell, 1965). The Lau people suspended their hunting for some time during the late 1960s or early 1970s because of a dispute with the Bitama landowners at Tombaita (Pepys-Cockerell, 1973). The drive hunt at Malaita was apparently not pursued in 1970 (Dawbin in Mitchell, 1975a, 25). An average of 840 small cetaceans were taken per year at Fanelei from 1976 to 1993 (maximum: close to 2000 in 1986; minimum: less than 50 in 1979) (Takekawa 1996b). Pantropical spotted dolphins and spinner dolphins comprise the bulk of the catch at Fanelei (Takekawa 1996b).

Although the species and numbers of cetaceans taken are poorly documented, Dawbin (1966a) confirmed that catches from single drives could be in the hundreds, and he was told that annual catches, apparently in 1964, 1965 and 1966, were several thousand. Pepys-Cockerell (1965) reported that 1392 animals were taken in a single harbour (Bita'ama) between 13 May and 27 June 1964, and that more than 2000 had been taken there by the end of August. As 327 and 365 had been taken earlier that year at Walande and Fanelei, respectively, he estimated a total catch of more than 3000 in 1964.

Most of the cetaceans taken in the Solomon drive fishery are apparently long-snouted oceanic forms, including spinner (*raa*), pantropical spotted (*unubulu*), striped (*robo tetefe*), common (*robo manole*) and rough-toothed dolphins (Dawbin, 1972, 1974; in Mitchell, 1975b, 949; Takekawa 1996a, 1996b). Risso's dolphins were taken occasionally, but their low number of teeth made them of relatively little value to the Malaitans (Dawbin, 1966a). Spotted dolphins were said to be twice as valuable as spinner dolphins because their teeth, though fewer, are considerably larger (Dawbin, 1972). The larger teeth from a small cetacean species known locally as *lobo* were formerly of special importance in blood bounties and in payments to burial parties (Akin, 1981). *Lobo* were still needed for many types of public presentations at "Oloburi and south into 'Are'are" as recently as the early 1990s (Akin 1993, 883). Akin's *lobo* is probably either the melon-headed whale (*robo au*) or, less likely, the bottlenose dolphin (*Tursiops* sp.). According to Takekawa (1996a), melon-headed whales have the most valuable teeth of all. They are rarely taken today, apparently because they are not often seen. Bottlenose dolphins are generally not hunted because they cannot be driven in the usual manner (by clapping stones together underwater) (Takekawa, 1996a).

Accounts of the drive fishery for small cetaceans in the Solomon Islands do not indicate that there was any deliberate management for conservation embedded in the local culture. Although Christianity, introduced in the early 20th century, transformed many of the cultural and "spiritual" aspects of the hunting, it did not discourage the people from continuing their traditional fishery. The conversion to a cash-based economy, with the need for currency being met primarily by coconut farming and cattle raising, apparently has had a much more profound effect on the porpoise hunt than has Christianity (Boyd, n.d.).

Reference is made in Mitchell (1975b, 949) to similar drive hunting in New Guinea, citing Dawbin (1966a) as the authority. However the only reference in Dawbin (1966a) is to the fact that the author "requested sample catches from other parts of the Solomon Islands and Papua-New Guinea". Akimichi (1992) claimed that harpoons were used to kill sea turtles, sharks, dugongs and small cetaceans ("porpoises") at Manus, Admiralty Islands. He speculated that the technique was introduced there by Germans in the 1930s. He reported having received three specimens from Rabaul, New Britain, PNG, but gave no indication as to how or by whom they were captured. We have found no definite evidence of a drive hunt for small cetaceans in Papua New Guinea. According to Dawbin (1972), spinner dolphins were formerly hunted for meat and teeth (currency) from the village of Nova, Buka Passage, far northwestern Solomons. The finding of Risso's dolphin remains in archaeological material at Motupore Island, Bootless Inlet, southeastern New Guinea, led Pernetta and Hill (1981) to consider the possibility that small cetaceans were once hunted there opportunistically.

Small cetaceans were said to be prized as food in the Gilbert Islands (Kiribati), and some drive hunting apparently occurred there until at least as recently as the early 1980s (Tenakanai and Uwate, 1984). "Porpoise" teeth have been used there as currency and ornaments (Akimichi, 1992). A drive hunt similar to that in the Solomons also occurred on Woleai Atoll in the western Caroline Islands. According to Alkire (1968), who visited Woleai in 1965, the most recent catch of "porpoises" in the western lagoon was in 1953.

Leatherwood (unpub. data, 1990) was told by villagers on Ua Pou, Marquesas Islands, that there had been a drive hunt for small cetaceans at several villages on the island (also see IWC, 1994b, 17). The technique apparently was similar to that used in the Solomons, with men in many boats clanging rocks together underwater to drive dolphins, mainly spinner dolphins, inshore or onshore. The meat was cooked with onions and coconut milk, and the teeth were used for money. The hunt had been banned

some time before Leatherwood's visit (April 1990), and the most recent catches had been made more than ten years previously (on the east side of the island). The village of Hakehetau was known as the place where dolphin-tooth necklaces were made.

An early observation of local people on Saipan, Mariana Islands, driving a herd of 80 "sperm whales" ashore and feasting on them (Costenoble, 1905) has been interpreted as likely evidence of "porpoise" (= dolphin) hunting (Kami and Lujan, 1976). We are unable to evaluate this report. It does, however, seem sufficient to indicate that a drive hunt for cetaceans occurred at Saipan during the late 19th and early 20th centuries.

People in the Marshall Islands and Kiribati have harpooned small cetaceans for food (Reese, 1987; also see IWC, 1994b, 18), particularly after the animals have become disoriented and trapped inside atoll lagoons (Nitta, 1994). The killing of small cetaceans by Fiji islanders can be inferred from the photograph published by Baker (1983, 114), showing a Fraser's dolphin near a man with a spear. Baker's caption indicates that the dolphin was speared in Fiji in the 1930s. Rancurel (1973b) noted that a pilot whale "was stranded on the reef and killed by native fishermen" at Efate, Vanuatu, in 1972. Whether any use was made of the animal before it was buried is uncertain from Rancurel's account.

Akimichi's review (1992) of cetacean hunting in Oceania includes references to the driving or harpooning of small cetaceans at Manus (see above), Malaita (see above), Tuamotu and Marquesas (in the past), Tonga, the Caroline Islands (including Woleai; see above) and Mokil in eastern Micronesia.

3.3.3 Dugongs

Dugongs have been hunted throughout their range and are endangered in most areas outside Australia as a result (Bertram and Bertram, 1973; Nishiwaki and Marsh, 1985).

Dugong hunting has long been central to the subsistence economy and culture of Torres Strait Islanders (Nietschmann and Nietschmann, 1981) and to people throughout much of Papua New Guinea (Hudson, 1976, 1977, 1982, 1986a, 1986b, 1986c; Pernetta and Hill, 1981). The Kiwai living around the Fly River delta traditionally hunted dugongs by harpooning them from temporary platforms built in reef areas (Olewale and Sedu, 1982). This hunting method was replaced in the early 20th century by the use of two-masted, double-hulled canoes, from which the dugongs are harpooned mainly at night. Pregnant females apparently have always been hunted selectively; they are preferred because of their fatness and because fetuses provide good food for older people

who have difficulty chewing (Olewale and Sedu, 1982). Dugong meat and oil are valuable as food and medicine (oil only), and they have provided the hunting communities with something to trade for sago, tobacco and money (Olewale and Sedu, 1982).

Hudson (1982) and Olewale and Sedu (1982) sought examples of ways in which traditional hunting methods in Papua New Guinea might have conserved dugongs, but they found few. Hudson (1982) noted that in Manus Province (especially at Baluan Island) a "tambu" against the hunting and eating of dugongs by a particular clan may have reduced somewhat the traditional hunting pressure. Also, the ritual importance of dugongs in marriages and funerals on Baluan Island meant that they were hunted there only irregularly. The reef tenure system meant that even this occasional hunting was spatially constrained. In contrast to these examples, the strong traditional preference for fat, pregnant female dugongs (Olewale and Sedu, 1982) probably meant that hunters traditionally removed more of this critical segment of the population than they would have if the hunting had been unselective.

The introduction of motor transport and nets in Papua New Guinea and northern Australia has had devastating effects on dugong populations (Marsh et al., 1984; Hudson, 1986a, 1986b, 1986c; Marsh, 1986a, 1986b). Netting intensified with development of markets for barramundi (*Lates calcarifer*) and crayfish (*Panulirus ornatus*) in both countries. Trawlers and other commercial fishing boats have sometimes been used as "mother ships" for dugong hunting on offshore reefs.

The dugong was given legal protection in Papua New Guinea in 1976, which made sale of products illegal but allowed continued "traditional" hunting and use of dugong products (Hudson, 1977, 1986b). This protection proved unenforceable in the case of the Kiwai, and they were encouraged to develop the Maza Wildlife Management Area, where the exploitation of dugongs and the selling of their meat would be subject to community regulation and monitoring. The approach was unsuccessful. The legally protected status of 1976 was reinstated, and the sale of dugong meat at markets in Daru was again prohibited (Hudson, 1986a, 1986b).

The people of the Arawe Islands, West New Britain, have long hunted dugongs with fibre nets (Hudson, 1980). The people living on the Trobriand and Manus islands used nets made of pandanus palm leaves, while the people from the Siassi Islands used tree bark for making their dugong nets (Pyne, 1972). Dugongs still play a large role in the cultural life of the people living on Pilopilo Island, where the bones are used to make spears and other weapons, the skin and teeth to make jewellery and ornaments (Hudson 1980). It was estimated in the late 1970s

that about 10–20 dugongs were killed annually in the Arawe Islands, on each occasion a cause for feasting and celebration (Hudson 1980).

There was said to be a tradition of not harming dugongs in Nokon, New Ireland. The meat of one that was killed in 1985, apparently by gunshot, was not eaten (Greenwell, 1985; Williams, 1985). This would seem exceptional for Papua New Guinea in general, as there is a widespread tradition of dugong hunting throughout much of the archipelago.

Dugongs are generally protected in New Caledonia although permits are issued occasionally to authorise hunting for festivals. The animals are taken with harpoons or nets. Sixteen individuals were reported to have been taken between 1978 and 1984 (Sylvestre and Richer de Forges, 1985).

Dugongs are hunted on a small scale in some parts of Vanuatu (Chambers and Bani, 1988, 1991; Chambers et al., 1989) even though marine mammals are explicitly protected from fishing under the Vanuatu Fisheries Act of 1982. Dugong hunting in Vanuatu is largely opportunistic and limited to only a few communities. The species apparently does not play a significant role in local cultures there (Chambers and Bani, 1988).

In Palau dugongs were traditionally hunted with heavy spears thrown from canoes (Johannes, 1981; cf. Harry, 1956). They were a staple food source as recently as the 1920s (Kramer, 1929); there was even some inter-village commerce in dugong meat (Kubary, 1895). Dugongs were legally protected in Palau beginning in the early 1930s (Hirasaka, 1934), and they were given further protection by a Palau District Order in the early 1950s (Brownell et al., 1981). Nevertheless, the introduction of outboard engines and firearms has increased the ability of Palauans to find, follow and kill these animals, and poaching has been widespread. Explosives, apparently introduced by Japanese prior to World War II and widely available to fishermen and hunters since the war, were also used, at least until recently, to kill dugongs (Brownell et al., 1981; Rathbun et al., 1988). This use may now have stopped (Marsh et al., 1995). The additional protection given dugongs in Palau under the U.S. Marine Mammal Protection Act of 1972, US Endangered Species Act of 1973, and Trust Territory Endangered Species Act of 1975 (Brownell et al., 1981) has failed to stop the poaching (Johannes, 1981; Brownell et al., 1981; Rathbun et al., 1988; Marsh et al., 1995). The use of dugong vertebrae as wristlets in Palau has been continuous since at least the 18th century (Keate, 1788; Kramer, 1929; Hirasaka, 1934; Brownell et al., 1981), but this use was deemed “of minor relevance” in a recent study (Marsh et al., 1995). Ribs are used to some extent for carving jewelry (Marsh et al., 1995).

3.4 Commercial whaling

Pelagic whaling from sailing ships probably began in the tropical Pacific Ocean in the early 1800s. The first whaleship on record as having visited Samoa, for example, was the Nantucket vessel *Maro* in 1824 (Richards, no date). British whalers visited these waters as early as 1827–28. According to Richards (n.d., 12) at least 528 visits were made by 328 whaleships to Samoan waters between 1824 and 1878. After the first decade or two, the main reason for such visitation was provisioning rather than whaling.

Most of the 19th century whaling effort at the offshore islands and island groups in the tropical Pacific was centred on the sperm whale (Searles, 1936; Derrick, 1950; Dodge, 1971; Langdon, 1978, 1984; Forster, 1985, 1991; Richards, n.d.) although the migratory populations of humpbacks were also hunted, particularly around Tonga, Fiji and New Caledonia (Townsend, 1935; Lever, 1964).

Mitchell (1983) documented in detail a multi-year whaling cruise by the *Mariner* to the Pacific Ocean in the 1830s to 1840s, which included four seasons of whaling for sperm whales “on the line”, i.e. off the Marquesas, Line and Phoenix islands, or in the Tuamotu Archipelago. According to Mitchell (1983), the *Mariner's* itinerary was representative of the American whaling fleet in the Pacific at the time (cf. Wilkes, 1845; Hohman, 1928; Townsend, 1935; Bennett, 1840).

Modern shore whaling was initiated at the Ryukyu Islands, between southern Japan and Taiwan, in 1954 (Nishiwaki, 1959). Although initially involving mainly humpback whales, this whaling came to include more sperm whales and Bryde's whales as the quotas on humpbacks were lowered. Modern whaling for Bryde's whales was conducted by the Japanese on an “experimental” basis in the Solomon Sea and south of Vanuatu and Fiji during the Antarctic seasons 1976/77 to 1978/79 (Ohsumi, 1980b).

It is important to recognise that much commercial whaling outside the SPREP region has involved stocks of whales that migrate into the region seasonally. Whaling in the Antarctic and North Pacific has thus seriously affected the numbers of whales using the SPREP region.

3.5 By-catch in fisheries

Large by-catches of cetaceans in fisheries have occurred in many parts of the world (Northridge, 1984, 1991a; Perrin et al., 1994). Information on

gillnet and trap fisheries throughout most of the SPREP region is inadequate to judge effects on marine mammals (see IWC, 1994b, 18). It is fair to assume, however, that by-catches have occurred whenever set or drifting gillnets have been deployed in areas inhabited by cetaceans. Modern gear (mostly made of synthetic materials) has replaced traditional gear (mostly made of natural materials), and it has become difficult to distinguish among recreational, commercial and subsistence fishing (e.g. Nitta, 1994).

In the southeastern part of the SPREP region (eastwards from Fiji), passive fishing gear consists mainly of drift gillnets, deep and shallow set nets, and reef-top and reef-passage set gillnets (IWC, 1994b, 17). No information is available on cetacean by-catches in this area.

Experimental and large-scale pelagic driftnets have been used in the South Pacific since the mid-1970s (Northridge, 1991b; IWC, 1994b). Large by-catches of small cetaceans are known to have been made in the Taiwanese driftnet fishery for sharks, Spanish mackerel (*Scomberomorus spp.*) and long-tail tuna (*Thunnus tonggol*) in the Arafura Sea, between northern Australia and Irian Jaya, from 1974 to at least 1986 (Harwood and Hembree, 1987; Northridge, 1991b). When Australia forced the closure of this fishery in the Australian Fishing Zone in 1986, largely because of the by-catch of small cetaceans, the fleet relocated its operations into the Indonesian sector of the Arafura Sea (Richards, 1994).

Other large-scale driftnet fisheries have operated in the South Pacific. A joint Taiwan–PNG shark fishery in the western Gulf of Papua operated between 1980 and 1992. Although the cetacean by-catch was not monitored systematically, reports from crew members suggest that cetaceans were taken “frequently” (Richards, 1994). Taiwanese and Japanese driftnet fishing in the Tasman Sea is known to have taken large numbers of cetaceans, especially common dolphins and striped dolphins (Wright and Doulman, 1991; Watanabe, 1994; Hayase and Watanabe, 1994; Hagler 1994). Driftnet fishing for tuna was done by Japanese and Taiwanese vessels from the mid-1980s to early 1990s in the subtropical convergence zone south of Tonga, French Polynesia and the Cook Islands, but little is known of their incidental catch of marine mammals (Sharpley et al., 1991; Richards, 1994).

A worldwide moratorium on high-seas driftnet fishing was established by the United Nations in the early 1990s, and since then the scale of such activities in the South Pacific has been dramatically reduced.

It was noted in the New Zealand annual progress report to the IWC that the one tuna purse seiner under New Zealand registry operating outside the New Zealand Exclusive Economic Zone around the Solomon Islands and New Caledonia in 1980–81 set only on schoolfish and thus did not take small cetaceans as a by-catch (Anonymous, 1982).

Substantial numbers of dugongs have been killed in gillnets and shark-meshing nets in many areas (e.g. Heinsohn et al., 1976; Compost, 1978; Brownell et al., 1981; Marsh et al., 1984; Marsh, 1986b, 1988). These animals are clearly susceptible to entanglement, so we assume that by-catches occur whenever nets are set in areas used by dugongs. Occasional by-catches of dugongs are also made by trawlers (Hudson, 1986a).

Dugongs are killed, whether by accident or design, when explosives are used for fishing. The impact of dynamite fishing on dugongs, reefs and fish stocks led to a ban on this practice in Manus Province, Papua New Guinea (Hudson, 1982).

3.6 Other causes of mortality or removals from natural populations

Collisions with vessels kill and seriously injure marine mammals. This cause of mortality, however, is poorly documented except in those few instances when an endangered population is being closely monitored. For example, collisions with boats and barges are responsible for a large proportion of the deaths of West Indian manatees (*Trichechus manatus*) in Florida, USA (O’Shea et al., 1985). Dugongs in most areas do not appear to be as susceptible to such collisions as are manatees. In Palau, the lack of scars on dugongs observed during aerial surveys has been interpreted as suggesting that boat strikes are “uncommon” there (Brownell et al., 1981). A “diver-friendly” dugong in Lamenu Bay, Epi Island, Vanuatu, has a gouge in its back, thought to have been made by a boat propeller (Nicholson, 1996).

Large whales are struck and killed or injured by vessels with surprising frequency. An analysis of scarring and deaths in North Atlantic right whales (*Eubalaena glacialis*) showed ship collisions to be a serious problem for this endangered species (Kraus, 1990). Even after allowing for the fact that many collisions happen post-mortem, S.D. Kraus (pers. comm., April 1995) has estimated that some 1000 large whales die each year from ship strikes worldwide. One of us (Stone) has learned that each year at least one or two ships arrive in Auckland, New Zealand, with the carcass of a balaenopterid

(groove-throated) whale draped over the bow anchors. The vessel captain apparently does not realise that his vessel has struck a whale until he reaches port. Many ships are too large for the crew to feel the impact of hitting a whale; the only indication is a slight loss of speed and a change in the wake pattern off the bow (Patten et al., 1980).

Whales occasionally interact with fishermen in ways that are dangerous to both parties. For example, two fishermen in Samoa died when a whale that had become entangled with an anchor line overturned their boat (McCoy, 1987).

Samoa fishermen have reported that "porpoises" (i.e. small odontocetes) take fish off trolling lines near at least one fish-aggregating device. This problem is similar to that in Hawaii (Schlais, 1984; Nitta and Henderson, 1993; Kobayashi and Kawamoto, 1995) and could lead to calls for control measures against the cetaceans.

Substantial damage was said to have been done by killer whales to Japanese longline fisheries for tuna in the equatorial Pacific during the 1950s and early 1960s (Iwashita et al., 1963). Although killer whales do occur in Pacific equatorial waters (e.g. Dahlheim et al., 1982; Miyashita et al., 1995a; see also section 3.1.2), we regard the identities of the cetaceans involved in interactions with tuna longlines as uncertain. Other "blackfish", especially false killer whales, could have contributed to the damage and led to at least some of the complaints from fishermen recorded by Iwashita et al. (cf. Leatherwood et al., 1991b, 42)

Small cetaceans were reported to be having an adverse effect on subsistence fishing for flying fish (Exocoetidae) in Arorae and Tamana islands, the two most southern islands in the Gilbert group (Kiribati) (Tenakanai and Uwate, 1984). The fishermen fished at night, using leaf torches and long-poled scoop nets. Cetaceans would take advantage of the light attraction and prey on the fish before the fishermen were able to scoop them into their nets. It was suggested that the driving techniques used to capture small cetaceans in other parts of the western Pacific might be used to herd problem animals away from the fishing areas (Tenakanai and Uwate, 1984). Poole (1993) also

reported that rough-toothed dolphins were implicated in interactions with fisheries in French Polynesia.

Marine mammals have been live-captured for display in many parts of the world, but relatively little of this activity has occurred in the SPREP region. An oceanarium in Tahiti had spinner dolphins on display at some time in the past (J.C. Sweeney, pers. comm., 8 September 1994), and a dugong that had been speared by a Palau islander was taken alive to Steinhart Aquarium, San Francisco, California, in 1955 (Harry, 1956). Another dugong was on display at a local aquarium in New Caledonia, apparently in the 1960s (Bertram and Bertram, 1973, 310). An oceanarium in Port Moresby, PNG, had at least one dolphin in residence, but this facility is now closed (Eldredge, unpub. data). In early 1994 a US-based business enterprise (Dolphin Quest) live-captured seven small cetaceans (3 rough-toothed dolphins and 4 melon-headed whales) in the vicinity of Moorea, Tahiti. The animals were held in a sea pen in the lagoon at Moorea. After failing to adapt to captivity, the melon-headed whales were released within a few weeks after capture. Two of the three rough-toothed dolphins died soon afterward (M.M. Poole, in litt., 26 March 1994; J.C. Sweeney, pers. comm.), but as of February 1996 two rough-toothed dolphins were in residence at Dolphin Quest (Renato Lenzi, in litt., 4 February 1996).

4 Conclusions and recommendations

4.1 Large cetaceans

Sperm, humpback, Bryde's, and minke whales are believed to use areas within the SPREP region for calving, calf rearing and mating. Other large whales, particularly fin, blue, and possibly sei whales, may also regularly migrate into the region. Knowledge of the distribution, movements, abundance, and stock affinities of SPREP region populations of all these species is, however, rudimentary. The need for international cooperation in safeguarding the stocks of such wide-ranging, economically valuable animals is obvious, yet so is the historic failure of the IWC to accomplish this difficult mission. Considerable illegal whaling was done on Bryde's whales and other species (sperm, humpback and gray) in the western Pacific during the 1970s (Frizell et al., 1980; Brownell, 1981; IWC, 1981). At least some of these whales were killed within the SPREP region (western Caroline Islands), and some of those killed outside the SPREP boundaries probably belonged to stocks that use the SPREP region seasonally. Additional illegal whaling was done during 1983–86, including 13 trips into the areas of Palau and the western Caroline Islands (Greenpeace Environmental Trust, 1987?).

In spite of the current worldwide moratorium on commercial whaling, meat from baleen whales has continued to be sold in Japan. Some of this meat has been from species or stocks other than those subject to exploitation under special scientific permits (Baker and Palumbi, 1994). Thus the danger still exists that small, resident stocks in remote areas (e.g. the "Solomon stock" of Bryde's whale) could be seriously affected by illegal whaling operations.

The Southern Ocean Sanctuary was adopted by the IWC at its 47th annual meeting in 1994. The sanctuary boundary in the Pacific is at 40°S between 130°E and 130°W, and at 60°S between 130°W and 50°W. Commercial whaling is prohibited within the sanctuary. In effect, the sanctuary provides full protection from whaling to all of the commercially important whales during that part of the year when they are south of the sanctuary boundary. Terms of the sanctuary are subject to review every 10 years, with the first review due in 2004.

