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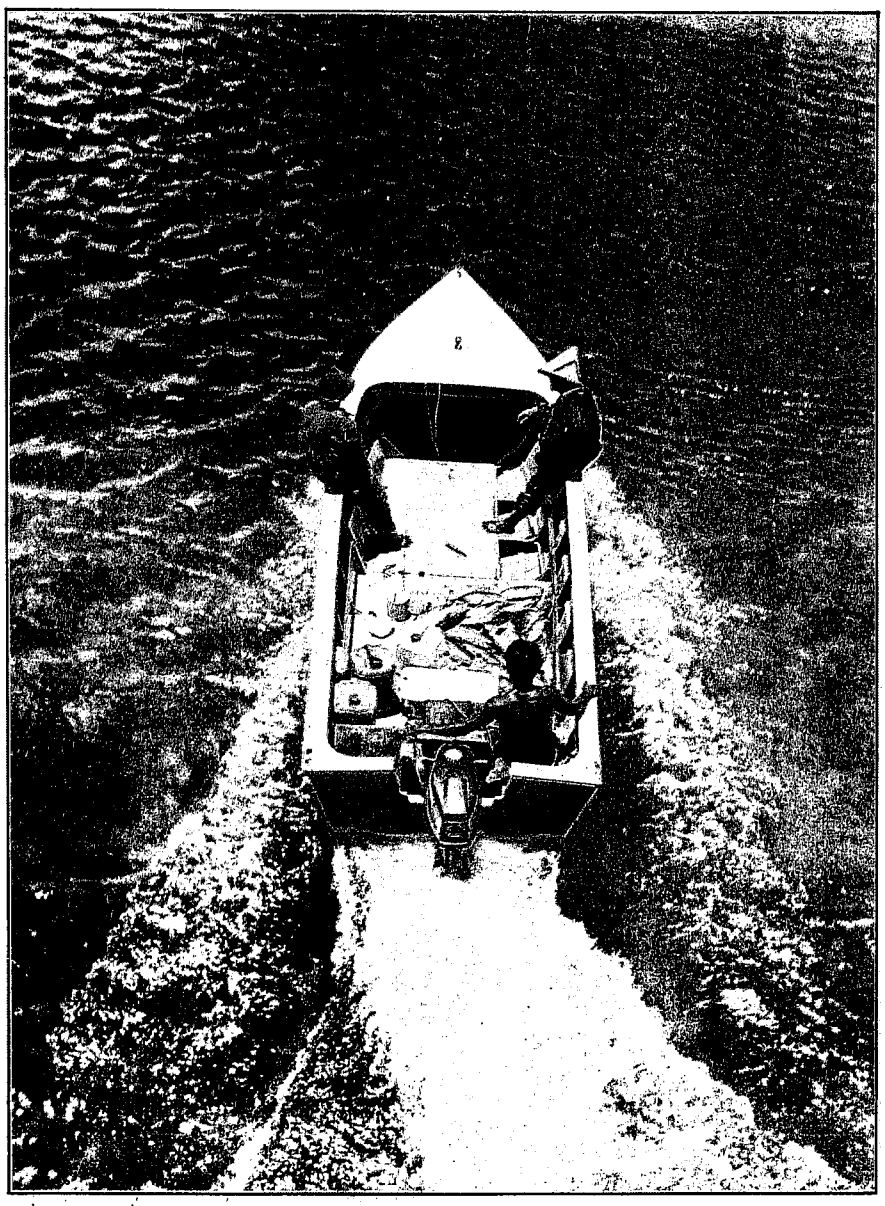
SURVEY OF SAFETY AT SEA ISSUES IN PACIFIC ISLAND ARTISANAL FISHERIES



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SURVEY OF SAFETY AT SEA ISSUES IN PACIFIC ISLAND ARTISANAL FISHERIES

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May 1991

Field Document 91/3

FAO/UNDP Regional Fishery Support Programme
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This informal report is one of a series of reports prepared during the course of the project identified on the title page. The conclusions and recommendations given in the report are those considered appropriate at the time of its preparation. They may be modified in the light of further knowledge gained at subsequent stages of the project.

The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the United Nations or the Food and Agriculture Organization of the United Nations concerning the legal or constitutional status of any country, territory or sea area, or concerning the delimitation of frontiers.

SUMMARY

The project, funded by the Technical Cooperation Programme (TCP) of the Food and Agriculture Organization of the United Nations, surveyed 16 countries and island territories. The objectives were to determine the types and magnitude of safety problems confronting small scale artisanal fishermen in the Pacific region, to catalogue current programs or projects which directly address this issue and to draw conclusions based on the information collected. General recommendations for measures to improve safety for artisanal fishermen are offered for the region as a whole.

Most international conventions dealing with safety were found to omit vessels of the size used in artisanal fisheries in the Pacific. After visits to the countries and territories and interviewing 169 fishermen and government officials, it was found that most countries do not provide for safety legislation to cover smaller boats or canoes, and officials generally believe that it would be impossible to enforce such regulations if they were introduced.

It is estimated that there are about 25,000 non-motorized and 16,000 motorized artisanal fishing vessels in the region, and that an average of one incident of distress per day comes to the attention of officials concerned with search and rescue. Because of problems of communication and the remoteness of many islands and villages, this probably underestimates the total number of actual incidents. Likewise, the known fatalities attributed to these incidents, about 60 per year, is probably far less than the actual total. It is also recognized that many of these vessels are used for a variety of purposes, and that distress is not always encountered solely during fishing activities.

Practical problems, including poor engine maintenance, limited availability of spare parts, and high cost of life-saving aids are also taken into consideration. It was found that the total of all budget allocations by the island countries for local search and rescue activities amounts to about $100,000 yearly. However the actual cost of such activities is probably in the range of $750,000 to $1,000,000 per annum for the region as a whole.

Many officials in the countries surveyed believe that the public (including artisanal fishermen themselves) does not recognize there to be much of a problem with safety on small boats. Many people interviewed, all of whom are associated with fisheries, safety, or search and rescue, offered a variety of suggestions on how to improve safety practices, thereby lowering the number of accidents. Professional mariners were almost unanimous in recommending increased public awareness through educational programs and publicity as being the one means most likely to produce the desired results. Several important suggestions for improving search and rescue activities were also given.

CONTENTS

5. PRACTICAL CONSIDERATIONS

5.1 Financial Implications

5.1.1 Registration and Inspection Schemes
5.1.2 Cost of Life Saving Aids
5.1.3 Maintenance of Engines, Spare Parts Availability

5.2 Social and Cultural Aspects

5.3 Past and Current Programs

5.3.1 Public Awareness and Education
5.3.2 Vessel and Engine Maintenance

5.4 Survival at Sea

6. SEARCH AND RESCUE OPERATIONS

6.1 Legal Framework

6.1.1 International Conventions
6.1.2 Domestic Legislation
6.1.3 Bilateral Cooperation

6.2 Organization

6.2.1 International Search and Rescue Organization
6.2.2 Regional Search and Rescue Organization
6.2.3 Local Organization

6.3 Search and Rescue Resources

6.3.1 Domestic Resources
6.3.2 Available External Assistance

6.4 Communications

6.4.1 Communications Use and Problems
6.4.2 Communications Between Drifting Boats and Merchant Ships

6.5 Life Saving Aids

6.5.1 General
6.5.2 Emergency Position Indicating Radio Beacons

6.6 Financial Considerations

6.6.1 Annual Budgetary Allocations
6.6.2 Search and Rescue Costs

7. PERCEPTIONS AND SUGGESTIONS NOTED DURING THE SURVEY

8. CONCLUSIONS

9. APPENDICES

1. INTRODUCTION

1.1 OBJECTIVES

The last few decades have seen great changes in the artisanal fishing fleets of the region. These changes have come about mainly because of the development of new fisheries, the introduction of new fishing techniques, and perhaps most importantly the increased reliance on engine power. Technological advances coupled with increasing participation in money economies have expanded the opportunities of Pacific islanders to exploit their fishery resources. The widespread use of relatively new technologies, including lightweight outboard engines, fiberglass-reinforced plastics plus the availability of marine plywood in islands lacking in timber resources have been coupled with the gradual adoption of newer vessel designs and the concurrent mechanization of traditional small craft. These innovations have often enabled fishermen to make greater catches, to capture previously under-exploited species, to reduce the time necessary for a fishing trip, or improve the quality of their catch.

The introduction of these newer technologies has come at a time when it is recognized that in numerous countries with historical seafaring backgrounds, there has already been a distinct degradation of traditional navigational and seafaring skills over the years. The loss of such skills by islanders can be traced to a variety of causes, including increased utilization of western-style education, and, in some cases, the forbidding of interisland voyaging by colonial or even their own governments.

Other Pacific islanders who were not necessarily as reliant on the sea have nonetheless been enticed by the economic opportunities presented by the new technologies and have been quick to embrace the innovations. Their adoption has injected another variable into an already marginally safe occupation, and in many instances has heightened the chances for disaster at sea.

The subject of safety on artisanal fishing craft has received little attention in past Pacific Island fisheries development. At the South Pacific Regional Fisheries Donors meeting held in Fiji in November, 1988, the FAO/UNDP Regional Fishery Support Programme was urged to become more involved in safety at sea issues for fishermen. A short time later the Regional Fishery Support Programme wrote to each of the Fisheries Divisions to enquire about the safety at sea issues for small scale fishermen. At the time the emphasis was on national safety legislation applicable to small boat operation and search and rescue plans. Eighty percent of the countries responding indicated an interest in obtaining safety information from other countries in the region. An approach to the FAO Technical Cooperation Programme (TCP), endorsed by nine Chief Fisheries Officers of the region, resulted in funding for this project.

With this mandate, the project's report presented here brings together the relevant aspects of safety at sea, including search and rescue, in the Pacific Island region and is intended to illuminate the possibilities for further action.

In compiling this report, it was accepted that conditions vary greatly between Pacific countries with respect to historical utilization of the sea, expertise of

fishermen, types of vessels, sea conditions, and other factors. The conclusions that are drawn are general ones and inferences made for additional work in this area are on a regional basis.