Besides continuing to pursue conservation goals within the IWC framework, countries in the SPREP

region should take the initiative in establishing coordinated programmes to investigate and monitor whale populations in the region. The humpback whale provides a useful model for building such a programme. Due to its tendency to use shallow, near-shore waters, and to behave conspicuously near the surface (breaching, lifting flukes and flippers into the air, blowing visibly), the humpback is comparatively well known. Collaborative, broad-scale investigations of humpback populations are underway in many parts of the world (e.g. see Katona, 1990; Hammond *et al.*, 1990), including the SPREP region (e.g. see Baker et al., 1993, 1994; IWC, 1994). We therefore recommend that SPREP use the humpback as a focal species for developing a research and conservation programme for large whales. Scientists in Australia and New Zealand (cf. Baker et al., 1993; Paterson and Paterson, 1994; Garrigue and Gill, 1994) should be encouraged and supported to work collaboratively with scientists in SPREP countries, using photodocumentation, genetic sampling, abundance surveys, and other appropriate research approaches (see 4.4 below).

The problem of vessel collisions may be particularly important for populations of large whales (see 3.6, above). In addition to a more general programme of documenting cetacean mortality through stranding and sighting networks (see 4.4, below), we recommend that SPREP initiate and coordinate a survey of port authorities in the region to explore the nature and magnitude of vessel collisions involving large whales.

4.2 Small cetaceans

4.2.1 Solomon Islands

Since Dawbin's (1966a) landmark study of the hunt for small cetaceans on Malaita, little has been learned about this hunt's implications for biological conservation. In Dawbin's words: "In 1964, for reasons that are still not completely clear, the scale of hunting increased enormously and became a regular occupation during a large part of the year, resulting in catches of several thousand animals per year since that time". Market changes that may have increased the incentive for large catches, together with the large reported catches for some years (Pepys-Cockerell, 1965), warrant concern. Although some recent information on historical, cultural and economic aspects of the hunting is

available (Boyd, n.d.; Akimichi, 1992; Takekawa, 1996a, 1996b), a biological assessment of the exploited cetacean stocks is needed. Of particular interest and concern is the possibility that melon-headed whales have been depleted, at least locally if not regionally, by the traditional hunting in the Solomons (cf. Takekawa, 1996a). Any investigation of the situation should be undertaken with sensitivity for the knowledge, values and interests of the local people. Unless some additional documentation and evaluation of the biological impacts of the Solomons hunt has been completed in recent years without our knowledge, we consider this subject a high priority.

4.2.2 Other directed and incidental fisheries

The sparse information concerning directed takes and by-catches of small and medium-sized cetaceans contained in this report is not likely to represent the full range and scale of these types of mortality. Drive hunts reported to occur (or to have occurred) in the Gilbert, Marquesas and western Caroline Islands and in other areas (see Akimichi, 1992) warrant further investigation. A systematic effort should be made to identify and evaluate cetacean-fishery interactions in the SPREP region. The particularly devastating effects of large-scale driftnet fisheries (Richards, 1994) make it necessary to maintain vigilance and prevent any resumption of such activities (see IWC, 1994b, 18). Large-scale driftnet fishing is incompatible with conservation, not only of marine mammals but of target and non-target fishes, birds and reptiles. Unmonitored and unregulated smaller-scale gillnet activities are similarly wasteful and imprudent. The reference by Akimichi (1992) to the capture of Risso's dolphins in a purse seine off the Solomons in 1990 raises the possibility that cetaceans are taken deliberately in active fishing gear. According to Akimichi (1992, p. 136) the meat of the Risso's dolphins was either consumed by the fishermen or sold at the town market, and the teeth were either kept or used as gifts. As he put it, "This new business reminded the people of their traditional culture of porpoise teeth money".

4.3 Dugong

4.3.1 Torres Strait and Papua New Guinea

Marsh et al. (1984), Marsh (1986a, 1986b) and Hudson (1986a, 1986b) expressed strong concern that the killing of dugongs in the Torres Strait area since the mid-1970s was unsustainable, causing serious depletion of the population. Based on available catch data, a population estimate from

aerial surveys in 1987 and current understanding of dugong life history, Marsh and Saalfeld (1991) were unable to confirm whether or not the dugong catch in Torres Strait was sustainable. Their "minimum population estimate" in November 1987 was $12\,522 \pm SE\ 1487$ dugongs within the Torres Strait region and adjacent waters of the Great Barrier Reef Marine Park. The annual catch of dugongs in the Torres Strait area was at least 500–1000 for at least part of the period 1975–1982 (Marsh, 1986a), but it apparently declined substantially thereafter (Hudson, 1986c; Marsh and Saalfeld, 1988, 1991; Johannes and MacFarlane, 1991).

Marsh and Saalfeld (1991, 1993) stated their concern that the situation of the dugong population in Torres Strait "has the potential to deteriorate rapidly if catches increase". It follows that:

- effort should be made to prevent any increase in catches;
- legal catches in both northern Australia and Papua New Guinea should be carefully monitored; and
- aerial surveys should be repeated at 5-year intervals as recommended by Marsh and Saalfeld (1989).

In addition, more of the dugong's range in Australian and Papuan waters should be included within sanctuaries, either by increasing the extent of existing protected areas or by developing new sanctuaries in high-density areas (see Marsh and Saalfeld, 1988, 1991).

4.3.2 Isolated island populations

Although Chambers et al. (1989) and Chambers and Bani (1991) concluded that dugongs are not threatened by either exploitation or habitat degradation in Vanuatu, the total population of dugongs inhabiting this archipelago is apparently not large. Also, there is relatively little suitable dugong habitat in Vanuatu, and the prospect of immigration from other, larger dugong populations is remote. This small, presumably isolated Vanuatu population, along with that in New Caledonia, should be closely monitored. Conservation measures should be developed, or reinforced, in both areas.

The situation is particularly critical in Palau. There, further research to document the dugong's status is far less relevant than is the urgent need for effective conservation measures. The call by Marsh et al. (1995) for a comprehensive programme of marine resource conservation, encompassing the entire Palauan archipelago, should be pursued as a

top priority for SPREP. Specific recommendations offered by Marsh et al. (1992) include much stricter enforcement of the ban on dugong hunting, stopping the illegal sale of jewellery made from dugong bone, initiation of a culturally appropriate public education programme, and the development of marine reserves in areas where sub-aquatic vegetation is suitable for dugongs.

4.4 General

It is important that marine mammals be explicitly considered in regimes intended to manage the exploitation of living marine resources. This imperative applies at many levels, from local to global. From geographical and ecological perspectives, populations of marine mammals can exist at vastly different scales. Some whale (and dolphin) populations may range across an entire ocean basin, whereas some dolphin communities and dugong stocks, in particular, may be resident near isolated islands or archipelagoes. Given the high mobility and advanced technology available in the industrialised world, all marine resources are vulnerable to distant-water fishing operations (e.g. factory-ship whaling, pelagic driftnets). Coastal resources need some kind of protection from both invasive “foreign” (pelagic) exploitation as well as local “indigenous” (shore-based) exploitation. We therefore believe that SPREP should be actively pursuing local and global initiatives simultaneously.

Some of the foregoing suggestions depend on the development of a mechanism (or mechanisms) to

ensure the regular exchange of information among SPREP countries. We therefore recommend that national and international regulatory agencies in the SPREP region establish bodies (committees, working groups, etc.) specifically charged with obtaining information on marine mammals. These bodies should meet annually and require participants to report on new findings, problems, and plans. The present report should be used as a basis for opening a critical dialogue: gaps in information should be filled, uncertainties removed, mistakes rectified, and obsolete conclusions updated. Fisheries that involve marine mammals in some way (by-catches, direct killing, resource competition, gear damage, etc.) need to be identified and scrutinised.

It is critical that expertise be developed within the SPREP region. To this end, we recommend that SPREP consider the possibility of supporting a course in marine mammal biology and conservation at the University of the South Pacific. The purpose would be to provide students with basic knowledge, stimulate local interest in marine mammal science and conservation and, in the process, advance SPREP’s long-term conservation objectives.

We also wish to call attention to the potential value of cetacean “watching” in those areas where whales or dolphins are commonly present. An appropriately managed tourism enterprise can provide significant economic benefits while at the same time raising awareness, educating people, and in some cases contributing to scientific knowledge.

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Annex 1

Summary of marine mammals in the SPREP region

Species	Known or probable temporal & spatial species occurrence	Comments
Minke whales <i>Balaenoptera acutorostrata</i> and <i>B. bonaerensis</i>	<i>B. bonaerensis</i> migrates into region from S during austral winter and occurs widely, with largest known concentrations at E end of Tuamotu Archipelago and from A. Samoa and Niue east to Tahiti. Dwarf form of <i>B. acutorostrata</i> known from New Caledonia.	Region may be important breeding ground for <i>B. bonaerensis</i> that summer in Antarctic.
Bryde's whale <i>Balaenoptera edeni</i>	All year, throughout region; dwarf form in Solomon Sea.	Pantropical, probably most abundant mysticete in region; at least some groups migratory.
Sei whale <i>Balaenoptera borealis</i>	Some probably enter N and S margins of region in winter.	Mainly limited to temperate waters, often confused with Bryde's whale.
Fin whale <i>Balaenoptera physalus</i>	Not known from region.	Mainly distributed in higher latitudes but may migrate into region in winter; can be confused with Bryde's whale.
Blue whale <i>Balaenoptera musculus</i>	Definitely known only from Solomon Sea in August.	Pygmy blue whales (<i>B. musculus breviceuda</i>) likely to occur in region, possibly year-round. Normal (Antarctic) blue whales would be likely to migrate into region in winter.
Humpback whale <i>Megaptera novaeangliae</i>	Mainly June–September in S. hemisphere; many sites. Mainly Jan.–March in N. hemisphere, N. Marianas.	Numerous calving, nursing and mating areas for S. hemisphere (Antarctic) animals; also at least one N. hemisphere stock reaches N. Marianas.
Sperm whale <i>Physeter macrocephalus</i>	All year; throughout region.	May still be most abundant large cetacean in region despite reduction in numbers from whaling; large historical database.
Pygmy sperm whale <i>Kogia breviceps</i>	Uncertain; probably throughout much of region; strandings in Guam and New Caledonia.	Rarely observed at sea; known mainly from strandings.
Dwarf sperm whale <i>Kogia simus</i>	All year; probably found throughout region; strandings in Guam and New Caledonia.	Rarely observed at sea; known in most areas mainly from strandings.

Species	Known or probable temporal & spatial species occurrence	Comments
Short-finned pilot whale <i>Globicephala macrorhynchus</i>	All year; probably found throughout region.	Usually seen in groups of 10 or more individuals; prone to mass strand.
Killer whale <i>Orcinus orca</i>	Widespread, probably year-round; some groups may migrate, others not.	Probably not abundant, but small pods can appear anywhere in region.
False killer whale <i>Pseudorca crassidens</i>	All year; throughout region.	Target of drive hunt in Solomons.
Melon-headed whale <i>Peponocephala electra</i>	All year; throughout region. (Can be difficult to distinguish from <i>Pseudorca</i> and <i>Feresa</i> .)	Records (mostly strandings) from many parts of region.
Pygmy killer whale <i>Feresa attenuata</i>	Likely to occur all year in many parts of region; large group seen near New Ireland, PNG, in March.	Circumglobal in tropical and subtropical waters. Difficult to distinguish from <i>Peponocephala</i> .
Risso's dolphin <i>Grampus griseus</i>	Likely to occur all year in many parts of region.	Cosmopolitan.
Bottlenose dolphin <i>Tursiops truncatus</i>	All year in many parts of region.	Cosmopolitan, with populations often associated with island shelf areas.
Short-beaked common dolphin <i>Delphinus delphis</i>	Around New Caledonia and probably elsewhere in region, especially in more temperate latitudes, all year.	Genus recently split into two species: short-beaked and long-beaked. Region may also have some long-beaked in near-shore regions or in northwest area.
Striped dolphin <i>Stenella coeruleoalba</i>	Likely to occur all year in many parts of region.	Distributed worldwide in tropical and warm temperate waters.
Pantropical spotted dolphin <i>Stenella attenuata</i>	All year in many parts of region.	Pantropical distribution; abundant.
Spinner dolphin <i>Stenella longirostris</i>	All year in many parts of region.	Pantropical distribution; abundant.
Fraser's dolphin <i>Lagenodelphis hosei</i>	Likely to occur all year in many parts of region.	Tropical, many sightings in eastern Pacific on tuna fishing grounds.
<i>Lagenorhynchus spp.</i>	Not known.	Only one published record in region, near Cook Islands, probably Peale's dolphin, <i>L. australis</i> .
Irrawaddy dolphin <i>Orcaella brevirostris</i>	New Guinean rivers, estuaries and coastal marine waters, probably year-round.	Overall range: Bay of Bengal to SE Asia, Indonesia, N and E coasts of Australia. Possibly occurs in parts of Solomons.
Rough-toothed dolphin <i>Steno bredanensis</i>	Likely to occur all year in many parts of region.	Distributed worldwide in oceanic tropical and warm temperate waters.

Species	Known or probable temporal & spatial species occurrence	Comments
Indo-Pacific humpbacked dolphin <i>Sousa chinensis</i>	Definitely known only from S. coast of PNG.	Coastal and estuarine distribution along N. Australia, S. Asia and E. Africa; occasionally near large islands away from continental coasts.
Southern bottlenose whale <i>Hyperoodon planifrons</i>	Possibly at least a seasonal migrant into parts of region.	Regularly occurs from Antarctica north to 30°S. Identity of bottlenose whales in tropical Pacific uncertain.
Cuvier's beaked whale <i>Ziphius cavirostris</i>	May be fairly common in deep water year-round.	Cosmopolitan in tropical and temperate waters.
Other beaked whales <i>Mesoplodon spp.</i>	At least 4 of 13 recognised species in the genus likely to occur in region: Blairville's beaked whale (<i>M. densirostris</i>), ginkgo-toothed beaked whale (<i>M. ginkgodens</i>), Longman's beaked whale (<i>M. pacificus</i>) and True's beaked whale (<i>M. mirus</i>).	Few confirmed sightings or specimens from inside SPREP boundaries, probably due more to limited reporting than to a scarcity; six additional species could occur at least as stragglers.
Leopard seal <i>Hydrurga leptonyx</i>	Occasionally wander from the Antarctic into the southern edges of the SPREP region.	Reported from Cook Islands, at Tubuai, Mangareve and Rapa. Several of these were emaciated, possibly sick seals; apparently regularly "stray" into SPREP region, but the species' primary habitat is farther south.
Southern fur seals <i>Arctocephalus spp.</i>	Occasionally wander from breeding grounds elsewhere.	Fur seals breed in Galápagos, SE Australia and New Zealand; occasional sightings in New Caledonia and Tubuai; primary habitat mainly S and E of SPREP region.
Dugong <i>Dugong dugon</i>	All year in at least Vanuatu, New Caledonia, Melanesia, New Guinea and Palau.	Range been reduced by over-hunting; limited to shallow waters with access to seagrasses for foraging.

1 Introduction

Wastes and marine pollution are of increasing concern in the South Pacific region. This has been clearly recognised by Pacific Island Countries and the SPREP Secretariat. The SPREP Action Plan for Managing the Environment of the South Pacific Region (1996–2000) was adopted by the Ninth Annual SPREP Meeting in Tonga in December 1996. Of the five objectives identified in the Action Plan, the Waste Management, Pollution Prevention and Emergencies Programme targets the problems of inadequate waste management and the increasing threat of marine pollution.

Hazardous wastes in particular are increasingly being recognised as a potential threat to both the land and marine environments of the region. This threat is posed by wastes generated in the region, wastes transported through the region and by wastes proposed for importation into the region. The seriousness with which the threat is recognised by Pacific Island Countries is exemplified by the drafting of the Convention to Ban the Importation into Forum Island Countries of Hazardous and Radioactive Wastes and to Control the Transboundary Movement and Management of Hazardous Wastes within the South Pacific Region (Waigani Convention). The Convention was adopted in Waigani, Papua New Guinea in September 1995 and will enter into force upon ratification by 10 of the 14 eligible South Pacific Forum member countries. Upon its entry into force SPREP will act as Secretariat to the Convention.

The Waigani Convention relates to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal 1989. The two conventions however differ in many

respects with, for example, Waigani including controls on radioactive wastes while Basel does not. In preparation for the entry into force of the Waigani Convention, the SPREP Secretariat and the Secretariat to the Basel Convention have signed a Memorandum of Understanding to ensure cooperation and coordination of activities.

The meeting also considered other marine pollution-related international conventions in which the SPREP Secretariat is interested. These include the SPREP Convention, the United Nations Convention on the Law of the Sea, the London Convention and MARPOL 73/78.

Funding for the workshop was provided by both the Australian Agency for International Development (AusAID) and the New Zealand Official Development Agency (NZODA). In addition to SPREP staff, assistance with presentations at the workshop was provided by: Dr Iwona Rummel-Bulska, the Executive-Secretary of the Secretariat to the Basel Convention; Professor Martin Tsamenyi of the University of Wollongong; Mr Lal Kurukulasuriya, Chief of the Regional Environment Law Programme, UNEP/ROAP Bangkok; and Mr Peter Heathcote, Regional Maritime Legal Adviser of the Forum Secretariat.

The interest generated by the workshop can be gauged by attendance by representatives from 13 SPREP member countries and territories. In addition representatives of Greenpeace, AusAID and the New Zealand High Commission in Samoa also attended as observers. This report summarises the meeting and includes the recommendations made by the meeting participants.

2 Country papers

2.1 Australian perspective on the Waigani and related conventions

by Mr Adam Lees

2.1.1 Introduction

It is with great pleasure that I am able to be here as the Australian representative at this Conference on International Conventions in the South Pacific.

Australia abides by a number of international conventions which enable us to meet our international obligations to protect the environment. I shall begin by discussing the Basel and Waigani Conventions. Then, I will provide a picture of the means by which Australia implements the Basel Convention and other international obligations concerning hazardous wastes. I will also speak on the London Convention and how this is used to aid the protection to Australia's marine environment.

2.1.2 Overview-Waigani Convention

Australia is a party to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, which is the global convention concerning the transboundary movement of hazardous waste. Under the Basel Convention, trade in hazardous wastes between parties and non-parties is prohibited unless, under Article 11, they enter into agreements regarding transboundary movement of hazardous wastes which provide for environmentally sound management.

As few countries in the South Pacific region are parties to the Basel Convention, in August 1993 it was decided to develop a regional convention on hazardous wastes that would be compatible with the Basel Convention but would deal with the specific concerns of the region. The Waigani Convention was developed in response to this need and is an Article 11 agreement under the Basel Convention.

The Waigani Convention was tabled in the Australian Parliament on 18 October 1995, and is awaiting ratification. The domestic process prior to ratification includes assessing the relative benefits to Australia of ratifying.

The Australian Government is committed to maintaining and developing a partnership with Pacific Island Countries through promotion of effective regional cooperation. Successful implementation of the Waigani Convention would further this aim.

2.1.3 Australia's obligations under the Waigani Convention

Australia's main obligation under the Waigani Convention would be to impose a ban on all exports of hazardous and radioactive waste to all countries within the "convention area" (Article 4.1). Article 10 provides that the Waigani Convention Secretariat will encourage "other parties", which include Australia, "to take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of or access to environmentally sound technologies and know-how to Pacific Island Developing Countries, to enable them to implement the Convention". It is envisaged that Australia would assist Pacific Island Countries in co-operation with Australian industry and applicable aid programs.

Other obligations, such as ensuring the environmentally sound management of hazardous wastes under our jurisdiction, are already carried out under the Basel Convention.

2.1.4 Amendments to the Hazardous Waste Act

As a party to the Basel Convention, Australia is committed to minimising the generation and transboundary movement of its hazardous waste. Considerable effort has been put into establishing effective and efficient systems to monitor and control the generation, movement and disposal of hazardous waste. The most recent achievement for Australia in this area has been the amendment of the Hazardous Waste (Regulation of Exports and Imports) Act 1989. As the legislation is the cornerstone for Australian implementation of the Basel Convention, I will highlight several features for you here today.

The Basel Convention was drafted to cover both final disposal and recovery operations. Both kinds of processes are defined in the Convention under the single term "disposal". In contrast, the Australian Act of 1989 did not cover a wide range of hazardous wastes which still had commercial value, and hence these materials escaped regulation. The

major purpose of amending the Act was to remedy this discrepancy between our international obligations and our domestic legislation.

The definition of hazardous wastes under the amended Act has now been aligned with that in the Basel Convention. This will ensure that in future Australia does not find itself out of alignment with the Convention by virtue of having adopted a definition which is at odds with the Convention. Nevertheless, questions concerning the definition of hazardous wastes still remain central to the operation of the Act, and remain the subject of very active debate in Basel Convention meetings. The Basel Convention is currently defining the kinds of material to be controlled under the Convention, and this will determine the types of wastes which will be regulated under the amended Act.

Australia has established a Technical Group to provide expert advice on these issues, and this advice is being fed into the work being done at Basel Convention meetings.

The concept of environmentally sound management of hazardous wastes is defined in the Convention as "taking all practicable steps" to ensure that hazardous wastes are managed to protect human health and the environment. As with the hazardous waste definitions, the Technical Group will provide advice to assist in determining what constitutes environmentally sound management and whether particular facilities or processes meet the definition.

Australia is also a party to the OECD Decision on Transboundary Movement of Hazardous Waste Destined for Recovery Operations (the OECD Decision), which is an Article 11 agreement of the Basel Convention. This OECD Decision regulates transboundary movement of hazardous wastes among OECD countries.

To add further confusion to the definitional questions, the OECD Decision covers some wastes which are not hazardous wastes under the Basel Convention and trade in these must comply with the controls set out by the Decision.

In deciding whether or not an export permit should be issued, the Government also must ensure that prior informed consent from all relevant countries has been obtained and that the wastes will be managed in an environmentally sound manner.

There also needs to be some consideration as to whether there are Australian facilities which could adequately treat the wastes. Local disposal facilities must, however, be more than merely experimental or test facilities, and must operate on a commercial basis. There must also be some cost effectiveness

factor which weighs up the pros and cons of local versus overseas disposal.

Australia is generally opposed to the export of wastes for final disposal, although there may be exceptional cases where such permits may need to be issued. The amended Act prohibits exports for final disposal to any country except in specified exceptional circumstances.

Our amended legislation has a number of other features. It provides for the issue of transit permits which give Australian consent (or denial) to the transiting of wastes from another country on its way to a third country as a deterrent to illegal traffic. Executive officers will be made personally liable for contraventions by companies. This is especially important with the Act, for example the identification of hazardous wastes at the customs barrier when material leaves the country is often difficult given that such wastes cannot readily be distinguished from a variety of other materials. The amended Act also allows Australian organisations and associations which have an interest in hazardous waste issues to appeal certain administrative decisions made under the Act.

2.1.5 The Ban Amendment

It is important to note that the recent amendments to the Australian Act do not implement the Ban Amendment decision at the Third Conference of Parties to the Convention in September 1995 (Decision III/1). The Government is yet to consider its position on ratification, and public consultation must be carried out as part of the Government's new treaty-making process. In the Australian explanation of its vote following the Amendment, it was made clear that Australia would not consider ratifying the Ban Amendment until the current work on the definition of hazardous wastes was completed to our satisfaction. The amendment can only be sensibly implemented when its scope is clearly defined.

2.1.6 Consultation

Australia has developed a very efficient consultation mechanism through which recent amendments to our legislation were negotiated. The main consultative group is a Policy Reference Group which consists of representatives from industry, environment organisations and State and Territory Governments. The Policy Reference Group was consulted before each negotiating session for the Waigani Conventions and their concerns and comments were taken into account.

2.1.7 Training and technology transfer

In the course of bilateral and multilateral consultations, we have found an intense interest in our region in the possibility of technology transfer and training activities. There are clear opportunities for trade in environmental technologies and associated services for Australia, which is strong in many areas of hazardous waste management. These include new technologies for domestic disposal of PCB wastes and the development of submerged lance technology in the AUSMELT process.

The Basel Convention, as well as regulating transboundary movements of hazardous wastes, actively encourages technology transfer to assist developing countries to increase their capacity for managing and disposing of hazardous wastes. For Asia and the Pacific, the third meeting of the Conference of the Parties to the Basel Convention agreed that regional centres for training and technology transfer in hazardous wastes management should be established in Indonesia and China. Australia funded a consultant to conduct part of the feasibility study for those centres, and also contributed towards travel costs to enable delegates from countries in the Asia-Pacific region to attend a discussion workshop in Beijing in July this year.

2.1.8 London Convention

As well as these advances in our national systems for controlling hazardous wastes, the past two years have also been significant for Australia's marine environment. Australia is a party to both the London Convention and the Dumping Protocol of the Convention for the Protection of the Natural Resources and Environment of the South Pacific Region (SPREP Convention) which are implemented through our Commonwealth Environment Protection (Sea Dumping) Act 1981.

The London Convention is aimed at the promotion of effective control of all sources of pollution of the marine environment, prevention of pollution of the marine environment and prevention of pollution of the sea by the dumping of waste that is liable to create hazards to human health, to harm living resources and marine life, to damage amenities or interfere with other legitimate uses of the sea.

Parties to the Convention are obliged to take effective measures individually, according to their scientific, technical and economic capabilities, and collectively to prevent marine pollution caused by dumping and to harmonise their policies in this regard.

The Commonwealth Environment Protection (Sea Dumping) Act 1981, which came into effect in March 1994, regulates the deliberate dumping,

incineration, and loading for the purpose of dumping of wastes and other materials at sea. The Act enables Australia to fulfil international responsibilities under the London Convention and the SPREP Convention.

Since the Sea Dumping Act was proclaimed a total of 229 permits have been issued. These have been mainly for dredge spoil, but permits have also been issued for the dumping of material including demolition materials, vessels for establishing artificial reefs, burials at sea and obsolete equipment. The number of sea dumping permits we have issued has been around 20 per year for some years now.

Proposals for sea dumping need to comply with the Waste Assessment Framework of the London Convention. This requires a number of factors including an assessment of wastes management options, dump site selection, evaluation of potential impacts and a waste prevention audit. Options for waste disposal, waste reuse, recycling or reclamation, and waste avoidance are also considered in accordance with the National Waste Minimisation and Recycling Strategy.

The Sea Dumping Act has been effective in protecting the marine environment and has provided the basis for long term environmental solutions. Before the implementation of the London Convention and the Sea Dumping Act, a considerable variety of toxic and industrial wastes were dumped in Australian waters. These activities have been considerably reduced with a reduction of pollutants entering Australian waters.

The dumping of industrial waste into Australian waters will cease from 31 December 1997, when co-treatment disposal procedures will be implemented for the disposal of jarosite. These will eliminate the need for jarosite to be dumped at sea.

Some of the most relevant national issues facing Australia today in relation to sea dumping and protecting our marine environment can be summed up as: tackling the problems associated with contaminated ballast water initially through undertaking ballast research; addressing the issue of protecting and preserving the marine environment within the EEZ; and protecting special areas from shipping activities.

At the international level, important issues are being dealt with such as assisting the international shipping industry to adopt environmentally sound practices and encouraging regional cooperation in managing the marine environment.

2.1.9 Conclusion

I have outlined for you some international conventions for waste management which Australia is either party to or is considering ratifying. These conventions enable us to fulfil our duties as environmentally responsible global citizens.

Australia will continue to work in international fora to ensure the environmentally sound and efficient management of our wastes. Australia will also continue to work in harmony with nations of the South Pacific to achieve our common goals and objectives, and I wish you well for the rest of the Conference.



2.2 Ipukarea Society–Cook Islands

by Nathalie Rosette Cazal

2.2.1 Background

International Capacity of the Cook Islands under the Constitution¹

The Cook Islands has plenary competence with respect to the conduct of their own international relations. With respect to both defence and external affairs, New Zealand has acted on the delegated authority or, in other words, as an “agent or facilitator” of the Cook Islands Government.

New Zealand’s declaration to the Secretary-General of the United Nations of 10 November 1988 reaffirms two principles. Firstly the Cook Islands have competence to enter into international relations “in their own right” and not simply through the agency of New Zealand. Secondly, the Cook Islands will only participate in New Zealand treaty action with the consent of the Cook Islands Government. These principles, solemnly declared before the international community five years ago, have met with no objections. They have also been supported by unbroken practice accepted without demur by the community of states and demonstrate that the Cook Islands are responsible for their own international relations.

2.2.2 The Cook Islands’ experience in ratifying conventions and complying with their requirements

The Cook Islands have ratified the following conventions and other international agreements regarding environmental issues.

I The Cook Islands’ participation in the international effort for protection of the environment

A. Bilateral relationships

1980 Treaty between the United States of America and the Cook Islands on Friendship and Delimitation of the Maritime Boundary between the United States of America and the Cook Islands (1983).

1990 Project Grant Agreement between the Cook Islands and the United States of America for the Pearl Oyster Culture Component of the Pacific Islands Marine Resources Project.

1995 Grant Agreement between the Government of the United States of America and the Government of the Cook Islands with respect to a Feasibility Study on Manganese Nodule Mining.

B. Multilateral relationships

1947 Agreement establishing the South Pacific Commission (1980).²

1976 Convention on Conservation of Nature in the South Pacific (1987).

1977 Memorandum of Understanding on the Establishment of the Pacific Forum Line.

1979 South Pacific Forum Fisheries Agency Convention.

1982 Rarotonga Conference on the Human Environment in the South Pacific, which established the SPREP Programme and Action Plan.

1982 United Nations Convention on the Law of the Sea (1995).

1985 South Pacific Nuclear Free Zone Treaty (Treaty of Rarotonga) and related Protocols (P).

¹ In the Constitution of the Cook Islands, p. 165.

² The date in brackets (...) refers to the date of ratification by the Cook Islands.

- 1986 Convention for the Protection of the Natural Resources and Environment of the South Pacific Region and related Protocols (Noumea Convention signed 25 November 1986, ratified 17 June 1987), and the following protocols which were adopted by the plenipotentiary meeting of the conference.
- 1987 Agreement among Pacific Island States concerning the Implementation and Administration of the Treaty on Fisheries between the Governments of Certain Pacific Island States and the Government of the United States of America.
- 1990 Agreement establishing the South Pacific Applied Geosciences Commission (SOPAC).
Vienna Convention for the Protection of the Ozone Layer (through New Zealand's treaty action).
- 1991 Agreement establishing the South Pacific Forum Secretariat.
- 1992 Niue Treaty on Fisheries Surveillance and Law Enforcement in the South Pacific (1993).
- 1992 United Nations Convention on Biological Diversity (1993).
- 1993 Agreement establishing the South Pacific Regional Environment Programme (1995).
- 1993 Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction (1994; not yet in force).
- 1995 Regional Conventions on the Ban on the Import into the South Pacific and the Control of Transboundary Movement and Management of Hazardous Wastes Within the Pacific Region (the Waigani Convention) signed 16 and 17 September at Waigani and Port Moresby by all Forum members except Tuvalu and the Republic of Marshall Islands. The Convention was closed for signature on 21 March 1996, when 14 members had already signed the Convention. Since then, three countries have deposited their instruments of ratification (Papua New Guinea, Federated States of Micronesia and Fiji).

II Legal steps before ratifying a convention

In general, the Cook Islands Government tries to pass implementing legislation before ratifying the convention.

The Office of International Affairs/Legal Advisor to the Government has been established by, and is directly responsible to, the Prime Minister and the Deputy Premier Minister for the performance of two complementary sets of advisory functions, one relating to international law and the other to international affairs. The one which is of interest to us regarding ratification of conventions is the international law functions.

The International Law Office's functions are to:

- advise Government of its rights and duties under both general international law and treaties to which it is a party;
- advise and assist Government on international law and related concerning law and treaties to which it is a party;
- advise and assist Government with respect to the development of international law in accordance with its national goals and objectives;
- in conjunction with Crown Law Office take all appropriate measures to ensure that the Cook Islands' actions, both domestic and international, are carried out in accordance with its rights and obligations under international law; and
- carry out the following specific treaty-related functions:
 - advising Government on and assisting with proposed treaty action (negotiation, signature, ratification, accession);
 - compiling and maintaining a treaty register containing records of all agreements to which the Cook Islands is a party and actions taken in respect of those agreements;
 - maintaining a treaty archives; and
 - publishing a treaty of all agreements to which the Cook Islands are a party.

III Difficulties encountered in ratifying conventions

A. The Law of the Sea Convention

The Cook Islands signed this convention in 1982 and ratified it in 1994, 14 years later. Why such a delay?

- Absence of an international legal advisor office specialising in the matter.
- The signature occurred because the Cook Islands wanted to be able to vote for the different bodies under the Convention.

- The discussion on Part XI of the Convention by the Committee of the Law of the Sea lasted several years and the interpretation of different articles was not finalised at the time of signature (e.g. the necessity to know the cost of membership before ratifying).

The Convention has been ratified finally without implementing legislation because the Cook Islands national legislation was compatible and provided for some of the obligations of the Convention. The Cook Islands' current needs for implementing the Convention are a qualified lawyer or assistant to implement the Convention and more time.

B. The Chemical Weapons Convention

This was signed and ratified in 1993 without delay between the signature and the ratification. There are three reasons for this:

- to save money in travel expenses;
- the Convention would not have been enforced within one or two years so the Cook Islands have had enough time to prepare the implementing legislation; and
- the Cook Islands do not have chemical weapons, so they did not feel any pressure for implementing legislation straight away.

C. The Biodiversity and Climate Change Conventions

These were signed and ratified in a short time because there is no need for implementing legislation.

2.2.3 The Cook Islands' NGO environmental strategy

I The Waste Management Task Force

Two years to the month have passed since the Waste Management Task Force was requested to draft a waste management strategy by the former Minister for Tourism and Health, Hon. Joe Williams. The task has been duly carried out, with recommendations for action to minimise the effects and consequences of an *ad hoc* approach to waste management. The results of the Task Force work was never endorsed at the Cabinet level.

Due to a number of circumstances, the failure of the 1994 Asian Development Bank/Cook Islands Government Integrated Urban Infrastructure Project concerns have contributed to the ongoing dilemma that the island of Rarotonga, at the very least, still faces.

Today, the Cook Islands need to decide where they are heading with both the recommendations and the Urban Infrastructure Project; and look at what is being addressed two years on and what could be carried out without waiting for the ADB project to come on line. This project, due to financial problems and the need for economic reforms within the Cook Islands Government, is on hold indefinitely.

Today, the environment becomes increasingly degraded and this may have negative repercussions on tourism. A combination of factors has contributed to this, but the finger can definitely be pointed at the ongoing, *ad hoc* approach taken towards the management of both solid and liquid waste. There are two ways of dealing with this problem:

- continue with the Infrastructure Project but, as it's an elaborate one, it will take two to three years even if the Cook Islands Government finds funding; or
- seek small scale solutions and policies.

II Ipukarea Society

Ipukarea Society was created in July 1996. Within the Society, private persons and corporate businesses have expressed their interest in different environmental issues (e.g. coral reef protection, waste management, ocean pollution and so forth) and created small groups which meet regularly around these topics.

A. The Taau Taku Tita group

This group manages composting and recycling. It started in 1992 with women's groups who were concerned with the environment that they will leave to their children. The primary purposes of this group are to recycle household items and do composting.

The main problem faced by this group is maintaining the women's interests in the cause. Without the appeal of economic value behind the work achieved, the women won't remain active. There is good work being done on recycling clothes by making cloth bags, dolls and Tivaivai (quilts), and some workshops have been provided for these purposes, but there has been nothing on the re-use of plastic, bottles and so forth.

B. Participation in environmental programmes

The branch of the Society dealing with waste management was actively participating in the Clean up the World operation in 1996 and it wishes to be closely involved in the WHO Healthy Islands programme. There are also a lot of environmental

issues projects with which the Society is preparing to assist, including:

- participation in the 1995 Global Action Programme at a local community level;
- an educational programme for intermediate schools on awareness of environmental issues; and
- dissemination of information on how to deal with waste on a wider scale than women's groups, but still in direct contact with the public.

III The Takitumu Conservation Area

This group has been created thanks to the SPBC Programme from SPREP. It was set up to conserve plants and animals through the involvement of local communities. It is composed of the three main landowners: the Karika, Kainuku and Manavarua. This group closely follows the Biodiversity Convention.

IV Recycling companies

There are currently two operations in Rarotonga which recycle aluminium, glass and plastic.

A. Father Glover

The first is run by Father Glover and two other staff. They placed 130 bins around the island to collect beer bottles, aluminium cans and plastic bottles. Father Glover crushes the aluminium cans in a crusher funded by SPREP. His current problem with aluminium cans is that he needs to wait at least 10 months before having enough weight for shipping. While waiting, he has to invest his own money for day-to-day operations.

He also has plenty of plastic bottles that he sells back to a local fruit juice shop and to a motel, *Are Ranga*, which uses them for heating their water system.

NB: There is potential for development in this area.

The Coca Cola company—represented by CITC store in Rarotonga—has offered to give bricks to build an incinerator for burning their recyclable bottles. But is it safe for the population? Only 10 of the 16 types of beer bottles imported into the island are valuable. Father Glover has asked the Cook Islands Government to pass a law banning certain types of bottles which are unable to be recycled. There is no glass crusher available on the island and, of course, no melting factory.

B. John Winchester

Mr Winchester owns an aluminium joinery factory and uses aluminium cans and other metal for his business.

V. Conclusion

There is a need for small-scale recycling factories that do not need big volumes of wastes to start working. Regarding hazardous wastes, there is no attempt to deal with these and no storage for batteries, oil and so forth.

2.2.4 The Waigani Convention and its implementation in the Cook Islands

I National controls (Customs, Port Authorities)

A. Customs

The general control of imports is exercised under the imports prohibition ordinance and other prohibitions or restrictions are imposed under the authority of Section 46 of the Customs Act and by the following acts and regulations:

- Animal Act;
- Animal Importation Regulation;
- Animal Diseases Prevention Regulation;
- Arms Ordinance;
- Cook Islands Amendment Act;
- Film and Censorship Act;
- Fireworks Ordinance;
- Gaming Act;
- Health Act;
- Misuse of Drugs Act;
- Narcotics Act;
- Plants Act;
- Plant Introduction Act; and
- Plant Introduction and Quarantine Regulations.

For dangerous waste importation and control, Customs are unable to identify each hazardous product unless declared on the airline documents and shipping documents.

*Suggestions for a better control:*³

Customs consider that they should work together with the Port Health, Ministry of Agriculture Quarantine Services, Conservation, Marine Resources, Air New Zealand, Port Authorities and international shipping companies such as Triad.

In the past, Customs have not issued any special authorisation to import dangerous wastes. Maybe that authorisation should be referred to the above mentioned departments first before any dangerous wastes are imported into the country. A list of all the hazardous materials should be made available for the above departments as well as to Customs as being the first dealing with any imported goods into the country.

B. Port Authorities⁴

New Act: 1995 Port Authorities Act.

There has not been any major oil pollution into the harbour or in our territorial waters. In the event where something like that happens, the Port Authority contacts Mobil which is equipped with detergent.

Regarding MARPOL requirements, the Port Authority considers that small facilities will be useful, consisting of:

- an oil recycling machine which can be used by the entire community as well; and
- an incinerator for ships' rubbish (currently it is Father Glover who comes every week to collect rubbish and store it, if it is plastic).

Such improvements are an important step in encouraging more ships to stop by Rarotonga instead of dumping at sea.

A Maritime Surveillance Department exists, but their equipment is very limited. There is only one patrol boat (provided by the Australian Aid Programme) which does not go much further than the territorial waters, every two or three months.

The local airline—Air Rarotonga—provides services between the southern and northern groups of the Cook Islands. Their planes may give some information regarding an oil spill if it happens to be in their path.

II Public awareness, information systems and the media

One workshop was organised in Rarotonga in 1995 on IRPTC (International Register of Potentially Toxic Chemicals). A database was established to

facilitate dissemination of information about toxic chemicals that have been banned or are under strict control.

The problem facing the Environment Department is that access to this database is virtually impossible: there is not enough memory for their computer, and there have been difficulties in converting the file from DOS to Windows®.

III Degree of regulation and technical expertise

The Cook Islands do not have the technicians and the equipment to face a major oil spill or contamination by hazardous wastes.

IV Legal, institutional and technical expertise

A. Current legislation

The Cook Islands participated in the meeting on the draft treaty banning hazardous and toxic wastes within the South Pacific (Forum Secretariat, Suva, 7–8 March 1994). It also participated in the Tokyo workshop on the Prevention of Illegal Traffic in Hazardous Wastes (1 March 1994).

The Cook Islands' national legislation is as follows:

- Shipping Act 1996 (has to be submitted to Cabinet);
- Rarotonga Environment Act 1994–95;
- Carriers Act 1948;
- Customs Act 1913;
- Dangerous Goods Act 1984;
- Continental Shelf Act 1964;
- Marine Resources Act 1989; and
- Territorial Sea and Exclusive Economic Zone Act 1977.

(1) *Under the Marine Resources Act 1989:*

“The Queen’s Representative may by order in Executive Council, make such regulations as may be necessary to give effect to the provisions of this Act and due administration thereof. Without limiting the generality of

³ From a letter from William Kuavai, Border Management Controller, dated 21 October 1996.

⁴ Tony Armstrong (personal communication, 13 November 1996).

subsection (1) regulations made pursuant to this section may provide for all or any of the following:

- the prevention of marine pollution...⁵

The area of the Marine Resources Act extends to the territorial sea and EEZ.

(2) *Under the Territorial Sea and Exclusive Economic Zone Act 1977:*

“Territorial Sea: the territorial sea of the Cook Islands comprises those areas of the sea, having as their inner limits the baseline described in section 5 of this Act and as their outer limits a line measured seaward from the baseline described in section 5, every point of which line is distant 200 nautical miles from the nearest point of the baseline.”

Provisions 23:

“the Queen’s representative may from time to time, by order in Council, make regulations:

- *prescribing measures for the protection and preservation of the marine environment of the zone;*
- *regulating the exploration and exploitation of the zone for the production of energy from the water, current and winds, and for any other economic purposes;*
- *providing that a breach of any such regulations shall be a criminal offence, and imposing penalties by way of fine not exceeding \$10,000 for any such offences...”*

B. The role of criminal law in the protection of the environment

The relevant environment legislation administered by MOWEPP is the Rarotonga Environment Act 1994–95. To date, no regulations have been brought into force nor have there been any prosecutions brought under the Act.

C. Draft legislation

(1) *The 1996 Shipping Bill*

Its purpose is to replace the Shipping Ordinance 1963 and the Shipping Registrations Act 1985. It also incorporates by reference the provisions of various International Maritime Organisation Conventions into the laws of the Cook Islands. This is increasingly important since the coming into effect of the United Nations Law of the Sea on 16 November 1994, as it legitimises the concept of

“Port State Control” over foreign ships within the jurisdiction of the port state. The Bill provisions also comply with the provisions of the following international conventions:

- The STCW Convention;
- SOLAS 74/78;
- COLREGS;
- Limitation of Liability for Maritime Claims;
- Load Line;
- Tonnage Conventions;
- International Maritime Dangerous Goods Code;
- Salvage Convention; and
- International Convention on Maritime Lines and Mortgages.

(2) *The Prevention of Marine Pollution Bill*

The Bill incorporates most of the provisions of the various conventions concerning marine pollution into the laws of the Cook Islands including:

- the International Convention for the Prevention of Pollution from Ships 1973, and the Protocol of 1978 relating thereto (MARPOL 73/78);
- the Convention on the Prevention of Marine Pollution by Dumping of Wastes and other matter, 1972 (London Convention 1972);
- The International Convention relating to Intervention on the High Seas in Cases of Oil Pollution Casualties 1969 and the Protocol 1973, relating thereto;
- The International Convention on Civil Liability for Oil Pollution Damage 1969;
- The International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage 1971;
- The International Convention on Oil Pollution Preparedness, Response and Co-operation 1990; and
- Any annexes, appendices and addenda, and any protocols to the above conventions.

Under the rules of English law, treaties that affect private rights or liabilities, or result in a charge on

⁵ Part IV of the Act.

public funds, or require modification of the common law or existing status require so-called “enabling legislation”, that is, an Act of Parliament, to give them effect. Where there is a conflict between existing domestic law and provisions of a treaty, the existing law would prevail within the country. As a result of the above principles, and prior to depositing the necessary instruments of accession or ratification, the Government of the Cook Islands will have to pass enabling legislation as may be required to give the international obligations assumed under the treaty domestic effect. This is also to ensure that a situation in which the Cook Islands assume treaty obligations but are unable to honour them because of deficient legislative authority is avoided.

It is not essential for the Government of the Cook Islands to accede to these conventions before incorporating the provisions into domestic legislation. However, as soon as the new law comes into effect, it is desirable that instruments of accession be deposited with the relevant depositories.

D. Movement of hazardous wastes through Cook Islands waters

At the 1996 Majuro Conference of the South Pacific Forum, the Cook Islands was concerned with Japanese shipments going from Japan to Europe and the need to be informed of such movement.

E. What about moving radioactive material by air?

The international Atomic Energy Agency is likely to adopt safety standards for containers used to ship radioactive materials by air. Although the Japanese Government denies it, there is concern that the standards are being established to pave the way for future air transport of highly radioactive plutonium to Japan.⁶

What will be the impact on the South Pacific islands? Do we need a special legal instrument?



2.3 Cook Islands

by Matilda Miria-Tairea

2.3.1 Background

The Cook Islands lie between latitudes 156° and 167° West and longitudes 8° and 23° South. The islands fall roughly into two groups: the northern group of scattered islands including the atolls of Penrhyn, Manihiki, Rakahanga and Suwarro, and the lower group including the capital Rarotonga, Mangaia and Aitutaki. The Cook Islands were proclaimed a British Protectorate in 1888 and on 11 June 1901 were annexed and proclaimed part of New Zealand. Under the Constitution of 1965 the Cook Islands is a fully self-governing state in free association with New Zealand. The Parliament of the Cook Islands has exclusive power to make laws for the Cook Islands, while the Government of New Zealand in conjunction with the Government of the Cook Islands has certain responsibilities with respect to foreign affairs and defence. The Head of State is Queen Elizabeth II and her representative in the Cook Islands, called the Queen's Representative, is appointed on the advice of Cabinet. The Prime Minister is the head of the executive and laws are made by a Parliament of 25 members elected by universal suffrage. A house of Ariki, comprising up to 15 hereditary chiefs, acts in an advisory capacity in relation to certain customary matters. The total resident population of the Cook Islands in 1991 was approximately 18,552 (1991 census).

2.3.2 Area of territorial jurisdiction

The territorial waters of the Cook Islands are defined in section 3 of the Territorial Sea and Exclusive Economic Zone Act 1977, as “...those areas of the sea having as their limits, the baseline described in section 5 of the Act and as their outer limits a line measured seaward from that baseline, every point of which is distant 12 nautical miles from the nearest point of the baseline”. Section 5 describes the baseline from which the breadth of the territorial sea is measured.

2.3.3 Potential problems perceived with the management of territorial waters

The examples of “perceived problems” include:

- dumping of wastes at sea;
- use of the Pacific as a dumping ground;

⁶ *Japan Times*, 5 September 1996.

- movement of dangerous goods through the Pacific;
- the threat of oil spills; and
- indiscriminate ocean pollution by vessels.

The management of those activities within the territorial waters also raises a problem. For the Cook Islands, policing the 12 mile territorial waters is difficult, considering that there are 15 islands that require monitoring and the distances from one to the other is quite vast, with only one patrol boat to monitor the territorial waters and the EEZ. Costs associated with travel and monitoring can be quite substantial, thereby rendering management not a priority.

At present the type of vessels in use lack the capability to travel 12 miles beyond the reef. Those vessels are mainly dinghies with outboard motors, primarily used for near-shore activities such as fishing and diving. They are capable of venturing out to sea for several miles, but they are not equipped for long distance travel; in fact they would not be suitable for managing or monitoring the territorial waters. The only flights we have are the inter-island flights servicing the islands in the southern group on a regular basis, while the northern group depends on special flights. In the absence of those flights, the inter-island shipping vessels provide transportation. Their role would be limited to sighting and reporting incidences of dumping wastes and indiscriminate ocean pollution by vessels, if within proximity. They are not empowered to implement legislation, nor are they equipped to take on large ocean-going vessels.

The question of dumping has been raised by the Cook Islands at international fora. These are issues of great importance to small island states. If we can prevent Western countries from storing their wastes in the Pacific, it ought to be done.

Oil spills in harbours or within our territorial waters could trigger a major environmental disaster with far-reaching ramifications. Due to the smallness and location of our islands, an oil spill would be detrimental to our tourism and fishing industries. Such a disaster could easily wipe out both industries, which we rely upon heavily. We would not be prepared to deal with the overwhelming damage to our environment if an accident of that nature occurred. The damage to the reef ecosystem and the environment which provides a livelihood for some if not most people would be disastrous.

2.3.4 Lack of port reception facilities

At present our Ports Authority arranges with a contractor to pick up wastes from vessels when they

dock to off-load containers of goods, or visiting military or non-military vessels. This arrangement appears to be operating reasonably well with the limited number of vessels calling in. However, if that number were to increase, our present facilities would not be able to meet increasing demands. The Authority lacks finance to develop a waste transportation facility on site, therefore it places the responsibility (or rather encourages) the vessels' masters to export their wastes rather than dumping them here.

2.3.5 Enforcement: lack of legislation

Legislation is seen as one component to prevent and minimise the adverse effects on the environment. However, although this is a powerful tool it cannot be solely relied upon. The scale of environmental problems (i.e. waste and hazardous waste problems) dictates other measures, namely education and awareness on wastes and hazardous wastes to support and supplement legislation.

Legislation will be of no value whatsoever unless it can be effectively enforced and there is a clear and urgent need to involve the public and Island Councils, traditional leaders and environmental officers in consultation on the most effective way in which to enforce the legislation depending on the location. Legislation is not enforced for various reasons: because it is inappropriate; people are not aware of its existence; or because of lack of personnel or resources.

At present the environment legislation deals only with foreshores and the disposal of toxic wastes on land; however, there is no legislation with respect to hazardous wastes. Under the Marine Resources Act 1989, regulations may be made for the prevention of marine pollution (s60(2)t), but to date no regulations have been made. Nevertheless, there is a draft Shipping Bill in its final stages that will contain provisions relating to marine pollution, which is expected to become law in 1997. Once the Act comes into force, it ought not to stop there. An ongoing review must take place to assess its strengths and weaknesses and the institution that implements it. A review provides the basis for developments of new policies and laws.

2.3.6 Regional coordination

The need for regional coordination and institutional capacity to address concerns ought to be identified where assistance is required by each country, depending on its need, and subsequently provided. This process would be ongoing and there may be a need for the establishment of a framework to identify those concerns and the institute to address those concerns.

2.3.7 Ratification of conventions

Ratification of conventions imposes obligations on the contracting party to comply with the provisions of the convention and to legislate prohibiting certain acts or limiting certain acts. The growth in the number of environmental conventions in the Pacific in the last decade and environment-related conventions to which the Cook Islands has become a contracting party represents a major response to tackle environmental problems at the international, regional and national levels.

2.3.8 The Cook Islands' experience in ratifying conventions and complying with their requirements

The Cook Islands have ratified the following conventions and other international agreements.

I Bilateral and multilateral treaties

A. Bilateral

1980 Memorandum of Understanding between the Commonwealth Secretariat and the Government of the Cook Islands with respect to the Commonwealth Fund for Technical Co-operation.

1980 Agreement on Fisheries between the Government of the Cook Islands and the Government of the Republic of Korea.

1980 Treaty between the United States of America and the Cook Islands on Friendship and Delimitation of the Maritime Boundary between the United States of America and the Cook Islands (1983).

1981 Exchange of Letters between the Government of the United States of America and the Cook Islands relating to the operation of the Peace Corps in Cook Islands.

1983 Exchange of Letters between the Government of the United States of America and the Government of the Cook Islands relating to the Overseas Private Investment Cooperation.

1984 Basic Agreement between the World Health Organisation and the Government of the Cook Islands.

1985 Agreement of Civil Aviation between the Government of New Zealand and the Government of the Cook Islands.

1986 Agreement between the Government of the Cook Islands and the Government of New Zealand concerning Air Services.

1987 Protocol concluded between the Government of the Republic of France and the Government of the Cook Islands pertaining to the Financing Conditions for the Reconstruction of Avarua, Cook Islands.

1988 Memorandum of Understanding between the South Pacific Commission and the Government of the Cook Islands for the establishment and implementation of the Mitiaro Integrated Rural Development Project.

1989 Financial Protocol concluded between the Government of the Cook Islands and the Government of the French Republic with a view to financing the economic development of the Cook Islands.

1990 Agreement on Maritime Delimitation between the Government of the Cook Islands and the Government of the French Republic.

1990 Project Grant Agreement between the Cook Islands and the United States of America for the Pearl Oyster Culture Component of the Pacific Islands Marine Resources Project.

1991 Memorandum of Understanding between the United Nations and the Government of the Cook Islands concerning the arrangements for the United Nations Regional Seminar on the Convention on the Elimination of all Forms of Discrimination against Women.

1991 Agreement between the Government of the Independent State of Samoa and the Government of the Cook Islands for Air Services Between and Beyond their Respective Territories.

1992 Exchange of Letters between the United Nations and the Government of the Cook Islands Constituting an Agreement governing terms and conditions for the holding of INSTRAW Sub-regional Workshop on Statistics and Indicators on Women in the South Pacific.

1993 Exchange of Letters constituting an Agreement between the Government of the Cook Islands and the Government of New Zealand on Arrangements for Visits by Elements of the New Zealand Armed Forces.

- 1995 Agreement between the Cook Islands and Samoa for the Transfer of Convicted Offenders.
- 1995 Agreement between the Government of the Cook Islands and the Government of Papua New Guinea concerning Technical Cooperation.
- 1995 Grant Agreement between the Government of the United States of America and the Government of the Cook Islands with respect to a Feasibility Study on Manganese Nodule Mining.
- 1996 Exchange of Letters constituting and Basic Arrangement between the Government of the Cook Islands and the Government of the Federal Republic of Germany on the Secondment of Development Workers of the German Volunteer Service (Deutscher Entwicklungsdienst—DED).
- B. Multilateral**
- 1943 Constitution of the Food and Agriculture Organisation (1985).
- 1944 Convention on International Civil Aviation (1986).
- 1945 Constitution of the United Nations Educational, Scientific and Cultural Organisation (1989).
- 1946 Constitution of the World Health Organisation (1984).
- 1947 Agreement establishing the South Pacific Commission (1980).
- 1947 Convention of the World Meteorological Organisation (1995).
- 1965 Agreement establishing the Asian Development Bank (1976).
- 1973 Agreement establishing the South Pacific Bureau for Economic Cooperation.
- 1976 Convention on Conservation of Nature in the South Pacific (1987).
- 1976 Agreement establishing the International Fund for Agricultural Development (1993).
- 1977 Memorandum of Understanding on the establishment of the Pacific Forum Line.
- 1979 South Pacific Forum Fisheries Agency Convention.
- 1979 Agreement on the establishment of the South Pacific Board for Educational Assessment.
- 1980 South Pacific Regional Trade and Economic Co-operation Agreement (SPARTECA).
- 1982 United Nations Convention on the Law of the Sea (1995).
- 1982 Charter of the Asian and Pacific Development Centre.
- 1985 South Pacific Nuclear Free Zone Treaty (Treaty of Rarotonga) and related Protocols (P).
- 1986 Convention for the Protection of the Natural Resources and Environment of the South Pacific Region and related Protocols (Noumea Convention) (1987).
- 1987 Treaty on Fisheries between the Government of Certain Pacific Island States and the Government of the United States.
- 1987 Agreement among Pacific Island States concerning the Implementation and Administration of the Treaty on Fisheries between the Governments of Certain Pacific Island States and the Government of the United States of America.
- 1987 Asia Pacific Telecommunity.
- 1989 Convention for the Prohibition of Fishing with Long Driftnets in the South Pacific (1989).
- 1990 Agreement establishing the South Pacific Applied Geo-Sciences Commission (SOPAC).
- 1991 Agreement establishing the South Pacific Forum Secretariat.
- 1992 Niue Treaty on Fisheries Surveillance and Law Enforcement in the South Pacific (1993).
- 1992 United Nations Framework Convention on Climate Change (1993).
- 1992 United Nations Convention on Biological Diversity (1993).
- 1993 Agreement establishing the South Pacific Regional Environment Programme (1995).
- 1995 Convention to Ban the Importation into Forum Island Countries of Hazardous and Radioactive Waste and to Control the Transboundary Movement and Management of Hazardous Waste within the South Pacific

Region (Waigani). (signed 17 September 1995; not yet ratified; treaty not yet in force).

II. Legal steps before ratifying a convention

In general, the Cook Islands Government tries to pass and implement legislation before ratifying the convention. That is the role of the International Legal Advisor Office created in 1988.

The Office of International Affairs/Legal Advisor to the Government has been established by, and is directly responsible to, the Prime Minister for the performance of two complementary sets of advisory functions: one relating to international law and the other to international affairs. The one which is of interest to us regarding ratification of conventions is the international law function.

The International Law Office's functions are to:

- advise Government of its rights and duties under both general international law and treaties to which it is a party;
- advise and assist Government on international law and related matters concerning the conduct and development of the Cook Islands international relations;
- advise and assist Government with respect to the development of international law in accordance with its national goals and objectives; and
- in conjunction with Crown Law Office, take all appropriate measures to ensure that the Cook Islands' actions, both domestic and international, are carried out in accordance with its rights and obligations under international law:
 - advising Government on, and assisting with, proposed treaty action (negotiation, signature, ratification, accession);
 - compiling and maintaining a treaty register containing records of all agreements to which the Cook Islands is a party and actions taken in respect of those agreements;
 - maintaining a treaty archives; and
 - publishing a treaty series of all agreements to which the Cook Islands is a party.

III. Difficulties encountered in ratifying

A. The Law of the Sea Convention

The Cook Islands signed this Convention in 1982 and ratified it in 1994, 14 years later. Why such a delay?

- Absence of an international legal advisor office specialised in the matter.
- The signature occurred because the Cook Islands wanted to be able to vote for the different bodies under the Convention.
- The discussion on Part XI of the Convention by the Committee of the Law of the Sea lasted several years and the interpretation of different articles was not finalised at the time of signature (e.g. necessity to know the cost of membership before ratifying).

The Convention has been finally ratified without implementing legislation because our national legislation was compatible and contained quite a few of the obligations of the Convention. Our current needs for implementing the Convention are a qualified lawyer or assistant to implement the Convention and more time.

B. The Chemical Weapons Convention

This has been signed and ratified in 1993 without delay between the signature and the ratification. There are three reasons for that:

- to save money in travel expenses;
- the Convention would not have been enforced within 1 or 2 years, so there has been enough time to prepare the implementing legislation; and
- the Cook Islands do not have chemical weapons, so did not feel any pressure for implementing legislation immediately.

C. Biodiversity and Climate Change Conventions

These have been signed and ratified with only a short delay because there is no need for implementing legislation.



2.4 French Polynesia—inland or sea dumping?

by Claude Serra

2.4.1 Waste treatment in French Polynesia

Waste treatment in French Polynesia meets the same difficulties as in other small island countries related to social, technical, geographical and economical parameters.

There are no large amounts of toxic wastes in French Polynesia, except for PCBs which are collected, stored in a special place and sent to France for destruction. The owners of PCB-containing devices pay for the treatment of their waste.

The lead from batteries could become a future ecological problem if scattered everywhere. Some recycling experience is developing in this area.

Nuclear wastes from the nuclear testing in Moruroa and Fangataufa are vitrified in the basaltic atoll basement; the French army is still in charge of them and the French Polynesian Government has no expertise in this area. We have to wait for the conclusions of the International Atomic Energy Association (IAEA) mission which visited the testing zone last July. There were no problems in requesting information on this and the Minister for the Environment and myself travelled to Moruroa on 23 October 1996. Military surveys of sites reported that the residual activity of the vitrified basalt after the test is *circa* 7.4×10^9 Bq per ton (approx. 0.2 Curie per ton).

Other toxic wastes are found in small quantities only, as there are no large industries in French Polynesia.

Considering the economic development of French Polynesia, the major problem is now domestic waste treatment. The authorities involved in waste treatment, when studying the various possibilities, cannot disregard the possibility of sea dumping for domestic wastes and non-toxic solid wastes. A special study on this subject was completed in 1995 by the consultant, Carex Environment. Legal and technical results of this study are summarised here and show that sea dumping is not as easy as previously expected.

2.4.2 International and regional conventions

I London Convention

London Convention, in Article IV and Annexes I, II, III, establishes that urban or domestic wastes are

classified in the category of materials that need a general licence, though these wastes are not specifically mentioned.

II Convention for the Protection of the Marine Environment in North Atlantic (Oslo and Paris meetings, 21–22 September 1992)

The possible-to-dump materials list is closer and, for some wastes, is restricted to some years. As domestic wastes are not mentioned, it can be considered that their dumping is forbidden.

We have to notice that this Convention shows that the regulations are more stringent than previous ones and the dumping of wastes will be more difficult in the future.

The Northern Atlantic is, however, different from the South Pacific in that it has highly industrialised and urbanised border zones, including high pollution levels in sites where the sea depth is relatively small. In the South Pacific Ocean, the influence of pollution is lower than in the Atlantic. A lot of countries do not have a continental shelf and the ocean close to the coasts is very deep.

III Noumea Convention (SPREP Convention)

The terms of this convention concerning the dumping of wastes are similar to the London Convention, especially concerning the list of wastes and the licences.

IV French regulation: Act 6-599, 7 July 1976 and by-law 82-842, 29 September 1982

According to French regulations, the dumping of wastes cannot be authorised if it is closer than 150 miles to the coast and at a depth lower than 2000 metres for wastes such as containers, irons, metallic or large wastes, ships, planes, platforms and so forth. These regulations are not effective in French Polynesia without the agreement of the Territorial Assembly.

V UN Convention on the Law of the Sea, published in French Polynesia in October 1996

In French Polynesia, the waste regulations fall under the authority of the Polynesian Government. The dumping of wastes in the sea is relevant to the state authority: the High Commissioner of the Republic. The international reference is the London Convention and, at a regional level, the Noumea (SPREP) Convention. A general licence for waste dumping should be presented to the regional organisation, but it is unclear if this should be SPC or SPREP.

Considering the physical and economical constraints of small islands in tropical zones, it is possible to look to the future for domestic and non-toxic waste dumping, although this is not always satisfactory.

Some old publications talk about the dumping of radioactive waste, but this is now forbidden. As a consequence, there have been difficulties in finding publications on sea dumping of domestic wastes. For these domestic wastes, it is pertinent to distinguish between two forms:

- compacted wastes; and
- bulk wastes (which are difficult to dump due to flotation).

Compacted wastes, to be dumped in good condition without visual pollution of surface waters, need a density around 1.2 T/m³, and have to reach the sea-floor without scattering when sinking. The major technical problem is to find the adequate press (current models reach only 0.7 to 0.9 T/m³), and to organise the operation between the waste producers and the sea floor. Compacting, transport and shipping are not negligible in financial terms and are more expensive than an inland waste disposal, a waste burner or other installation. Thus we cannot ascertain that the sea dumping of domestic wastes, even for small islands with big maritime areas, could be done without affecting the environment in the near future.



2.5 Federated States of Micronesia

by Richard G. Caldwell

PCBs (polychlorinated biphenyls) are hazardous substances which were once commonly used in electrical transformers, among other things. The FSM (Federated States of Micronesia) has many scrap transformers from the old Trust Territory days which still contain PCBs. Like the Republic of the Marshall Islands before it, the FSM has requested the US to undertake proper disposal of these PCBs. Unlike the Marshalls, the FSM has not been successful and may need to seek assistance elsewhere. The Basel and Waigani Conventions, while presenting no obstacle to the achievement of our goal, also appear to provide no real assistance. They are simply designed to promote other, albeit laudable, goals.

First, let us look at the Marshalls. Both the FSM and the Marshalls were in the Trust Territory of

the Pacific, administered by the US for the United Nations. Both became independent nations in 1986. Both entered into Compacts of Free Association with the US. The Marshalls, however, had a history of US nuclear testing which focused their concerns on the environment much more than in the FSM. Perhaps this explains why the Marshalls got to the US on PCB clean-up first.

In August of 1991 the US Environment Protection Agency (USEPA) made a preliminary identification of potential PCB sites in the Marshalls, followed by USEPA assessment of PCB contamination in July 1992. The US and Marshalls discussed possible responses and agreed that the US should "offer assistance in cleaning up the sites on an *ex gratia* basis" (6 September 1994 Description of Action and Related Understandings). Further study resulted in a 21 March 1994 Action Memorandum authorising USEPA Region 9 to undertake a clean-up. A team of Region 9 officials arrived in May of 1994 to make further clean-up assessments, plans and arrangements. The US took pains to develop a programme to accomplish the clean-up in one comprehensive effort.

The following is a description of the proposed actions:

- Draining all discarded transformers of liquids and recontainerising the liquids. PCB liquids will be separated from non-PCB liquids;
- Shipping all recontainerised fluids to the US for either incineration at a proper disposal facility or recycling;
- Shipping all transformer carcasses known to have contained PCB liquids in excess of 500 ppm to the US for proper disposal. Other carcasses will be filled with concrete and disposed of in local landfills;
- Excavating PCB contaminated soils and combining them with cement, flash and aggregate to immobilise them. The concrete mixture will be formed into reinforced pads and capped with a "clean" layer of concrete. At the Majuro site, the resulting pad will be fenced and left for use by the government of the Marshalls, possibly as a staging/storage area for future hazardous wastes; and
- Shipping existing drums of PCB liquids to the US for proper disposal.

This programme was undertaken with the following understandings:

- The programme was undertaken in consultation with, and agreed to by, the Government of the Marshalls;
- The Marshalls would not seek additional action from the US regarding clean-up;
- The Marshalls would provide at least one official for liaison services and assistance with logistical arrangements. The USEPA would pay travel expenses associated with this participation; and
- The Marshalls would provide an appropriate representative to inspect each site and indicate in writing where things had been completed and where they needed more work.

The FSM requested the US undertake a similar clean-up of PCB contaminated sites in the FSM subsequent to the Marshalls clean-up. The USEPA issued a preliminary report on the situation in a document entitled *General Assessment of Potential Sites of PCB Contamination in the Federated States of Micronesia* in February 1995. At the time of the assessment, the US Interagency Group on Freely Associated States Affairs had begun consideration of the FSM request but to date, almost two years later, there has been no response.

More recently, officials in the environmental division of the US Department of Defence have indicated a willingness to look into the problem, but follow-up attempts so far have yielded nothing noteworthy. There is also some possibility of Australian assistance. Meanwhile, transformers continue to rust, PCBs to leak, and environmental damage—possibly irreversible—occurs.

It is clear that the FSM lacks the expertise and resources to solve its PCB problem by itself. Any sensible solution will involve shipping PCBs to the US, Australia or another place where there are facilities for proper disposal. PCB is a hazardous waste under both Basel and Waigani, and its transboundary movement will be subject to those Conventions. At this point we know of no place with proper disposal facilities to which shipment would be precluded by those Conventions. Basel and Waigani will not stand in our way. Neither, however, do they contribute to a solution. That will require financial and technical assistance from abroad.



2.6 Kiribati

by Taulehia Pulefou

Of the six international conventions related to hazardous wastes, Kiribati has only acceded the London Convention (12 May 1982) and enforced it on 12 July 1982. It has also signed the United Nations Convention on the Law of the Sea (UNCLOS) on 10 December 1986 but has not yet ratified it. These Conventions set out similar objectives to control pollution of the sea by dumping, to set up a comprehensive new regime for the sea and oceans and, as far as environmental provisions are concerned, to establish material rules concerning environmental standards as well as enforcement provisions dealing with pollution of the marine environment.

Until recently, administrative responsibility for environment matters has been spread through a number of government departments, local government councils and statutory bodies. With developments following the General and Presidential elections in September 1994, the responsibility for environment matters that was within the Ministry of Environment Unit in the Ministry of Environment and Natural Resources Development has shifted and is now concentrated within the Environment Unit in the Ministry of Environment and Social Development. The Government reassessment of its priorities has given environmental issues a higher profile which is consistent with its efforts at regional and international levels to find ways and means of bringing a better balance between developments, environmental protection and conservation.

There is nothing in the Kiribati Constitution which guarantees the citizens of Kiribati a clean environment or obliges the Government to ensure that development is ecologically sustainable. At the same time, there are no substantial constitutional impediments to the Government seeking to achieve these objectives through legislation.

Although there is a general declaration that the customs and traditions of Kiribati will be cherished and upheld, there is no guarantee of this given in the list of fundamental rights and freedoms, and it would appear that customs and traditions could be overridden in situations where they were not environmentally sensitive. The obstacles to the Government pursuing a vigorous approach in the field of environmental regulation are political and customary rather than constitutional.

One of Kiribati's main concerns is to improve the management of waste and the control of pollution in order to control various perceived problems that are now currently experienced within the country.

Such problems include lack of facilities for hazardous waste, increasing use of imported non-biodegradable products and packaging, lack of information on the nature and origin of waste and its environmental impact, shortage of land for safe landfill sites and a lack of legislation controlling toxic and hazardous waste. With regard to all these environmental issues, the following specific strategies described in the NEMS report (1993) proposed to address all the above mentioned problems:

- improved management and disposal of solid waste and sewage;
- control of hazardous waste chemicals;
- control of marine pollution; and
- commitment to international pollution control.

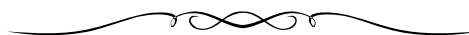
To actually implement the above strategies, Kiribati has no comprehensive legislation regulating the dumping of waste at sea, imposing liability for the discharge or escape of oil and other pollutants from ships or land into its marine environment or enabling it to take adequate preventative action. For this reason, therefore, Kiribati is not in a position to fulfil any obligations which might arise under the MARPOL, UNCLOS, London Dumping or the SPREP Conventions due to lack of legislation, financial and resource availability.

However, with the assistance of SPREP and UNEP, a final draft of the Environment Bill 1996 is now ready for Government and Parliament approval. Chapter IV of the Bill under Hazardous Substances and Waste Control covers the following areas:

1. The State shall, through the Ministries responsible for Health, the Environment and other relevant ministries, control the importation, transit, manufacture, formulation, handling, distribution, sale, transport, storage, use and final disposal of hazardous wastes under existing laws and the provisions of this Bill;
2. Hazardous substances shall not be manufactured, stored, imported, sold, transported, used or disposed of unless prior authorisation is obtained from the relevant authorities under existing laws and in accordance with the provisions of the Bill;
3. The Environment Division shall, in consultation with relevant authorities, establish criteria for the classification of hazardous chemicals and materials in accordance with the hazards they present to human health and to the environment;

4. The Environment Division shall, on the basis of the criteria established under subsection (3), recommend to the Waste Management Committee for the approval of the Minister, the regulations to establish the standards, guidelines and measures for the management of hazardous chemicals and materials;
5. No person shall import any hazardous waste into Kiribati;
6. No person shall export or transport any hazardous waste within or through Kiribati without prior authorisation from relevant authorities under existing laws, the provisions of this Bill and any regulations made under it;
7. The Minister shall make regulations, on the advice of the Waste Management Committee, which shall set forth the special control measures, standards and guidelines required for:
 - (a) the manufacture, identification, handling, packaging, labelling, transport or storage of hazardous substances originating in Kiribati for use within Kiribati or for export purposes, or originating outside Kiribati and imported into the country;
 - (b) the screening, handling, labelling, packaging, transport, storage or exportation as the case may be, treatment and disposal of hazardous waste;
 - (c) a permit system, including the conditions under which a permit is revoked for the manufacture, import, export, transport and disposal of hazardous substances and materials; and
 - (d) penalties to be imposed, including restoration of the environment damaged and costs to be paid by the polluter, for the breach of provisions of this part of this Bill and any regulations made under it.

Once the Bill is approved by Government, preventive actions to control toxic and hazardous waste being stored, imported, transported, used or disposed of will be carried out. On the other hand, Kiribati might therefore be committed to obligations set out under different international conventions related to waste and hazardous waste management.



2.7 Marshall Islands

by Karness Kusto

2.7.1 General country profile

The Republic of the Marshall Islands is located about 3520 kilometres south-west of Hawaii in the eastern-most section of the former United Nations Trust Territory of the Pacific Islands. It has a land area of 180 square kilometres, spread out over 5,000,000 square kilometres of ocean. The current population (1995) is estimated to be 56,216.⁷ The administrative and commercial centre of the Republic is in Majuro Atoll, consisting of Delap, Uliga and Darrit (Rita). This is commonly called DUD, and has a population of 14,649 and population density of 11,081 persons per square kilometre.⁸ The Republic has a growth rate of 3.76 percent per annum compared to Majuro, which has a rate of 4.4 percent—significantly higher than most neighbouring countries.

2.7.2 Types of activities which generate hazardous wastes within the Republic of the Marshall Islands

Apart from the coconut oil plant (Tobolar), there are no major industries in Majuro. The major sources of toxic and hazardous wastes are from the two hospitals (Majuro and Ebeye), the College of the Marshall Islands, households and (old) transformers containing PCB oils from the old power plant.

I Government

- The Department of Public Works generates nil to very small amounts of hazardous wastes in the form of battery wastes. These wastes are taken to a storage area provided by RMIEPA.
- Shipping wastes (especially oils) are stored in drums.
- At the International Airport on Majuro, hazardous wastes such as those used oils from AMI aircraft are stored in 55-gallon drums. To date about five drums were reported as being used for this purpose. Other wastes such as used batteries are stored for RMIEPA to dispose of at the designated site.

II Hospital

The types of toxic and hazardous wastes generated from the hospital include “sharps” (needles, scalpels, lab reagents) and other various materials contaminated with infectious bodily fluids. These wastes are incinerated when the plant is in operation. The amount of wastes incinerated averages 45 pounds per day. Alternatively, if the

machine breaks, the waste is taken to the dump to be burnt and ashes are buried on site.

III College

The College of the Marshall Islands operates two scientific laboratories for chemistry and biology. A very small amount of waste is generated from the lab.

IV Households

According to the WHO Mission Report (1991), the amount of toxic and hazardous waste generated from households was estimated at less than 0.5 percent of the total volume of solid waste generated. The wastes include spent fluorescent lamps which contain mercury, batteries which contain lead, cadmium, chromium and other heavy metals, unused and expired medicines, paints which contain heavy metal pigments, domestic solvents and old asbestos roofs and sheets.

V Automobiles

Used oils generated from the plant are recyclable by the Marshalls' Energy Company (MEC). Used oils from automobiles, generated from personal use and car repair shops, are received by the electric company for recycling.

VI Electrical power plant

All transformers that remained on these atolls since the former Trust Territory era were removed or transported out of the country by USEPA in 1994. Current transformers contain no PCB oils.

2.7.3 Toxic and hazardous waste legislation

Regulations regarding toxic and hazardous waste has just been drafted and are pending completion by the Republic of the Marshall Islands (RMI) EPA Legal Counsel.

2.7.4 Current hazardous waste management practices

The RMIEPA Environmental Specialist and the Chief of Environmental Health and Sanitation undertakes the responsibility of both monitoring and regulating the disposal of solid wastes and toxic and hazardous wastes for the Republic. The Department of Public Works and the Majuro Atoll Local Government collaborate in the solid waste management by

⁷ Office of Planning and Statistics (personal communication).

⁸ WHO Mission Report, 2–27 June 1991.

coordinating the collection and managing of the public dump site.

The RMIEPA Environmental Specialist offers advice on how to dispose, store or dispose of any hazardous wastes. RMIEPA currently utilise one shipping container for storing used batteries, unlabelled laboratory reagents, paints and other unknown chemicals.

2.7.5 Ratification of conventions

The Republic of the Marshall Islands is signatory to a number of international conventions and treaties relating to environmental concerns. Ratification of conventions is not especially problematic in the Marshalls. The Republic's unicameral legislature ("Nitijela") is usually in positive agreement regarding environmental conventions, as is Cabinet and the President. Compliance with conventions is sometimes hampered by lack of knowledge about the Convention and insufficient incentives within the Marshalls' business community, as well as a need for more information within the general population on the conventions' wording and impact.

The pre-eminent international document in the Republic is the Compact of Free Association between the Government of the United States and the Government of the Republic of the Marshall Islands, which defines the relationship between the two sovereign nations following the termination of the United States Trusteeship. The people of the Republic approved free association status by plebiscite in September 1983. The United States Congress passed the agreement in January 1986. The Nitijela approved the Compact and its subsidiary and related agreements by Resolution on 20 February 1986. The Compact came into effect on 21 October 1986.

The Compact broadly empowers the Republic to join the community of independent nations in the conduct of its domestic and foreign affairs, while the United States is given responsibility for external military defence and security matters. The United States agreed to provide annual financial grants to the Republic during the 15-year period of the agreements for certain stated purposes, and established its right to lease certain islands of Kwajalein Atoll for the use of the United States Army Kwajalein Atoll (USAKA) Facility.

A key component of the Compact is the establishment in Section 177 of a compensation fund totalling \$150 million for loss or damage to property and persons of the Republic resulting from the nuclear testing program conducted by the United States in the Northern Marshalls between 1946 and 1958. The fund contains moneys for the

establishment of a Nuclear Claims Tribunal to settle compensation claims, for radiation-related medical surveillance and treatment programmes, for radiological monitoring activities, and to provide assistance to the people of Bikini, Enewetak, Rongelap and Utrik Atolls through their local governing councils.

Under Title One, Article VI of the Compact, the United States and Marshalls Islands Governments have pledged to "promote efforts to prevent or eliminate damage to the environment and biosphere and to enrich understanding of the natural resources of the Marshall Islands". To carry out this policy, the United States agreed to:

- continue to apply the environmental controls in effect on the day preceding the effective date of the Compact to its continuing activities, until those controls are modified {Compact Section 161 (a) (1)};
- apply the US National Environmental Protection Act to its activities in RMI as if the Marshall Islands were the United States {Section 161 (a)(2)};
- apply environmental standards that are substantively similar to those required in six enumerated US environmental statutes when conducting activities requiring the preparation of a US Environmental Impact Statement {Section 161 (a)(3)}; and
- develop appropriate mechanisms, including regulations or other judicially reviewable standards and procedures, to regulate its activities governed by Section 161(3). The alternate standards must account for the "special governmental relationship" between the RMI and the US, technical support from appropriate US environmental agencies is required in the development of the standards, and RMI must be given the opportunity to comment during their development {Section 161(a)(4)}.

Reciprocally, the Marshall Islands, under Section 161(b) of the Compact, have an obligation to develop and enforce comparable environmental protection standards and procedures. Complex negotiations regarding the development of "alternate standards" for US Government activities in the Marshalls have taken six years and have resulted in a final "Environmental Standards and procedures for United States Army Kwajalein Atoll (USAKA) Activities in the Republic of the Marshall Islands", signed by the US and the Marshalls, effective from 4 December 1995.⁹

⁹ Elizabeth Harding (personal communication).

2.7.6 Problems perceived in the management of territorial waters

Perceived problems in the management of territorial waters within the Republic include the threat of oil spills, USAKA's dumping of wastes at sea, lack of port reception facilities for wastes and lack of institutional capacity to address our concerns. Further, although much environmental regulatory legislation has been passed, more is needed, as is a country-wide information campaign on the legislation already in force.

The Republic shares the fate of many developing Pacific nations in its present inability to control increasing land and sea pollution. Marshall Islands' lagoons and shorelines are becoming spoiled by urban wastes. Overcrowding and poor sanitary conditions on more populated atolls exacerbate this problem.

Implementation and enforcement of environmental goals in the Marshall Islands is no easy task. Marshallese geography mitigates against enforcement, and far-flung atolls create difficult communication problems. A further constraint is the strong cultural tradition of customary land ownership that resists governmental control of land use through environmental regulation. Dispute over whether government or customary landowners own and control intertidal areas increases the uncertainty of environmental control and enforcement.

The Republic is moving toward expanded environmental participation by traditional landowners. Stronger local participation in environmental decision-making, coupled with increased conservation funding and facilities, will go far towards creating a pollution control policy that links customary controls with modern preservation practices.

Although local government councils may consider and develop ordinances in regard to environmental and pollution control matters, most local councils do not have the present capacity to fulfil that function. Limited administrative, planning and management capacity and low levels of revenue generation prevent most outer island local governments from effective consideration of environmental problems.

Transportation, communication and resource restraints have limited industrial development on most atolls and islands of the Republic.

As development increases, problems of pollution associated with burgeoning infrastructure and commerce will, inevitably, also increase. The Republic has a chance to put legislative instruments

in place in the outer atolls and islands now, before development-related pollution problems have escalated to unmanageable proportions.

Although the process of increasing environmental awareness in the Republic continues, RMIEPA requires further monetary commitment. RMIEPA should be allotted adequate funds to enable inter-atoll and island travel for the purpose of interacting with the local councils in the development of effective anti-pollution measures. Such measures must reflect traditional customs, must be in harmony with present customary practices, and must be drafted in English and Marshallese. RMIEPA also requires funding for international travel to enhance regional coordination and information gathering regarding environmental conventions and treaties.

Legislative and educational efforts must remain focused on pollution eradication. Initial environmental efforts must be followed. RMIEPA environmental specialists are fully prepared to act as local government advisers and interpreters of environmental regulations and conventions.

Effective use and management of marine resources is the key to the independent economic development of RMI. The principles of sustainable development, allowing improvement of the quality of human life while requiring humans to live within the carrying capacity of supporting ecosystems, are essential here. A traditional way of life, future tourism potential and internal and international fishing ventures all rely on the ability of this resource to be renewable.

Fisheries resources often become non-renewable when plagued by overfishing and pollutants. As commercial fisheries opportunities in RMI are not fully developed, and because human population pressures are not extreme on most atolls in RMI, impacts from external sources on fisheries resources do not presently overwhelm the resource. Potential impacts, including pollution from intonation vessels, inappropriate fertilizers, coral mining, selective fishing, aquarium harvesting, sewage and pesticides must be closely monitored for future effects.

The Republic's marine waters are vulnerable to point source and non-point source pollution. One area of concern is leaking PCB-contaminated transformer fluid. RMI has long been aware of the existence of a number of questionable electrical transformers brought to Majuro and the outer atolls during Trust Territory days. The transformers were suspected to contain polychlorinated biphenyl (PCB) fluid, a highly hazardous substance. In 1989, some of these transformers were found to be leaking PCB-contaminated oil directly into Majuro lagoon.

Subsequent RMIEPA enforcement efforts resulted in the provision of a small Majuro Hazardous Waste Storage Facility (a modified shipping container), but PCB contamination remains a problem.

Due to lack of sewage pump-out facilities at the major docks in Majuro and Ebeye, government and private ships regularly discharge waste into lagoon waters.

Oil spills into marine waters continue to plague the urban centres of Majuro and Ebeye. So far, the Republic has escaped catastrophic damage from a large spill, but lack of oil spill prevention and contingency plans leave a gap in current marine water protections.

Planned discharges into marine waters also cause concern in the environmental community. In Majuro, untreated sewage flows directly into coastal waters. The sewage outfall may or may not be adequate in length and depth; further research is required. On Ebeye, the sewage outfall discharges directly into the lagoon and also requires monitoring.¹⁰

2.7.7 How conventions may assist in overcoming problems

The ratification of conventions may assist in overcoming many of the above-stated problems by drawing nation-wide attention to the issues, as well as increasing political discussion and a renewed commitment to environmental advocacy. Further, this process may identify environmental priorities the Government may wish to pursue with vigour. Finally, inclusion in international conventions increases the Republic's visibility within the international community and brings relief for many incipient and ongoing environmental problems faced by our island nation.

2.7.8 Status of ratifications of conventions by the Republic

I SPREP Convention

As a member government and active participant in the South Pacific Regional Environment Programme (SPREP), the Republic was among the first countries to ratify the Convention for the Protection of the Natural Resources and Environment of the South Pacific Region (SPREP Convention) and its two related protocols: the Protocol for the Prevention of Pollution of the South Pacific Region by Dumping and the Protocol Concerning Cooperation in Combating Pollution Emergencies in the South Pacific region.

Ratification of the SPREP Convention and related protocols occurred on 4 May 1987. The Convention's

goals are to prevent, reduce and control pollution resulting from vessels, land-based sources, seabed activities, discharges into the air, disposal of toxic and non-toxic wastes, testing of nuclear devices and mining. Further protection for fragile ecosystems and endangered species are contemplated. Convention language has been included in the Republic's USAKA Environmental Standards.

II Maritime conventions

In concert with RMI's enactment of the Maritime Act of 1987 (later replaced by the Maritime Act of 1990 {PL 1990-94}), which provides in part for a Registry of Vessels of the Marshall Islands, on 7 March 1988 the Nitijela by resolution accepted and approved the following maritime conventions:

- Convention of the Safety of Life at Sea, as amended, and its related protocol 1976;
- Convention of the International Regulations for Preventing Collisions at Sea 1972, as amended;
- International Convention of Load Lines 1966; and
- International Convention for the Prevention of Pollution from Ships (MARPOL 1973/1978), as amended.

The tenets of the MARPOL Convention, although politically accepted and approved, have yet to be put into full practice in the Republic.

III. Driftnet prohibition

On 15 February 1990, the Nitijela approved and accepted the Convention for the Prohibition of Fishing with Long Driftnets in the South Pacific, including the Protocols and associated instruments to the Convention. This Convention prohibiting long driftnet fishing was adopted in Wellington, New Zealand on 29 November 1989 at an international meeting attended by RMI. Although approved by the Nitijela, RMI has not yet ratified the Convention.

The Republic further demonstrated its commitment to halting the spread of driftnet fishing by adoption of the Marshall Islands Marine Resources Authority (Amendment) Act of 1989, which prohibits the use and possession of driftnets from within the exclusive economic zone of the Republic.

¹⁰ Elizabeth Harding (personal communication).

IV. Anticipated ratifications

The Republic of the Marshall Islands is still a very young country, and has therefore not yet ratified a number of proposals of interest of its environmental community. Informal discussions in government circles have indicated some political interest in ratification of the following five agreements:

- Convention on International Trade in Endangered Species (CITES Convention);
- London Dumping Convention;
- Migratory Bird Treaty;
- Convention on Conservation of Nature in the South Pacific (Apia Convention); and
- United Nations Convention on Law of the Sea.

Any conventions not mentioned above have not been considered by the Marshall Islands.¹¹

2.7.9 Conclusion

It has been suggested that as development proceeds in the Republic a higher priority must be assigned to the development of a comprehensive hazardous waste management system facilitating safe and efficient routine disposal mechanisms. Hazardous waste is not segregated and access to the dump is not restricted.



2.8 Niue

by Peleni Talagi

2.8.1 Introduction

Niue is a single island nation located in the central South Pacific Ocean, 480 kilometres from Tonga to the west and 560 kilometres from Samoa to the north. It is an uplifted coral atoll approximately 19 kilometres long and 18 kilometres wide covering 258 square kilometres. It is a small nation with a population of only 2300 in 1994. It lacks any natural harbours, so the resources of the sea have been minimally exploited.

The wharf at Alofi is small and is restricted primarily for the use of fishing vessels. The risk of pollution is limited to the possibility of a grounding at the anchorage or a spill of product from the fuel transfer operation.

The main threat to the environment from the oil industry are the risks of spillage and pollution of groundwater supply and the harbour area during tanker discharges, ships' bunkering operations and during fuel distribution to customer sites.

Supply of products to Niue is by local coastal tankers. Niue's stock replenishment occurs once every three months, being mainly motor spirit, gas oil and aviation fuel (Jet A1). The fuel tanker is scheduled so that Niue is the last port of discharge at most times, which currently minimises the risk of a major oil spill during ship delivery.

The ship is moored some 100 metres from shore and is secured by the ship's mooring ropes and anchor. All products are discharged via the marine tanker's floating hoses, connecting to above ground shore pipelines into the main holding tanks.

The fuel depots are equipped with drainage controls (interceptors/separator pits) to ensure that, after heavy rains and tanker discharge operations, clean water from the tank compound (bundled area) is discharged into the sea.

Further sources of marine pollution are the improper disposal of used oil from motor vehicles, power generators, using oil to mark playgrounds, marine pollution from offshore structures, hazardous materials, chemicals, sewage and garbage.

The Niue Oil Spill Contingency Plan was adopted in 1994. Unfortunately, it awaits enabling legislation. Its effectiveness is further hampered by a lack of equipment and staff.

2.8.2 International conventions

The situation with regard to international treaties is a little confused, owing to the fact that under the constitutional arrangement, New Zealand acts on Niue's behalf in all foreign matters. However, New Zealand can only enter into international agreements for Niue at the request of the Niue Government. It is not clear how many of the numerous environmental treaties which New Zealand has entered into also bind Niue. At times, New Zealand has passed legislation in order to give domestic effect to certain treaties, for example, the Marine Pollution Act 1974 (NZ), and the Continental Shelf Act 1964 (NZ), both of which are in force in Niue.

Niue is not a member of the International Maritime Organisation (IMO) and has not ratified or acceded to any international maritime conventions in its own right.

¹¹ Elizabeth Harding (personal communication).

A list of environmental or related treaties to which Niue is a party or a signatory was not available at the time of writing.

2.8.3 Problems in the management of territorial waters

Niue shares similar problems with most Pacific island nations with regard to the management of territorial waters in the following areas:

- dumping of wastes at sea;
- use of the Pacific as a dumping ground;
- movement of dangerous goods through the Pacific;
- the threat of oil spills;
- indiscriminate ocean pollution by vessels;
- lack of port reception facilities for wastes;
- lack of legislation. The Niue Oil Spill Contingency Plan has good policies and objectives; however, it lacks enabling legislation;
- lack of regional co-ordination;
- lack of institutional capacity to address concerns;
- lack of resources for effective policing of territorial waters; and
- shortage of manpower with appropriately skilled personnel, both technical and legal.

2.8.4 Assistance of conventions

Currently, the Marine Pollution Act 1974 (NZ) is Niue law and provides for preventing and dealing with pollution at sea. Five regulations are promulgated under this Act. Niue may be a party to (and have obligations under) international conventions on ship-based pollution.

The Prevention of Marine Pollution Bill 1996 (“the Marine Pollution Bill”), closely based on the Cook Islands Marine Pollution Bill 1995, is currently being drafted. The Marine Pollution Bill deals with the prevention of pollution, dumping and incineration of wastes, and marine casualties.

The following International Conventions have been adopted in the Bill, although Niue is yet to accede to them:

- International Conventions for the Prevention of Pollution from ships, 1983; and

- Protocol of 1978 relating to the International Convention for the Prevention of Pollution from Ships 1973 (MARPOL 73/78);

- Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 (London Dumping Convention);
- Convention for the Protection of the Natural Resources and Environment of the South Region 1986 (London Dumping Convention); and
 - Protocol for the Prevention by Pollution of the South Pacific Region by Dumping 1986;
 - Protocol concerning Cooperation in Combating Pollution Emergencies in the South Pacific Region;
- International Convention relating to Intervention on the High Seas in Cases of Oil Pollution Casualties 1969; and
 - Protocol Relating to Intervention on the High Seas in Cases of Pollution by Substances other than Oil 1973;
- International Convention on Civil Liability for Oil Pollution Damage 1984;
- International Convention on the Establishment of an International Fund for Compensation from Oil Pollution Damage 1984;
- any annexes, appendices and agenda to the above-mentioned conventions; and
- any other international agreement for the protection of the marine environment to which Niue is a party.

The Bill also incorporates principles from the International Maritime Dangerous Goods Code (the IMDG Code).

However, Niue has problems with complying with requirements under conventions regarding facilities. Although Niue may sign MARPOL 73/78, the lack of port reception facilities to comply with MARPOL and other similar requirements pose problems.

There is also the difficulty of implementing any international convention they accede to. This includes domestic constitutional requirements that may be necessary, for example, passing domestic legislation incorporating the conventions.

It has been proposed that, if the Government wishes to promote international banking and trust activities, consideration should be given to

implementing modern shipping legislation to complement this initiative.

It has also been recommended that some consideration be given to acceding to MARPOL and the Liability and Fund Conventions should there be a major oil spill off the coast of Niue.

One of the major problems facing environmental issues in Niue is the lack of effective and enabling legislation to deal with objectives made by environmental policy-makers. There is also general lack of knowledge and awareness of environmental concerns, given that it is a relatively new area. The Environment Unit was set up in 1992 and consists of only one environmental officer.

The need for Niue's laws to be updated is long overdue. The problem is a shortage of legal personnel and expertise in law drafting. There is little legislation relating to waste management and the environment; what little legislation exists is outdated and ineffective, and not suitable for current environmental issues. New Zealand laws which are binding on Niue are outdated as Niue succeeded to self-government in 1974. In order to keep up with modern shipping practices and international legislation regarding environmental issues, it is important that Niue move with the times.

International conventions will assist Niue in developing legislation for waste management and environmental concerns. The conventions, while they are to be binding on Niue, provide guidelines in the development of legislation. Niue will behalf from those who have already signed, acceded to and ratified conventions, and may be able to provide advice on ratification.

Ratification of these conventions also ensures that Niue is up-to-date with modern issues regarding waste management and environmental issues. Niue will be protected under international arrangements by virtue of these treaties.



2.9 Papua New Guinea

by Lois Kesu

2.9.1 FAO pesticide project in the South East Asia and Pacific region

In the mid 1980s to the early 1990s, FAO was tasked with assisting countries in the South East Asia and the Pacific region in response to concerns raised on widespread pesticide poisoning due to exposure (both acute and chronic).

FAO helped countries in the region to develop control mechanisms (for those that lacked these) and strengthen legislation (for those that had existing legislation). It also established a harmonised system which covered areas of legislation, labelling and packaging for countries in the region. It ran training courses in various countries on safe use and handling and established test protocols for various pest/crop situations.

One of the issues that was raised by South Pacific island countries at that time was the disposal of unwanted pesticides. This case study of PNG is based on the issue of safe disposal of unwanted pesticides.

2.9.2 Case study

In 1994, SPC advised the Department of Environment and Conservation (DEC) that it had funds to assist member countries to dispose of its unwanted pesticides. PNG DEC sent out a questionnaire to all the provincial health offices to provide information to the questionnaire. The responses came in and were collated and sent to SPC. SPC engaged a private contractor to facilitate the removal of all the unwanted pesticides around the country. The contractor prepared a proposal based on the information provided with costing for the whole exercise, i.e. from packaging to transporting to a central point where it would all be shipped out to its final destination.

The contractor had made arrangements with an incineration facility in UK to receive the unwanted pesticides for destruction. The contractor assisted with regard to a lack of understanding of the procedures for getting clearance from the receiving country.

2.9.3 Problems encountered

The problems encountered with the exercise were as follows:

- SPC informed DEC that it no longer had funds for disposal and advised DEC to seek funds from other aid agencies;
- Foreign Affairs officers who were contacted to assist in obtaining aid funding were not sure how to go about assisting DEC, thus the proposal is still pending; and
- Basel Convention Secretariat has not officially informed PNG of its ratification status even though Parliament approved PNG's admission to the Convention and its protocols in early 1995 and authorised Foreign Affairs to accede to the Convention.

Prior to the exercise involving unwanted pesticides, the PNG Electricity Commission was prevented from shipping PCB waste to Australia because PNG was not at that time a party to the Basel Convention.

2.9.4 Existing legal elements

There is existing legislation in place which international conventions that relate to the environment can complement: in particular, the six that this workshop is interested in (refer to the table at the end of this report for their status in PNG).

With regard to MARPOL and UNCLOS Conventions, the respective lead government agencies, i.e. Transport and Fisheries Departments, are implementing the protocols that complement the legislation for which they are responsible.

2.9.5 Steps taken to address the situation

- DEC will submit another proposal to the department responsible for aid donor funding for next year.
- The contractor is coordinating all the paper work on behalf of DEC for the shipment of the unwanted pesticides from PNG to UK.
- The contractor came to Port Moresby in July 1996 and did a presentation on the collection, packaging, transport and disposal of hazardous wastes to DEC, Transport and Foreign Affairs officers.

2.9.6 Conclusion

Until such time as countries ratify international conventions, the option available to those countries who are not party to the Basel Convention and its protocols would be to seek a bilateral agreement with the receiving country's government before hazardous wastes are accepted to leave the shore of the exporting country.

DEC, as the implementing agency for the Basel Convention, has not familiarised itself fully with the requirements of the Convention to understand the implications when exporting hazardous wastes.

The unwanted pesticides are still stored at the respective sites around PNG.



Table listing the conventions and their status

Name of convention	Status	Date of ratification
SPREP	Ratified	7 November 1994
Basel	Signed Acceded	22 March 1989 Yet to be notified
Waigani	Signed Ratified	16 September 1995 11 December 1995
London Dumping	Acceded	?
UNCLOS	Approved in Parliament for admission to Convention, acceded	2 October 1996

2.10 Solomon Islands

by Ranjit Hewagama

Solomon Islands lies in the south-west Pacific. It consists of six major islands, some 30 or so smaller islands and approximately 950 isles and atolls. It has a total land area of 1.34 million square kilometres. The country is divided into provinces. Most provinces consist of a number of islands which are in some instances scattered quite far apart. Honiara, the capital, is located in Guadalcanal.

Large and small passenger vessels provide inter-island transport. Some of the larger islands have airstrips. However, the main means of transport is by sea. Transport between smaller islands is by canoe or boat.

In the absence of any major reported incident in regard to dumping, movement of dangerous goods, major oil spills or pollution in the territorial waters of Solomon Islands, I shall deal with some of the problems encountered in sea transport within Solomon Islands.

Sea transport plays a vital role in the transportation of people and goods from one island to another. Honiara is the main port in Solomon Islands to which foreign vessels call. There are as yet no large foreign-going vessels registered within the Solomons, but a few small ships have been purchased and registered for voyages within the near western Pacific Islands.

Local shipping in Solomon Islands is regulated by the Shipping Act 1966 and regulations made under it. The 1966 Act was drawn up at a time when the number of ships in the Solomon Islands and the movement of passengers within the Solomons was limited. At the time dangerous cargoes such as petrol and gases were transported in small volumes and there were no large fishing vessels operating within the territorial waters of Solomon Islands.

The movement of dangerous goods is regulated by the Shipping (Dangerous Goods) Regulations 1967. A Commission of Inquiry established in 1987 to inquire into the sinking of the *Vula*, a landing craft, found that the total amount of cargo taken on the voyage was approximately 82,775 tonnes, excluding the weight of passengers, fresh water, fuel and ships stores. The heavy machinery and equipment included bulldozers, fuel tanks, drums of petrol, gas cylinders, generators, outboard motors and chainsaws. The report further stated that there was no means available to calculate the residual stability of the ship, that a calculation of dead weight had not been carried out and that there was no proper documentation. This is a clear instance where the regulations were not followed.

Overloading is quite a common feature in Solomon Islands sea transport. The Shipping Act and the regulations need to be amended to reflect modern shipping practice by incorporating international maritime standards. The standard prescribed for the carriage of dangerous goods is inadequate in today's context.

A new shipping act which will replace the UK Merchant Shipping Acts 1894 and amendments (which are still applicable) has been drafted with the assistance of the Regional Maritime Advisor of the Forum Secretariat, and is scheduled to be placed before Parliament in early 1997. This Bill seeks to repeal the UK acts and the Shipping Act of 1966. The object of the Bill is to revise the shipping laws both in respect of inter-island shipping and merchant shipping, and to update the laws relating to shipping by bringing it in line with modern international maritime laws. The Bill further seeks to give effect to certain requirements or obligations imposed on SI by international conventions.

At present, Solomon Islands does not have any major industries. However, with the opening of the gold mine project and a number of other mining projects which are under consideration at present, it is likely that the transport of dangerous cargo to and from the Solomons will increase. At present the safety measures for the handling, storing and transportation of such cargo appears to be inadequate. The ports of Solomon Islands lack proper reception facilities for waste. The Ports Authority is at present in the process of building incinerator facilities for the disposal of waste. According to the Ports Authority, there have been no major oil spills or pollution in the territorial waters of Solomon Islands. Minor spills of palm oil and discharge of oil from vessels have occurred on a few occasions. However, in such instances the problem faced by the Authority has been in proving liability. There have also been reported instances of dumping dead fish in the ocean. Again, proof of liability is often difficult.

In the management of Solomon Islands territorial waters, some of the problems encountered are:

- the lack of modern legislation—the new Shipping Bill seeks to update the laws and regulations by incorporating standards required under various conventions; and
- the enforcement of legislation requires trained personnel and financial support—with the financial constraints faced at present not much attention is being focused on this aspect.

In recent times there has been a great deal of coordination at regional level with assistance provided by the Forum Secretariat and SPREP. More

advanced training at all levels to persons such as the Marine Division and the Ports Authority is essential in order to improve the management capability of these institutions. Greater exchange of information and cooperation between Pacific countries could make it easier to prevent the Pacific being used as a dumping ground or being polluted by vessels. The responsible authorities need to implement safety regulations more strictly.

A draft Environment Bill has been finalised and is to be presented at the next sitting of Parliament. The Bill seeks to make provision for the protection and conservation of the environment at a national level. The provisions apply to land, water and the territorial sea.

The ratification of conventions may to an extent help in identifying some of the problems that Solomon Islands may face in the future. Solomon Islands are signatory to a number of conventions relating to shipping and environment-related issues.

The conventions may provide a basis for development of national policies. However, it is of utmost importance that leaders both at national and local levels are made aware of the need and importance of implementation, enforcement and administration of the principle agreed upon on being a party to a convention.

In most instances where Solomon Islands have either signed or ratified conventions, nothing or very little has been done at national level to give effect to these. There also appears to be a lack of coordination between ministries in the implementation of environment-related issues.

The status of ratification by Solomon Islands of the conventions listed here is:

SPREP Convention	Party
Basel Convention	Signatory
Waigani Convention	Signatory
London Dumping Convention	Party
MARPOL	–
UNCLOS	Signatory (not yet ratified)



2.11 Tuvalu

by Uale Sinapati

2.11.1 Tuvalu's ratification of waste-related international and regional conventions

SPREP Convention	Yes?
Basel Convention	Not signed
Waigani Convention	No
London Dumping Convention	Yes
MARPOL	Yes
UNCLOS	No

Tuvalu's processes for ratifying conventions are very slow. Complying with the convention requirements is even more difficult to follow and hence even slower than the process of ratifying conventions. The problems contributing to ratification can be categorised into two main areas.

I Lack of staff and awareness

In Tuvalu, there is a lack of staff to address issues in the conventions. A department such as the Marine Department of Tuvalu is overloaded with responsibilities. There is hardly time available to do the work to enable quicker ratification of maritime-related conventions. The same problem is faced by other departments involved in the ratification process. But even if there is adequate staffing, there is not always the knowledge required to address the issues in the conventions.

From a maritime administration perspective, transport has been given low priority. Within one ministry, there are other departments such as telecommunications. This department has been given higher priority than transport.

II Lack of funds

This is a major problem because there has to be implementation.

2.11.2 Problems with managing dumping of wastes in Tuvalu's territorial waters

There are no means of controlling dumping of wastes in Tuvalu. We have a patrol boat but it is used for fisheries surveillance.

In the matter of movement of dangerous goods into Tuvalu, there is a great need for training to solve problems related to handling dangerous goods.

Regarding the threat of oil spills, there is too much debate on the "polluter pays" principle. Superiors believe that the oil company must prepare a

contingency plan for spills and should also pay for oil pollution combating equipment.

Lack of port facilities for wastes is one reason for Tuvalu's shortcomings in implementing MARPOL. This illustrates the need to have funds to enforce legislation.

The lack of institutional capacity to address concerns with regard to management of Tuvalu's territorial waters contributes to the lack of awareness as mentioned in the first part of this report. This problem reflects the need for training and technical assistance in those relevant fields.

2.11.3 Ratifying conventions

This will, of course, help overcome those problems addressed above, but there is no point in ratifying conventions if implementing them is not completely possible.



2.12 New Zealand

by Mike Walsh

I would like to cover two topics in this brief presentation. The first focuses on two of the waste management conventions, Basel and Waigani. The second will focus on a strategy through which New Zealand hopes to assist South Pacific countries with their environmental management.

2.12.1 Background

As a starting point, I should say that New Zealand is keenly aware of the difficulties posed by hazardous wastes and their management for our South Pacific neighbours. Indeed we have our own problems in New Zealand, but we are conscious that the problems for the South Pacific countries have even more potential to cause environmental and health problems given the comparatively small land area and lack of waste disposal facilities. The various international conventions which address hazardous waste can be of considerable assistance to all countries, including South Pacific countries, in helping them to solve their problems in dealing with hazardous waste.

2.12.2 Status of various conventions

Just to let you know where New Zealand stands with respect to the various treaties, we ratified the Basel Convention on the Transboundary Movement of Hazardous Wastes and their Disposal in 1994. We have also ratified the London Convention, the United Nations Convention on the Law of the Sea

and the SPREP Convention. We signed the Waigani Convention at the Madang Forum, but have yet to ratify it. We expect to make progress on that next year. In addition we should be in a position to ratify the MARPOL Convention early next year, as regulations to give effect to the Convention are currently being developed. (In fact, that is one of the reasons no-one could be here today from our Ministry for the Environment—they are all busy struggling with the regulations as we speak.)

2.12.3 Basel and Waigani Conventions

I thought it might be useful to focus primarily on the two conventions which deal with Hazardous Waste Management—Basel and Waigani—and an example which demonstrates their relevance to Pacific island countries. As I said, we ratified the Basel Convention in 1994 and since then we have been participating actively in the Basel Convention meetings, including those that are presently being held, which are working on clearer definitions of what constitutes a hazardous waste (on that, we would be happy to supply information on the process to Pacific island countries so that we may take their concerns into account). We have yet to ratify the Waigani Convention but hope to do so in the next year or so.

I intend to focus, in this brief presentation, on the regional approach to waste management. This regional approach is demonstrated by several clauses in the Waigani Convention, most notably the differentiated responsibilities between Australia and New Zealand compared to the Forum island countries. As you know, Article 4 of the Convention bans the export of hazardous wastes and radioactive wastes to Forum island countries, with the exception of those that have the status of other parties, namely Australia and New Zealand.

This important clause allows Forum island countries which have produced hazardous waste, but are unable to deal with them locally, to export them to either Australia or New Zealand where they can be recycled or disposed of. There have been, and will continue to be, instances where Pacific island countries produce wastes which they do not have the facilities to deal with. In situations where the wastes must be destroyed, the last thing we all want to happen is that the wastes remain in the country, causing health or environmental problems. They should be exported where they can be safely destroyed. And if those wastes can be recycled, we would certainly hope that the wastes are exported for recycling, instead of simply being destroyed, for example by putting them in landfills.

However the point I wish to emphasise is that these exports can only occur, in accordance with international law, if countries ratify the Waigani Convention

and the Basel Convention. Otherwise we will have to break international law in order to ensure that the best environmental outcome is achieved.

By way of example, under the Basel Convention parties are not able to trade with non-parties unless a bilateral or regional arrangement (such as Waigani) has been concluded. New Zealand is a party to the Basel Convention and is therefore not meant to trade with the South Pacific states that are not parties. Trade could proceed, on the other hand, if both New Zealand and the Pacific countries were parties to Waigani.

There was an instance, in the last year or two, where New Zealand imported used car batteries from a Pacific island country, so that these batteries could be recycled at a New Zealand factory rather than being dumped in a landfill. Now in theory, New Zealand should not have taken the import, as at the time the country in question had not ratified the Basel Convention and was thus a non-party. In addition, New Zealand and that country were not yet parties to Waigani, in which case the import could have proceeded legally. Despite this, we considered that it was far worse to have the batteries remain in the country with the potential to cause environmental and health effects, than it was to violate the Basel Convention.

This somewhat complicated example demonstrates two points. Firstly, the process by which countries ratify international conventions is time-consuming and complicated—otherwise we would all be parties and would not encounter these problems. Secondly and more importantly, it shows how Basel and Waigani can help countries to deal with their waste problems for the benefit of their people.

I hope this small example has been useful in giving you an idea of the benefits of participating in the various international conventions which deal with wastes. Before I finish, I would like to provide some information on a strategy which New Zealand has just developed, in order to assist Pacific island

countries with environmental management. One of the target areas of the strategy, as you will hear in due course, is waste management.

2.12.4 An environment strategy for NZODA in the South Pacific

The Minister of Foreign Affairs and Trade has recently approved a strategy for NZODA to address global environmental issues in the South Pacific. Over the last decade, there has been increasing interest in environmental issues such as climate change, depletion of the ozone layer and loss of biodiversity that transcend national boundaries and have an impact on the global environment. These global environmental issues are of particular importance to the small island states of the Pacific.

The NZODA programme has supported, on a selective but rather *ad hoc* basis, a number of environment and sustainable development initiatives in response to specific bilateral and regional requests since the late 1980s and particularly since UNCED. The Ministry of Foreign Affairs and Trade sees value in constructing a more strategic NZODA approach to assistance for environmental issues in the South Pacific.

The strategy document, *Environment Strategy for the South Pacific: NZODA*, summarises some key principles that would provide a framework for such a strategic approach. The strategy focuses on five main sectors: environment management, biodiversity conservation and natural resource management, climate change, waste management and the phase-out of ozone-depleting substances, as follows:

- Environmental management: the strategy proposes that NZODA build on existing initiatives in Samoa, Tonga and the Cook Islands and complement the activities of regional programmes such as Capacity 21 managed by SPREP;

New Zealand's status regarding various international conventions on hazardous waste management

Name of convention	Signature	Ratification
SPREP Convention	25 November 1986	3 May 1990
Basel Convention	18 December 1989	20 December 1994
Waigani Convention	16 September 1995	-
London Convention	30 April 1975	30 August 1975
MARPOL Convention	-	-
UNCLOS	10 December 1982	19 July 1996

- Biodiversity and resources management—work closely with the South Pacific Biodiversity Conservation Programme (also managed by SPREP) and utilise the models for community conservation and natural resource management being developed by NZODA projects in Fiji and the Solomon Islands;
- Climate change—help to implement the strategies and plans formulated through the regional programmes funded by the Global Environment Facility;
- Waste management—work with partner governments to complement the activities of SPREP in helping countries respond to the National Environmental Management Strategy for each Pacific Island Country; and
- Phase-out of ozone-depleting substances—work with partner countries, SPREP and UNEP to help countries develop alternatives to ozone-depleting substances for refrigeration, fumigation and other uses.

Waste management is one of the key target areas of the strategy.

The strategy will have an emphasis on capacity building for environmental management in partner countries. In addition the implementation of the strategy would specifically seek to complement activities of other donors and regional programmes, sharing resources as appropriate in order to maximise the benefit of both existing and this new allocation. The approach will be participatory and will help partner countries to better manage their own responses to the key issues affecting the establishment of long-term sustainable development.

Developing the strategy into a programme of action and implementing that programme will require a commitment of NZODA funds to address global environmental issues in the South Pacific. By the financial year 1998/99 an additional allocation of \$2 million is proposed within NZODA to the region for implementation of the strategy.

Initial discussions will be held with SPREP and partner governments in early 1997. A programme of action will then be developed to address the needs, priorities and opportunities identified, complementing existing programmes funded by other donors. This programme of action will be formulated in consultation with partner governments and regional organisations. The release of the strategy document at the Ninth SPREP Meeting in Nuku'alofa marked the beginning of this process of consultation.

2.13 Palau

by Donald Dengoki

2.13.1 The problem of solid waste management and pesticides in the Republic of Palau

The people of the Republic of Palau, like most islands in Oceania, rely primarily on the ocean for their livelihood. In fact, today remains of old villages line the shores of most of the inhabited islands in the Republic. Our people used traditional methods of building houses, canoes and roads, and relied heavily on subsistence agriculture and the ocean for food.

The trend continued until the early 1950s when the Republic was under US Naval Administration. People's lifestyles began to change as a result of the slowly emerging materialistic lifestyles introduced into the Palauan society. Diet was slowly modified to include imported canned goods and other consumer products. Attitudes toward the environment also began to change as people adopted different lifestyles and the "out of sight, out of mind" mentality took hold, especially with regard to what we should do to dispose of our society's wastes.

This paper sets out to discuss two of the most important problems that the Republic of Palau in general, and the Environmental Quality Protection Board in particular, have had to deal with for the protection of the environment and the well-being of Palauan citizens.

The first discussion concerns the problem of solid waste disposal. The reason solid waste disposal is considered to be Palau's priority problem is that the Republic simply does not have the necessary land and proper facilities to run an effective "sanitary landfill". For this reason, most of the states in the big island of Babeldaob use mangrove areas as dumping areas because of the unique land tenure system. In other words, most lands that have been identified as potential sanitary landfill sites are privately owned.

Today, Palau is experiencing rapid growth in tourism and population, increased availability of imported consumer goods and an increase in industrial-type activities such as garment factories and fishing. Due to the subsequent increased generation of solid waste, the safe disposal of solid waste is likely to become a major problem if control measures are not established. This problem is presently being addressed by the Palau Environmental Quality Protection Board's Solid Waste Management and Environmental Surveillance and Control section.

This section is responsible for assisting all State Governors and traditional leaders in the siting, design and proper operation and maintenance of future sanitary landfill sites. This includes the requirement that all landfill sites be moved to upland areas.

With the opening of access roads to most of the States in the big island of Babeldoab, it will be easier for those state governments to move all existing mangrove dumps to upland areas that are publicly owned. The EQPB will continue to monitor the effectiveness of the operation and maintenance of these dumps.

Another problem facing the Republic of Palau is the importation of illegal pesticides from Taiwan and the Philippines by local farmers. The government agriculture station also runs a demonstration project with aid from Taiwan and most of the chemicals used on the farm are imported from Taiwan. Local workers who are unfamiliar with the chemicals do not know what pesticide brand they are working with. Safety-wise, there is the potential for workers to poison themselves and contaminate the soil and groundwater because the chemicals are not labelled in English.

Furthermore, most of these imported chemicals are either banned in the United States or recommended for "restricted use", and an applicator needs a special license issued by the EQPB to apply such pesticides.

However, this problem is being addressed by the EQPB so that the EQPB, Palau Customs and the Ministry of Health will work together to ensure firstly that only those pesticides that are US-registered are brought into the Republic of Palau, and also that all pesticide applicators be licensed in accordance with the Republic of Palau pesticide regulations.



2.14 Wallis & Futuna

by Elisabeth Pagnac

2.14.1 Situation of the Territory regarding international conventions

The London and MARPOL Conventions are partly in force in the Territory. The areas concerned are:

- marine pollution with hydrocarbons;
- dumping by ships and aircraft and combating accidental marine pollution; and

- protection of human life, living conditions on board ships and prevention of pollution.

The following protocols to the SPREP Convention of 25 November 1986 are in force in the Territory:

- Cooperation in Combating Pollution Emergencies in the South Pacific Region; and
- Prevention of Pollution of the South Pacific Region by Dumping.

To be valid within the Territory, international conventions signed and ratified by metropolitan France must be given executive force by an Order of the Chief Administrator.

2.14.2 Situation of the Territory of Wallis & Futuna with regard to waste management

The Territory has a rubbish tip on each of the islands which have sufficient capacity at present. Virtually all waste is taken to these tips without prior sorting.

Some hospital waste is treated in the incinerator at Wallis Hospital, which has a limited capacity. Used oil is not treated, but some of this material is stored in barrels or re-used. No waste is imported or exported. There are no Territorial regulations concerning the management of hazardous waste (chemicals, pesticides, hydrocarbons used oil, hospital waste and so forth). Consumption patterns are changing, and yet the waste management capacity within the Territory remains limited.

An environment protection strategy is currently being prepared. In this context, it would be useful to evaluate the following:

- the volume and nature of waste at present, and trends for the future;
- conditions applicable to the treatment of waste (regulations and so forth);
- technical facilities available in the Territory; and
- projects to be considered for the future (export and so forth).

Hence it is important for the Territory to be aware of the international context and more specifically that of the South Pacific region, to assist decision-makers in making choices concerning management policy in the Territory.



2.15 Guam

by Conchita Taitano

Guam is on the United Nations' list of Non-Self Governing Territories and remains an unincorporated territory under the US law. According to local statutes {1 Guam Code Annotated Section 402 (b)}, the boundaries of Guam run two hundred nautical miles seaward from the low-water line. As such, the Territory may exercise jurisdiction when conserving and managing the natural resources therein. The law further states that negotiations affecting Guam's ocean rights and responsibilities must be consistent with the United Nations Convention on the Law of the Sea.

Although in 1981 Guam claimed its right to jurisdiction of the island's 200 mile Exclusive Economic Zone (EEZ), the United States by Proclamation 5030 (10 March 1983), inappropriately attempted to lay a claim to Guam's EEZ. However, in 1994, the United States signed the United Nations Convention on the Law of the Sea (UNCLOS) without reservation. UNCLOS declares that in the case of a territory whose people have not attained full independence or other self-governing status recognised by the United Nations, or a territory under colonial domination, provisions concerning rights and interests under the Convention shall be implemented for the benefit of the people of the territory with a view to promoting their well-being and development.

Guam is currently seeking Commonwealth status with the United States. As such, the Territory's Commonwealth Act was created and approved by the people of Guam. Within the Act, a provision has been included that specifically prohibits the United States from utilising the territorial waters or the island for dumping or storing nuclear wastes. At the present time, the Act is with the United States Congress awaiting approval.

In terms of threat of oil spills, a cooperative agreement between major petroleum companies of Guam has been established to respond to spills. I have attached a description of this agreement which was prepared by Mr Martin Gerber. Indiscriminate ocean pollution by vessels falls within the jurisdiction of the United States Coast Guard whose penalties and enforcement capabilities are firm.



2.16 Responses to oil spills in Guam

by Martin J. Gerber

The oil spill of the Exxon Valdez in Prince William Sound and other major oil spills in the territorial waters of the United States brought about a renewed momentum in the US Congress to pass strict oil spill laws. The Federal Water Pollution Control Act, as amended, and other related laws were encompassed in a new law entitled Oil Pollution Act of 1990.

The Oil Pollution Act of 1990 (OPA90) required owners and operators of petroleum tankers and owners and operators of petroleum bulk terminal facilities operating within the jurisdiction of the United States to ensure, by contract or other approved means, the availability of private personnel and equipment necessary to respond, to the maximum extent practicable, to a worst case discharge or a substantial threat of a discharge. The US Environmental Protection Agency and the US Coast Guard, oversight governmental agencies, required owners and operators to submit for approval vessel and facility response plans.

In early 1993, the oil companies on Guam assembled together to address industry's requirements under OPA90. These companies were Peterra Inc, Shell Guam, Mobil Oil Guam, BHP Petroleum and Esso Eastern Inc. By the end of 1994, Mobil Oil Guam had acquired BHP Petroleum. The oil companies operate bulk terminal storage facilities on Guam which receive, store and distribute essentially all commercial petroleum products imported to our island. Although the oil companies of Guam are competitive by nature and are individually responsible for their respective facility and/or vessel response plans, a unified approach in addressing the requirements of OPA90 was accepted and the need for a local oil spill response organisation established.

Thus, in August of 1993 the company Guam Response Services Ltd (GRSL) was incorporated. The current GRSL Board of Directors consists of:

- Gregory Krogel, GM of Esso Eastern;
- David O'Brien, GM of Shell Guam;
- Timothy Glath, GM of Mobil Oil Guam; and
- Martin Gerber, GM of Peterra.

Although GRSL was formed in August 1993, it was not until the end of the first quarter of 1994 that we received, inventoried and commissioned the bulk of the initial equipment purchased. Peterra, Shell,

Mobil, BHP and Esso, the founding members of GRSL, have to date jointly contributed in excess of \$1,000,000 in the purchasing of our oil spill response equipment. GRSL's current equipment consists primarily of work boats, protective and oil collection boom, on-water portable storage bladders and skimming devices with associated appliances. GRSL plans to purchase additional equipment which may include barges to be used to supplement on-water platform space and temporary storage.

Earlier this year, GRSL entered into contractual arrangements with East Asia Response Limited (EARL), a major oil spill response organisation in Singapore, whereby we may call upon EARL for additional oil spill response resources in the event of a major oil spill event in Guam.

In the area of spill response training utilising our equipment, CRSL has and continues to train member company employees as well as contracted personnel. From the private sector alone, we maintain a minimum of thirty-five (35) qualified personnel capable of responding to an oil spill event. On 23 March 1995, the members of GRSL conducted its first ever and required industry-led NPREP drill.

The member companies of GRSL are committed to further developing the organisational structure of GRSL and our response capabilities. We are currently training a minimum of forty personnel of the Port Authority of Guam and plan to train a minimum number of personnel of the Guam Power Authority as well, beginning early 1997.



2.17 Western Samoa

by Laavasa Malua

2.17.1 Background

The need to manage and control hazardous wastes at the national level in Samoa has been identified in its National Environmental Management and Development Strategy (NEMS) as a priority target environmental component for policy development. Recent treaties have also reiterated and pushed for international and regional cooperation in coordinating and putting in place legal mechanisms to help address the problem of marine pollution. Likewise, Samoa has taken steps towards achieving objectives and requirements of these international instruments.

Samoa has a land area of 2,820 square kilometres. Its Exclusive Economic Zone (EEZ), which has been

continuously debated and reviewed at international fora, currently stands at 128,000 square kilometres. Samoa's area of jurisdiction is surrounded by the vast expanses of ocean under the jurisdiction of American Samoa to the east, Wallis and Futuna to the west, Tokelau to the north with Tonga and Niue to the south. Samoa's EEZ is smaller than each of its neighbours and any seaward movement from Samoa will inevitably have to go through its neighbours' EEZs.

This paper will describe first of all Samoa's current experience in hazardous waste management, outline the preventive and curative measures which attempt to protect the marine environment from the transboundary movement of hazardous wastes, and the status of ratification of relevant international and regional conventions; as well as difficulties experienced before and after ratification. In order to clarify the likely movement of such substances should they eventuate, it would be equally useful to also inform this gathering of the transboundary movement of hazardous and dangerous goods in and out of Samoa as administered by the Ministry of Transport.

2.17.2 Status of convention membership

Ratification of international conventions and treaties in general involves the collective responsibilities of the Attorney General's Office, the Ministry of Foreign Affairs and the relevant line ministry or ministries that will be in charge of coordination and implementation.

Of the six conventions dealing with the protection of the marine environment from pollution, Samoa has ratified only the SPREP Convention and its related Protocols and the United Nations Convention on the Law of the Sea (UNCLOS). In addition, Samoa has also approved the International Maritime Organisation initiatives. Other relevant international instruments such as the Basel Convention and its regional image in the Waigani Convention have both been signed by Samoa, but are yet to be ratified.

It would be useful to note here the Montreal Protocol for the Protection of the Ozone Layer. Samoa's national activities that have been geared towards meeting obligations under this convention can assist with regulating and controlling trade in obsolete and banned goods and substances. Without such a control, the Pacific island countries would become a dumping ground for these goods given the economic and social conditions.

For Samoa, the Customs Act can be used to grant an Order of Prohibition to control entry of these kinds of goods. Transiting vessels however will have to be dealt with using other forms of legislation in

accordance with conventions discussed here at this meeting.

Apart from the conventions it has signed or become party to in 1993, Samoa has already shown an interest in other conventions. Notable are the London Dumping Convention 1972 and the International Convention for the Prevention of Pollution from Ships 1973/78 (MARPOL). In addition, and on top of the requirement as a general obligation for parties to cooperate in the formulation of appropriate rules and procedures that would accommodate damage resulting from pollution in the Convention area, it was noted that the insertion of a provision on liability and compensation for such damages in the SPREP Convention (of which Samoa is party to) would have strengthened the capacity within the region to deal with such problems. Samoa's interest in accessing assistance prompted a closer analysis of the International Maritime Organisation (IMO) instruments such as the CLC and Fund conventions establishing the IOPC Fund to complement the SPREP Convention and its protocols. In fact Samoa is in the process of ratifying the IMO Conventions. Likewise the Waigani Convention has also incorporated a statement to this effect although not in detail.

2.17.3 Actions at the national level of implementation

Transboundary movement to and from Samoa is administered by the Ministry of Transport pursuant to the Shipping Act 1972. Under the Shipping Act 1972, the Ministry of Transport (MOT) is responsible for the administration of all areas within the two nautical miles radius from any declared wharf or wharves. These include all shipping activities and marine accidents. It is the coordinator of all maritime activities with the Samoa Shipping Corporation, and is also the receiver of wrecks through its Permanent Secretary. However since the principal legislation governing the MOT's activities imposes a limitation to its jurisdiction, the rest of the territorial waters remain unprotected from transboundary movement of hazardous wastes.

In addition to normal administrative and operating procedures controlling the entry and safe handling of hazardous and dangerous goods with regard to the Shipping Act since 1972, Samoa has taken some legislative steps to protect and preserve the marine environment from sources of pollution.

Division 6, Part VII of the Lands, Surveys and Environment Act 1989 provides for offences against "any discharge or dumping of any refuse matter of any kind, or of whatever description into Samoan waters from any ship". Except in the case of an emergency or unavoidable accident threatening life or property, any discharge or disposal is prohibited.

It is interesting to note here the use of the word "life" which can be construed to apply only to humans and not other organisms in the marine environment. To date the DLS has not taken any action to court regarding the enforcement of this piece of legislation.

The Shipping Bill 1993 contains provisions on marine pollution, but is limited only to shipborne pollution and does not cover other sources of pollution, such as land-based ones. This inadequacy in the initial draft was pointed out mainly in order to address issues of land-based sources of pollution which were considered as major contributors to marine pollution. In light of giving effect to the objectives of the SPREP Convention and Part XII of UNCLOS, as well as dealing with marine pollution emanating from all possible sources, a comprehensive local Marine Pollution Act was recommended for drafting. A draft Shipping Amendment Act is now with the Attorney General's Office.

More recently, the drafting of the Maritime Zone Bill 1995 has been completed. It gives foreign vessels the "right of innocent passage" unless a vessel was engaging in any act of wilful and serious pollution of the marine environment of Samoa. Foreign vessels carrying substances harmful to the environment and noxious or hazardous wastes also would be obligated to seek prior authorisation of the Government of Samoa before traversing through its territorial waters.

The National Environmental Management and Development Strategy process also contributes to the protection of the marine environment. The draft Waste Management Policy 1996, prepared through NEMS, identified and recommended for immediate action the ratification of relevant conventions that target the protection of the marine environment from both land-based activities and shipping activities. It provides the framework for the development of legislation in the area of marine pollution.

Samoa's experience in the transboundary movement of hazardous wastes would be comprised mostly of container recycling which is mainly between Samoa and American Samoa, New Zealand and Australia. The only other transboundary movement that would constitute the movement of substances with hazardous components or qualities would fall within the trade in hazardous and dangerous goods. The other transboundary movement which will no doubt be of interest as a source of marine pollution is the transportation of oil into, and transit via, Samoa.

In respect of dangerous goods, the Master Agent or consignee of any ship due to arrive in Samoa will advise the MOT of all dangerous and toxic goods on the ship's manifest. The manifest will then be

directed to the harbourmaster for inspection. A manifest for the same kinds of goods must also be submitted to the harbourmaster for inspection and also for departures. For reporting purposes under the conventions, these manifests can be used as means to collect information on all hazardous goods and wastes entering or exiting the country. It will just be a matter of itemising the wastes in addition to existing formats.

About nine shipping companies frequent the ports of Samoa, namely the China Navigation, Bali Hai, Bank Line, Pacific Forum Line, Polynesian Line, Dilmun Navigators, South Seas Steamship, Warner Line and Mobil Line. All these shipping lines have the right of passage through Samoan waters and carry goods of various types between Samoa and its trading partners.

Hazardous wastes imported into Samoa had been in the form of waste oil and lead acid batteries mostly from American Samoa. These were collected mainly for recycling either in Apia or New Zealand and Australia.

The local disposal of hazardous wastes is not specifically provided for in the Lands Surveys and Environment Act 1989, although there is a general provision for the designation of a landfill for disposal of all types of wastes. A section of the 100 acre dump at Tafaigata (situated at the south western end of the greater Apia urban area) has been designated for the disposal of hazardous wastes. Disposal is effected through burying the wastes in sealed containers. It has been noted with concern that it will not be possible for Samoa's fragile environment to absorb hazardous wastes without causing damage to its ecosystem. Therefore, until the disposal capability for hazardous wastes is raised to a level that is environmentally safe, disposal will remain restricted to hazardous wastes generated internally. These wastes are a problem; transboundary movement may be the only alternative way to get rid of them, preferably to exporters of the products these wastes emanated from.

2.17.4 Oil spills

In the case of oil transportation and the preparedness in the event of oil spills, Samoa has adopted a number of significant measures as responses to pollution emergencies. First of all, a draft Oil Spill Contingency Plan was prepared in 1992 and the committee in charge is still in the process of refining it. It deals with both land and ocean spills and covers the whole of Samoa's EEZ.

The main purpose of the plan is "to develop a state of readiness to allow for a prompt and orderly response to an oil spill". It goes further to include also "other marine pollution incidents". The MOT

is the lead agency for coordination of all the activities pertaining to the plan, with the rest of the relevant agencies of government and private organisations or companies expected to carry out required activities as support agencies.

Like any other Pacific island state, the disposal of waste oil in Samoa has been problematic. From land-based activities waste oil is discharged directly into drains, streams and rivers and eventually reaches the marine environment.

Samoa has been fortunate that enterprising initiatives from the private sector resulted in the setting up of an oil refinery plant in the greater Apia urban area. Problems with the disposal of waste oil have been addressed by this innovative plant owned by local businessman Tony Hill (Aegis Oil). It receives waste oil from mechanical workshops, diesel-fuelled power generators and the local depots of the two oil companies, Mobil and British Petroleum.

At one stage, waste oil was brought in from American Samoa, and ships docking at the international port in Apia (mainly Pacific Forum Line) would bring in waste oil generated during the usual ship operations, where it would be taken to Vaitele in 44 gallon drums. However, due to the lack of any sustained incentive to encourage and maintain a continuous local supply of waste oil, the plant encountered problems with shortages in its main raw material. There was also a setback in the supply of waste oil from vessels as it became apparent that the ship-liners considered it easier and faster to dispose at sea rather than carry waste oil that was receiving only minimal returns at their destination.

Looking back over the last three or four years, the plant proved very attractive at the inception with customers adopting the recycled product mainly on the basis of it being cheaper than conventional oil due to incompatibilities of the oil with various engine models. Despite this setback, there is still potential for expansion through the insertion of a better research and marketing strategy. Ratification of the MARPOL Convention by Samoa should discourage the dumping of oil at sea, and in turn obligate shipping companies to store their oil for Tony's plant.

For the protection of the marine environment, it is well recognised that an oil spill is hazardous and we need to determine appropriate response mechanisms to prepare for such an event. Oil spill containment and recovery equipment and techniques are numerous and of varying effectiveness. The MOT, which is mandated to administer Samoa's territorial waters, does not have the proper oil spill containment equipment, although the capacity is there for planning and

response designing. Selected staff of the Police and the Fire Departments have received limited training in this area but do not have the proper type of equipment. Surveillance of Samoa's territorial waters is the responsibility of the Police Department, and their only patrol boat inspects its EEZ for illegal fishing activities and helps with rescue missions. Policing vessels to detect transboundary movement of hazardous wastes is not included in their mandate.

The oil companies have acquired the proper equipment in preparation for their own emergency response. Should an oil spill occur, this capability is accessed and paid for by the Government through the MOT. There is, however, the argument that since the oil companies and ship owners are the ones benefiting from the trade, they must also be made responsible for preventing any spills with the assistance of the MOT as well as for containing it.

2.17.5 Priorities for ratification

Noting the prevalent interests in and commitment of the international community to selected conventions and possible benefits identified to be derived from these conventions, Samoa has moved to consider, or in fact is already in the process of ratifying those conventions it has already signed. Ratification of the following international and regional conventions on the transboundary movement of hazardous wastes has also been raised within government.

Samoa is in the process of ratifying the Waigani Convention and Basel Convention consecutively, and is also considering the London Dumping Convention. Another international instrument for later consideration is the Global Programme of Action on Marine Pollution from Land-Based Activities.

National interest is very much in line with environmental management and protection. However, there are also obstacles, most of which are shared by Pacific Island states, hindering attempts to successfully implement these conventions. At the centre of all those problems is inadequate institutional capacity.

2.17.6 Obstacles to ratification and implementation

Like many Pacific island developing states, Samoa's main problem regarding the ratification of international conventions lies with the lack of legislation that would particularly serve or meet the relevant convention's obligations. But even if there was legislation, the difficulties with enforcing this due to the lack of any institutional capacity to effect the controls will still remain.

In order to duly control pollution of the marine environment, national laws which deal in some way with pollution will all have to be harmonised. The Shipping Act of 1972 provides for the administration of Samoan waters but does not address pollution from ships; this is contained in another Act (LSE Act 1989). The shipping legislation also provides liability for damage or loss to property but not specifically on the environment and the surrounding ecosystems. The Fisheries Act 1988 and its Regulations of 1996 also provide for the protection of marine resources. In order to prevent any legally binding expectations that Samoa may find impossible to meet as a party to any of these conventions, the Government decided to first of all prepare itself and build its institutional capacity before actually entering into an internationally binding agreement. Experience with the Vienna Convention and Montreal Protocol has also encouraged taking this approach. It will however be very interesting to note that the Government is taking quite some time to effect the codification of this legislation. Hence, given the preference of the Government to firstly tidy up local legislation, the slow pace at which codification of local legislation takes place will also result in further delays with ratification. This delay in ratification should not however be seen as a reflection of Samoa's position on these conventions. Samoa has noted and committed itself to the goals and objectives of the conventions as reflected in current activities towards building local legislation from legislative reviews conducted earlier. Thanks to SPREP and UNDP, Samoa now has a review of all its environment-related legislation as a base for future legislative development.

The need for prior consultation with interested groups, relevant government and non-government organisations also causes unavoidable delays in the ratification. Nevertheless it is critical for the successful implementation of conventions that views and interests of all relevant organisations are taken into account.

Another problem that is seen as a major factor influencing the decision of the Government to ratify conventions, irrespective of whether there is local capacity or not to implement the convention, lies with the lack of information on benefits a country will receive from being a party to the convention. Perhaps secretariats of conventions can assist governments with this concern. It should also be explained clearly that conventions will assist governments to meet their obligations under the conventions.

Regarding implementation, the usual problems include the inadequacy of technology and equipment to respond to emergencies. It should be remembered that agencies responsible for the implementation

of conventions of small island states are very small. In Samoa one person could be in charge of more than three or four conventions. The shortage of technical personnel to fully perform all the tasks pertaining to each convention therefore makes implementation more difficult.

In addition to the limitations in personnel, the availability of proper technology as part of remedial strategies for the containment of pollutions is very scarce. Sometimes, the equipment could be made available, but at a very high cost which is normally in excess of the government resources allocated for this purpose.

Coordination and close consultation between government agencies and the private sector is one key to successful implementation. This is a problem that has persisted in Samoa until recent attempts by NEMS to coordinate line ministry activities. The same problem of lack of coordination between respective government departments can be blamed for the delays in ratification. Taking the Waigani Convention as an example, the Department of Lands, Surveys and Environment is SPREP's environmental focal point in government, but the coordination of transboundary movement and shipping activities lies with the MOT. The issue will therefore centre on deciding who the instigator will be, and where ratification should originate and be followed through. It is all so easy to involve the Department of Lands, Surveys and Environment for pollution prevention in general, but once maritime activities are involved, MOT may focus mainly on the safety of personnel and property and not so much on the rest of the marine environment.

2.17.7 Conclusion

In summary, the protection of the marine environment from the transboundary movement of hazardous wastes and their disposal in our territorial waters will certainly require integrated and coordinated actions between all states of the South Pacific. Not only should we strengthen national legislation, institutional capacity must be lifted to a level that enables the enforcement of this legislation.

The problems hindering the ratification and implementation of international and regional conventions by Samoa is transparent among other Pacific islands. These include the uncontrolled dumping of wastes at sea, lack of facilities and equipment to deal with hazardous wastes, the lack of legislation and weaknesses in their enforcement due to the limited institutional capacities and lack of coordination between government agencies. Thanks to the NEMS process, government departments and non-government organisations are now beginning to work together.

Although Samoa has yet to ratify the rest of the conventions, it is hoped that the activities and actions taken by the Government at the national level provides ample evidence of its commitment to the protection of the marine environment. In fact Samoa is actually effecting implementation before ratification. With more clarification and sensitisation of Pacific islands to the advantages of becoming parties to these conventions, ratification should no longer be a difficult task.

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3 Summary of international conventions

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3.1 The Law Of The Sea Convention 1982

- Entered into force 16 November 1994.
- Most comprehensive international agreement regulating every marine sector activity, including:
 - navigation;
 - resources (fisheries, hydrocarbons and other minerals);
 - protection of the marine environment;
 - marine scientific research; and
 - peaceful settlement of disputes.

3.1.1 Creation of zones of jurisdiction

- Internal waters—rivers, lakes, lagoons, bays.
- Territorial sea—12 nautical miles from baseline (full sovereignty).
- Contiguous zone—24 nautical miles (fiscal, immigration, sanitary powers).
- Exclusive economic zone (EEZ)—200 nautical miles from baseline:
 - fisheries;
 - protection of environment.
- High seas—flag state jurisdiction only, but obligation to protect environment.
- Continental shelf.
- Deep seabed.
- Archipelagic waters.

3.1.2 Regulatory framework

- Provides the basic framework for all conventions dealing with marine environment and coastal zone.
- Provides general rules for marine environmental protection.

- Detail and technical rules left to other conventions.
- Agenda 21 (Chapter 17) provides policy guide to implementation.

3.1.3 Significance to Pacific

- Large ocean space.
- Potential benefits.
- Land-sea integration.
- Consequences of non-integration.

3.2 London Dumping Convention

- 1972 Stockholm Conference recommended that:
“governments should bring into force as soon as possible, an overall instrument for the control of ocean dumping.”
- October–November 1972 Inter-Governmental Conference on the Convention on the Dumping of Wastes at Sea.
- Convention entered into force on 30 August 1975.
- As at January 1996, 74 states and parties.

3.2.1 Concerns

- Waste consequences of industrialisation, urbanisation and population growth.
- Sea dumping attractive option for many states.
- “Out of sight, out of mind” mentality.
- Limited assimilative capacity.
- Threat to marine ecosystem.
- Threat to human health through food chain and recreational activities.

3.2.2 Preamble

- Recognizing that the marine environment and the living organisms which it supports are of vital importance to humanity, and all people have an interest in assuring that it is managed so that its quality and resources are not impaired.
- Recognizing that the capacity of the sea to assimilate wastes and render them harmless, and its ability to regenerate natural resources is not unlimited.

3.2.3 General framework

- Identifies types of wastes that should not be dumped at sea under any circumstances.
- Identifies the substances that require special permits before being dumped.
- Identifies the substances that require a general permit before being dumped.
- Result: all types of wastes require some form of permit before they are dumped.
- London Convention framework incorporated into SPREP Convention.

3.2.4 Dumping regulations

Dumping includes:

- deliberate disposal of material and substances of any kind, form or description from vessels, aircraft, platforms or other man-made structures; and
- deliberate disposal of vessels, aircraft, platforms or other man-made structures.

Dumping does not include:

- disposal of wastes or other matter from normal operations of vessels, aircraft, platforms or other man-made structures;
- placement of matter for a purpose other than mere disposal and the disposal of wastes, for example, for the creation of artificial reefs; or
- disposal of wastes or other matter which directly arises from or relates to the exploration, exploitation and associated off-shore processing of seabed mineral resources.

3.2.5 Regulatory framework

- Article (iv) generally prohibits dumping wastes or other matter in whatever form or condition except as otherwise specified.
- Complete prohibition of dumping substances is listed in Annex (i).
- States must issue a “special permit” to dump substances listed in Annex (ii).
- States must issue a “general permit” for dumping all other substances at sea.

3.2.6 Annexes

Annex (i)

- Substances listed in Annex (i) must not be dumped at sea or loaded onto vessels by contracting parties.
- Annex (i) substances include waste with very damaging environmental effects on the marine environment. They include, for example:
 - organohalogen compounds;
 - mercury and mercury compounds;
 - cadmium and cadmium compounds;
 - persistent plastics and other persistent materials;
 - crude oil and its wastes;
 - refined petroleum products;
 - petroleum, distillate residues, and any mixtures containing any of these, taken on board for the purpose of dumping;
 - high-level radioactive waste or other radioactive matter; and
 - materials in whatever form produced for biological and chemical warfare.
- In 1994, Annex (i) was amended to include industrial wastes. Materials with trace contaminants of industrial wastes are also included as part of the amendments.

Annex (ii)

- States must prevent “significant amounts” of Annex (ii) wastes being dumped, and to also ensure that “special care” is taken in disposing such wastes at sea. For example, wastes containing significant amounts of the following matter and their compounds:
 - arsenic, lead;
 - copper;
 - zinc, organosilicon compounds;
 - cyanides, flourides; and
 - pesticides and their by-products not covered in Annex (i).

- No dumping of containers, scrap metals and other bulky metals which may sink to the sea bottom and are likely to present a “serious obstacle to fishing or navigation”.
- States must not dump non-toxic substances either because of the quantities in which they are dumped, or because they may seriously reduce amenities of the sea.

Annex (iii)

- Substances not within Annex (i) and (ii) come with Annex (iii) and must be dumped after issuing a general permit for their disposal.
- Lists factors that must be considered in determining whether dumping should occur, such as:
 - characteristics and composition of the matter being dumped;
 - characteristics of dumping site and method of deposit; and
 - other general considerations.

3.2.7 Area of application

Apply in the:

- territorial sea;
- exclusive economic zone;
- continental shelf; and
- high seas—flag states who are parties to Convention.

3.2.8 Protocol

1996: Article (iv) requires states to apply either the provisions of the Convention or adopt other effective measures to control the deliberate disposal of wastes in marine internal waters.

3.3 Differences between SPREP Protocol and London

There are very few differences.

3.3.1 Area of application

- London: exempts application to internal waters only.
- SPREP: includes internal waters and archipelagic waters.

- SPREP: applies to portions of continental shelf beyond 200 nautical miles.
- 1996 London amendment: party may apply the Convention to *internal marine waters*.
- SPREP: applies to pocket of high seas enclosed by exclusive economic zones.

3.3.2 Waste covered in Annex (i)

- London: high-level radioactive wastes or other high level radioactive matter defined on public health, biological or other grounds by the international atomic energy agency as unsuitable for dumping at sea.
- SPREP protocol applies also to organo-phosphorous compounds.

3.3.3 Links between SPREP Protocol and London

- London article (viii): States should enter into regional arrangements consistent with the London Convention.
- Preamble to SPREP Protocol: desiring to enter into a regional agreement consistent with the London Convention as provided in Article (viii).
- SPREP Protocol Article (iii): national laws, regulations and measures adopted by the parties to be no less effective than those under London Convention.

3.3.4 Is it necessary to ratify both SPREP Protocol and London?

- SPREP Convention area is limited to South Pacific region, whilst London has no geographical limitations.
- There are minor differences between two conventions. Ratification of both provides comprehensive coverage of field.
- Disputes resolution between SPREP and London parties less problematic.
- Ratification of London may give access to financial and technical assistance to implement Convention.
- Reporting obligation no different: channelled through SPREP to IMO.

3.4 MARPOL 1973/78

- 1973—International Conference on Marine Pollution Prevention.
- Result: the International Convention on the Prevention of Pollution from Ships 1973.
- 1978—text of 1973 convention amended by protocol before entered into force – hence MARPOL 1973/78.

3.4.1 Concerns

- Lack of regulation of large amounts of waste generated at sea by ships including:
 - oil;
 - garbage;
 - sewerage; and
 - other harmful substances.
- Environmental implications.

3.4.2 Preamble to MARPOL

- Being conscious of the need to preserve the human environment in general and the marine environment in particular.
- Recognizing that deliberate, negligent or accidental release of oil and other harmful substances from ships constitutes a serious source of pollution.

3.4.3 Broad framework

- Marine pollution from ships regulated under five annexes:
 - (i) oil—came into force 2 October 1983;
 - (ii) noxious liquid substance—came into force 6 October 1987;
 - (iii) harmful substances in packaged form—came into force 1 July 1992;
 - (iv) sewerage—not yet in force; and
 - (v) garbage—came into force 31 December 1988.

3.4.4 Global significance

- MARPOL 1973/78 and annexes provide main international law rules and standards for pollution from ships required under the Law of the Sea Convention.

- MARPOL 1973/78 accepted by 93 states representing 92 percent of world shipping tonnage.
- Significant for Pacific given reliance on shipping.

3.4.5 Annexes

Annex (i): Regulation for the Prevention of Pollution by Oil

- Prohibits discharge of oil and oily substances into the marine environment.
- Sets standards for the use of oil fuel tanks or cargo tanks which carry ballast water.
- Sets standards on the manner ballast water- or oil-contaminated water should be discharged from oil tankers and cargo tank areas.

Annex (ii): Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk

- Covers approximately 200 chemicals classified in different categories according to their toxicity level for aquatic life.
- Prohibits discharge of noxious liquid substances from vessels unless diluted to acceptable levels.
- Requires the use of reception facilities if dilution not properly achieved.

Annex (iii): Regulations for Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Forms or in Freight

- Requires goods to be packaged to minimise hazards to the marine environment.
- Must properly mark and label packages carried on board vessels.
- Must carry proper documentation for packages.
- Limits the quantity of packaged materials to be carried on board vessels.
- Regulates proper stowage and securing of goods on board vessels.

Annex (iv): Regulations for the Prevention of Pollution by Sewage from Ships

- Generally prohibits the discharge of sewage from ships.
- Permits discharge of disinfected sewage within 4 nautical miles of the nearest land.

- Permits discharge of sewage if processed by an approved sewage treatment system meeting Convention standards.
- States to provide reception facilities at ports for sewage without causing undue delay to ships.

Annex (v): Regulations for Prevention of Pollution by Garbage from Ships

- Regulates disposal of all domestic and operational waste occurring during the operation of ships.
- Generally prohibits disposal of plastic from vessels.
- Ground garbage dumping allowed only if a vessel is 3 nautical miles from nearest land.
- Disposal of non-ground garbage allowed if a vessel is 12 nautical miles from nearest land.
- Disposal of floating garbage allowed if a vessel is 25 nautical miles from nearest land.
- Restricts disposal of garbage from certain fixed or floating platforms.

3.4.6 Relationship between MARPOL and the Law of the Sea Convention

- Law of Sea: general rules.
- MARPOL: specific and technical details to implement Law of Sea.
- Article 211 Law of Sea:

“States, acting through the competent international organisation... shall establish international rules and standards to prevent, reduce and control pollution of the marine environment from vessels...”

3.5 A practical guide to the implementation of environmental treaties/conventions

3.5.1 Preliminary issues

- Has the treaty been signed and ratified in accordance with domestic constitutional requirements?

- Have signature and ratification been communicated to the depository?
- International law significance of signature, ratification or accession.
- Gain some understanding of history of treaty/convention and the nature of the problem.
- Undertake a brief national impact evaluation.

3.5.2 Identification of obligations

- What actions are required to implement obligations? Go through the convention article by article.

3.5.3 Obligations requiring regional and global action

Examples include:

- reports (how often?);
- communication;
- exchange of information; and
- attendance at conference of the parties;

3.5.4 Obligations requiring domestic action

- Identify appropriate governmental authority/authorities to implement obligations.
- Where multiple agencies, agree on principal coordinating authority and process of inter-departmental coordination.
- Identify legislative changes required.
- Review existing legislation in terms of compatibility.
- Identify other complimentary treaties ratified.
- Draft appropriate legislation and ensure consistency.
- Identify scientific information, data and so on required.
- Assess cost of implementation:
 - education and training;
 - reporting; and
 - attendance at conference of parties and so on.

- Identify sources of technical and financial assistance:
 - provided by the convention;
 - available at the regional organisation level;
 - available globally;
 - available through bilateral assistance; and
 - available domestically—budget appropriation, industry, NGOs etc.
- Develop strategy/plan to access funding.
- Develop checklist of actions required.

3.5.5 Role of conventions in overcoming problems

- Nature of environmental problem:
 - extra-territorial impact;
 - requiring regional and international cooperation.
- Role of regional organisations:
 - provision of technical assistance: scientific, legal and so on;
 - provision of financial assistance to implement; and
 - provision of training and capacity building.
- Fostering of unity against external threat.

Examples:

- Nuclear testing
- Export of waste to region.

3.6 MARPOL Article 17: Promotion of Technical Cooperation

The parties to the Convention shall promote, in consultation with the organisation and other international bodies with assistance and coordination by the executive director of the United Nations Environment Programme, support for those parties which request technical assistance for:

- (a) the training of scientific and technical personnel;
- (b) the supply of necessary equipment and facilities for reception and monitoring;
- (c) the facilitation of other measures and arrangements to prevent or mitigate pollution of the marine environment by ships; and

- (d) the encouragement of research

preferably within the countries concerned, so furthering the aims and purposes of the present Convention.

3.7 Law of the Sea, Article 202: Scientific and Technical Assistance to Developing States

States shall, directly or through competent international organisations:

- (a) promote programmes of scientific, educational, technical and other assistance to developing states for the protection and preservation of the marine environment and the prevention, reduction and control of marine pollution. Such assistance shall include, *inter alia*:
 - training of their scientific and technical personnel;
 - facilitating their participation in relevant international programmes;
 - supplying them with necessary equipment and facilities;
 - enhancing their capacity to manufacture such equipment; and
 - advice on and developing facilities for research, monitoring, educational and other programmes.
- (b) provide appropriate assistance, especially to developing states, for the minimisation of the effects of major incidents which may cause serious pollution of the marine environment;
- (c) provide appropriate assistance, especially to developing states, concerning the preparation of environmental assessments.

3.8 Law of the Sea, Article 203: Preferential Treatment of Developing States

Developing states shall, for the purposes of prevention, reduction and control of pollution of the marine environment or minimisation of its effects, be granted preference by international organisations in:

- (a) the allocation of appropriate funds and technical assistance; and
- (b) the utilization of their specialised services.

3.9 Approaches to international conventions at domestic level

- Refuse to sign and ratify.
- Sign but refuse to ratify.
- Sign and ratify but no implementation. No inventory of international obligations available.
- Sign and ratify and implement.
- A mix of the above.

Questions

- Which category does your country fall into?
- What considerations determine your approach?

4 The role of UNEP in promoting environmental law as an instrument for waste and marine pollution management

by **Lal Kurukulasuriya**

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4.1 Role of UNEP

4.1.1 Introduction

4.1.2 UNEP responses to the challenges of UNCED

- Agenda 21 and SDC.
- Restructured programme of UNEP.
- Montevideo 11 programme.

4.1.3 UNEP's programme in the field of environmental law

- International legal instruments.
- Capacity building:
 - national legislation;
 - training; and
 - information.

4.1.4 UNEP's programme of activities in the areas of:

- Waste management; and
- Marine pollution management.

4.1.5 What can UNEP offer the SPREP countries in the area of waste management and marine pollution control?

4.2 UNEP's programme in the area of waste management and marine pollution management

- Implementation of the Basel Convention.
- Industry and environment.
- Partnership in strengthening human resource capabilities.
- Toxic chemicals management.
- Special concerns of small island developing states.
- Regional Seas programme.
- International coral reef initiative.
- Protection of the marine environment from land-based sources of pollution.
- Integrated management of water resources.
- Coordination of the Global Environment Facility.
- Global plan of action for marine mammals.
- Strengthening legal and institutional regimes.
- Code for the safe currency of irradiated nuclear fuel, plutonium and high level radioactive wastes in flasks on board ships (joint IAEA/IMO/UNEP workshop developed the code in 1993). UNEP/IMO contribute to environment impact of accident at request of IMO.

4.3 Activities of UNEP's Regional Office for Asia and the Pacific (ROAP)

4.3.1 Role of regional offices

4.3.2 Activities of ROAP

- Environmental management seminars
- Nettlap
- Environmental law
- Implementation of environmental conventions
- Regional seas programmes
- Environmental assessment:
 - capacity building;
 - data management; and
 - assessment and reporting.
- Coastal and Marine Environment Management Information System (COMEMIS)

4.4 What can UNEP offer SPREP countries in areas of waste management and marine pollution management?

4.4.1 Critical part of a government-driven, multi-agency programme

4.4.2 UNEP inputs include its specialised expertise and experience in:

- Strengthening related policies, administrative and institutional basis, and legal regimes.
- Implementation of relevant agreements in collaboration with the relevant secretariats.
- Participation in international and regional initiatives.
- Strengthening human resource capabilities:
 - natural/regional training;
 - information dissemination; and
 - publication.
- Mobilisation of comparative strengths of relevant international and regional organisations.

- Resource mobilisation for implementing agreed programmes of activities, e.g. GEF, COMEMIS.

4.5 Contemporary approaches to waste management and pollution control

4.5.1 Command and control versus incentive approaches

4.5.2 Policy and legal instruments

- Regulatory instruments
 - standards
 - licenses and permits
 - land and water use controls
- Economic instruments
 - pollution charges
 - effluent and emission charge
 - user charges
 - product charges
 - administration charges
 - tax differentiation—to promote consumption of environmentally-friendly products
 - marketable permits
 - liability insurance
 - subsidies
 - enforcement incentives
 - deposit refund schemes
 - noncompliance fees—fees charged when they exceed limits
 - emergency fund

4.5.3 Institutional arrangements

- Governmental
 - national
 - state/provincial
 - local
- Non-governmental
 - private sector
 - NGOs
 - community groups and so on.

4.6 Contemporary approach in the new context of sustainable development

4.6.1 Integrated approach in the new context of sustainable development

- Equilibrium between economic, social and environmental considerations

- Evolution of environmental law:
 - international agreements;
 - national legislation.
- Environmental degradation curve.
- EIA as an instrument for integrating environment and development.

4.6.2 Systemic approach as against sectoral approach

- Ecosystems.
- Water pollution—law-based, coastal and marine.

4.6.3 Participatory and consultative approach

- Regional cooperation.
- Intra-governmental cooperation—lateral/vertical.
- Role of environment ministries.
- Community participation, NGOs, academic institutions.
- Partnership with private sector.

4.6.4 Incentive approach as against command and control

4.7 Global Environment Facility (GEF)

- Purpose: to provide grant and concessional funding to developing countries for projects and activities that aim to protect the global environment.

- Areas of activity funded by GEF (focal areas)
 - climate change
 - biodiversity
 - international waters
 - depletion of ozone layer

Also land degradation (desertification and deforestation) as they relate to the above four areas.

- Implementing agencies
 - UNEP
 - UNDP
 - World Bank
- GEF operational strategy (1995)
 - general
 - country driven
 - based on national priorities designed to support sustainable development.

International waters

Country	PDF Name	Implementing agency
Regional (Africa)	Regional oil spill management	World Bank
Regional (Albania, Macedonia)	Lake Ohrid conservation and management	World Bank
Regional	Assessment of priority transboundary water-related environmental problems and preparatory phase of a strategic action programme for the Dnieper River Basin	UNDP
Regional	Rumen River development programme	UNDP
Regional	Integrated management of the Lake Chad Basin	UNDP
Regional	Development of self-sustaining mechanism to ensure the environmental management of the Black Sea (project development phase)	UNDP
Regional	Strategic Action Programme (SAP) for the Red Sea and Gulf of Aden	UNDP/UNEP
Regional	Implementation of the Strategic Action Plan in the Danube	UNDP
Regional (Argentina, Bolivia)	Bermejo River Binational Basin	UNEP
South Pacific	SAP for South Pacific	SPREP

4.7.1 Priorities (GEF operational strategy)

- Control of land-based sources of pollution that degrade the quality of international waters.

Example:

Release of persistent toxic substances, heavy metals, nutrients, sediments into water basins with fragile ecosystems and rare biodiversity.

- Prevention and control of land degradation where transboundary environmental concerns result from desertification and deforestation.
- Prevention of physical and ecological degradation of critical habitats (e.g. shallow waters, reefs, wetlands) that sustain biodiversity and protect threatened species.
- Improved management of marine resources that stem overfishing and excessive withdrawal of fresh water.
- Control of ship-based sources of chemical washings and non-indigenous species transferred in ballast water that disrupt ecosystems and affect health.

4.7.2 GEF operational programmes

I Water-body based operational programme

Focus:

- Geographic distribution of regionally important transboundary waterbody that has significant environmental problems.
 - freshwater basins (river/lake basins, groundwater and aquifer systems)
 - marine ecosystem, e.g. Black Sea, South Pacific

II Integrated land, water, multiple focal area operational programme

Focus:

- Transboundary concerns needing broad interventions to address international water concerns that stem from or are interlocked with problems in other focal areas.

Example:

- land degradation and dry land issues
- special needs and conditions of SIDs
- water bodies that yield results and benefits for other GEF focal areas (e.g. biodiversity)

III Operational programme on contaminants

Focus:

- Strengthen practices that prevent releases of contaminants, e.g. policy and management, information, alternative technologies, international/regional collaboration.

Projects funded by GEF in the area of international waters

Region	Type	Name	Implementing agency	GEF financing (\$ millions)
AFR	Regional	Pollution control & other measures to protect biodiversity in Lake Tanganyika	UNDP	10.0
AFR	Regional	Pollution control & biodiversity conservation in the Gulf of Guinea large marine ecosystem	UNDP	6.0
Asia & Pacific	China	Ship waste disposal	World Bank	30.0
Asia & Pacific	Regional	Management of pollution in SE Asian seas	UNDP	8.0
ECA/MENA	Regional (Algeria, Morocco, Tunisia)	Oil pollution management system for the south-west Mediterranean Sea	UNDP	10.0
ECA/MENA	Egypt	Engineered wetlands (Lake Manzala)	UNDP	4.5
ECA/MENA	Egypt	Red Sea coastal and marine resource management plan	World Bank	4.75
ECA/MENA	Regional	Environment management and protection of the Black Sea	UNDP	9.3
ECA/MENA	Regional (eastern Europe)	Environmental management of the Danube River Basin	UNDP	8.5
ECA/MENA	Yemen	Protection of marine ecosystems on the Red Sea coast	UNDP	2.8
Global	Global	Support for regional centres for international oceans training	UNDP	2.6
LAC	Regional O E C S	Waste reception centres for international oceans training	World Bank	2.14

5 Recommendations

The Meeting, recognising the importance of dealing effectively with waste management strategies and disposal of hazardous wastes, calls on SPREP in collaboration with UNEP, the Secretariat for the Basel Convention and other relevant organisations and institutions to strengthen its assistance to member countries in this region, especially through disseminating information and preparation of technical guidelines and the provision of financial and management-related resources.

The Meeting specifically recommends:

- That governments should strengthen and build endogenous capacity, at the national level, *inter alia*, in the area of environmental law and management. SPREP, in collaboration with UNEP, the Secretariat for the Basel Convention and other relevant organisations and institutions will have a key role to play in this process. Such capacity building will include:
 - SPREP ensuring the availability of relevant training/scholarships packages for both public and private personnel. Such training programmes shall commence in 1997;
 - SPREP providing assistance to strengthen existing legislation and regulation upon request in collaboration with UNEP, SBC, IMO and other relevant organisations and institutions as appropriate;
 - SPREP striving, within a regional framework, to strengthen institutional and legal capacity at the national level, so as to improve the monitoring, implementation and management of waste disposal and dumping of all kinds of wastes including toxic and hazardous wastes.
- That governments should concentrate on hazardous waste education and awareness programmes. SPREP, in collaboration with UNEP, the Secretariat for the Basel Convention, and other relevant organisations and institutions will have a key role to play in the building of such programmes. They will include:
 - SPREP ensuring the availability of technical information relating to the disposal and minimisation of hazardous wastes;
 - SPREP producing information in the form of publications and technical guidelines for the implementation of the Waigani Convention during the year 1997;
- SPREP providing law fact sheets summarising the relevant conventions including information on the history of these conventions;
- SPREP mobilising technical and other resources to assist countries at the national level to strengthen and improve environmental education and awareness.
- That SPREP member countries be encouraged to consider ratification/accession of marine-related conventions on the prevention of pollution, namely MARPOL Convention, the London Convention, the SPREP Convention, the Law of the Sea Convention and the Waigani and Basel Conventions;
- That draft Model Country Legislation be prepared by SPREP for the joint implementation of Basel and Waigani Conventions;
- That projects being identified and developed under SPREP's waste management programme include small scale projects, involving NGO and community-based participation;
- That SPREP seek external funding for the disposal of hazardous wastes;
- That SPREP encourage the establishment of regional hazardous waste treatment facilities;
- That SPREP should coordinate waste management activities with the Secretariat for the Basel Convention and UNEP as appropriate;
- That SPREP provide comparative analyses and summaries of the conventions;
- That SPREP produce guidelines for the disposal of the various categories of hazardous wastes, and a listing of disposal facilities and their capabilities;
- That SPREP compile an inventory of hazardous wastes within the South Pacific region.

**Annex 1: Agenda – Meeting on International Conventions
Relating to Pollution Activities
2–6 December 1996**

	Item	Resource Personnel
Day One		
0900–0930	Registration, welcome to participants Welcome speech	
0930–1000	Approval of agenda and election of Chairperson	Bernard Moutou
1000–1030	Morning tea	
1030–1200	Summary presentation of the conventions <ul style="list-style-type: none"> • Basel • Waigani 	Iwona Rummel-Bulska Bernard Moutou
<i>Promotion of the benefits to countries of wastes and marine-related conventions</i>		
1200–1300	Lunch break	
1330–1500	Official opening <ul style="list-style-type: none"> • Opening prayer • Welcoming remarks from Government of Samoa • Opening remarks by SPREP 	Hon. Tuala Sale Tagaloa Don Stewart (SPREP)
1500–1530	Afternoon tea and photograph	
1530–1630	Presentations continue <ul style="list-style-type: none"> • SPREP Convention and related protocols • London Dumping Convention • MARPOL Convention • UN Convention on the Law of the Sea 	Bernard Moutou Martin Tsamenyi Martin Tsamenyi Martin Tsamenyi
1630–1700	Status of conventions membership in the South Pacific region	Bismark Crawley Bernard Moutou
1700–1730	Discussion	Chair
1830–2030	Welcome reception—Aggie Grey’s Hotel	
Day Two		
0830–1000	Civil Liability and FUND Conventions	Peter Heathcote (Forum Secretariat)
1000–1030	Morning tea	

Comparative analysis of conventions

1030–1200	<ul style="list-style-type: none">• Comparative analysis of the links between Waigani and Basel Conventions. Discussion of the history of the two conventions. Why they were deemed to be necessary? Where does Waigani fit in? Is it necessary to ratify both conventions or only one?	Bernard/Iwona
	<ul style="list-style-type: none">• Comparative analysis of SPREP and London Dumping Conventions.	Bernard/Martin
	<ul style="list-style-type: none">• Comparative analysis of MARPOL and UNCLOS	Martin/Lal Kurukulasuriya
1200–1300	Lunch break	
1300–1500	Comparative analysis of conventions (continued)	
1500–1530	Afternoon tea	
1530–1700	Joint discussion	

Day Three

Country positions

0830–1000	Presentations of country papers	Participants/ Andrew Munro
1000–1030	Morning tea	
1030–1200	Presentations of country papers (continued)	
1200–1300	Lunch break	
1300–1500	Summary of perceived problems of PICs <ul style="list-style-type: none">• Dumping of wastes at sea• Use of the Pacific as a dumping ground• Movement of dangerous goods through the Pacific• The threat of oil spills• Indiscriminate ocean pollution by vessels• Lack of port reception facilities for wastes• Enforcement of legislation• Lack of legislation• Lack of regional coordination• Lack of institutional capacity to address concerns• Role of conventions in overcoming problems	Andrew Iwona/Martin/Lal
1500–1530	Afternoon tea	
1530–1700	Determination of priorities for ratification. Should these priorities be on a country basis or a regional basis? <ul style="list-style-type: none">• How have countries identified priorities up-to-date (noting an apparent total lack of uniformity/pattern in the ratification of conventions by Pacific Island Countries)?	Bernard/Andrew
	Obligations following ratification/accession <ul style="list-style-type: none">• Elaborate on requirements of each convention, noting that some make concessions for a country's ability to comply, e.g. for developing countries	Iwona/Martin/Lal

Day Four

Identification of assistance to signatory countries provided by Convention Secretariats, SPREP, UNEP and others

0830–1000	Basel Convention	Iwona
	<ul style="list-style-type: none">• The Technical Working Group and the Technical Guidelines which the TWG produces. Are these guidelines intended as guidance only and not mandatory? What is their basis (noting that some, e.g. disposal of PCBs by incineration, are likely to be highly controversial)?• The draft legislation prepared by SBC to assist ratifying countries in meeting their legal commitments.• Advantages of ratifying Basel—or why should they bother?• Assistance to ratifying countries by SBC.• Implications of Waigani Convention—will it effectively become an Article 11 agreement and if so is there any real advantage in ratifying Basel in addition to Waigani?• Proposed Regional Centres for Training and Technology Transfer: Where will they be? What is their purpose? Will they be accessible by PICs? What are the chances of one being established to specifically serve PICs? How are they funded?	
1000–1030	Morning tea	
1030–1130	Waigani Convention	Andrew/Bernard
	<ul style="list-style-type: none">• SPREP / IMO Strategy and Work Programme for the Protection of the Marine Environment in the South Pacific Region, Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities, CSPOD, Commonwealth Secretariat Marine Pollution Officer, and work as Secretariat to Waigani.	
1130–1200	Internet demonstration	Alex Williams/ Satui Bentin
1200–1300	Lunch break	
1300–1500	London Dumping Convention / UNCLOS / MARPOL	Martin/Lal
1500–1530	Afternoon tea	
1530–1700	UNEP / AusAID / NZODA	Lal/Observers

Day Five

Recommendations by participants for follow-up activities

0830–1000	Elaborate on problems identified on Day 3 and identify who can help and how to relieve deficiencies in each convention which effectively become barriers to prevent ratification by PICs.	Andrew/Bernard
1530–1645	Tabling of meeting report	Andrew/Bernard
	Summary of discussions and adoption of meeting report	
	Meeting close	

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