In reading the report one should keep in mind that for most of the countries covered here, the same boats and canoes used by artisanal fishermen are often used for transportation or commerce, often by the same operators. Thus the issue of "safety at sea for artisanal fishermen" is in many areas more appropriately that of "safety at sea in small vessels" which happen to be used on occasion for artisanal fishing. The implications of this are evident in some of the descriptions of maritime practices, legal interpretations, record-keeping and general attitudes which follow.

1.2 RESEARCH METHODOLOGY

Formal research for the project and writing of this report was undertaken from January 20 to April 26, 1991. Research included a review of available literature relevant to the issue of safety at sea in the region, searches of regional periodicals for statistical and anecdotal information, and, most importantly interviews with 169 people in 16 countries and island territories (see Appendix 10).

During the first 3 weeks, the project was greatly assisted by the presence and knowledge of Tony Boyle, a course leader in safety and survival at the Australian Maritime College in Launceston, Tasmania.

At all times during the project, officials of the various administrations and institutions in the region made themselves available to be interviewed, provided information and showed an obvious concern for the safety of those who venture to sea in small boats or canoes.

In particular, master mariners such as harbormasters, marine department officials, administrators, instructors at maritime schools, and members of the navy or defense forces, whose professions are linked with the sea but are not closely associated with artisanal fisheries on a daily basis, often showed an intense interest in the subject and a desire to improve the level of safety in local fisheries.

1.3 DEFINITIONS

In undertaking the compilation of information for this report, it was necessary to first define "artisanal fisheries" for use in this context. The usual formula seems to be to take all the current fisheries in a country and omit the "industrial" ones, that is, those fisheries which offload to a fish plant or processing facility. Those activities which remain are then called "artisanal" or "subsistence". Some go further and define "artisanal" as being fishing activity undertaken on a smaller scale than industrial fisheries and for mostly domestic or non-export use. "Subsistence" fishery is then that which catches for self-consumption and an occasional sale of surplus catch. This however does not always fit the South Pacific context, as with the small-boat deepwater snapper fisheries in Tonga and Western Samoa where a great amount of the catch is exported, or the trochus

fisheries in Micronesia and elsewhere, where canoes, rafts and outboards are used but the object of the fishery is almost wholly exported.

Conveniently, the subject matter here was more neatly defined by its almost total absence from either international or domestic law in all the countries surveyed. The lower limits of applicability for fishing vessels under international safety conventions and domestic law dealing with registration or inspection of fishing vessels in countries where such limits exist is variously 10, 12, or 15 meters overall vessel length. Thus, for the purposes of this report and depending on the country in question, any vessel under those limits and used for fishing was considered an artisanal vessel. Since the vast majority of these vessels are outboard, sail or paddle powered, and do not land their catch at a processing facility, they also fit the sometimes convoluted definitions given above.

The term "safety" also needs clarification. For purposes of compiling the information here, "safety" was linked with the ability of a vessel to return to port (or more usually the island or village) at the completion of a voyage or trip. Given the small size of the vessels, the short duration of fishing trips and the almost total absence of any kind of mechanized fishing gear, other aspects of safety such as accidents with gear or in fish handling, dealing with illness on board or collisions at sea are not addressed in this report.

1.4 CONSTRAINTS

Any project of this type, covering a large number of countries in a relatively short period of time involves some compromises, the major of these being the amount of time a consultant is able to spend in any one country. The budget available to the project and regional air schedules for the most part dictated the time allotted for each country. It was thus not possible to visit or collect first-hand information in areas of some of the countries where a great amount of the small boat activity takes place.

A second problem, linked with the first, was that for the most part it was not possible to include many of the actual artisanal fishermen in interviews conducted. This was mainly because, except for the smallest countries, the activities of artisanal fishermen are spread out over distances far from the capital or major port town or city where time and presence of officials dictated the author's presence. While this omission can in no way be rectified, the author tried to seek out those with experience in more remote areas and hopes that those comments coupled with his 23 years' experience in the region and familiarization with at least some of these areas has afforded some insight that otherwise might not be available.

A third problem, not unexpected, was the lack of available data on the current safety situation from some of the countries. Except for the smallest countries and a couple of the larger ones, administrators in the various responsible departments or ministries were unable to place a figure on the number of artisanal vessels extant in their country. While inferences could be made in several instances, by reference to importation figures for outboard motors for example, sometimes even these figures were suspect and had to be viewed with caution.

Given the fact that figures did not exist for the numbers of vessels, it followed that one would expect records on incidents involving these vessels in distress to also be scant or non-existent. This however was not always the case, particularly in countries with relatively large domestic shipping sectors and concurrently well-organized and (usually British) trained administrators responsible for either shipping, search and rescue or both. In these countries the records of incidents which had come to the attention of administrators were readily made available, the problem being that, for reasons noted above, it was difficult to determine even roughly what percentage of total incidents in a particular country these figures represented.

2. REGIONAL SUMMARY

2.1 Number of Motorized Small Fishing Craft

As stated earlier, many of the countries surveyed do not have accurate records or statistics on the numbers of artisanal vessels. The production of a realistic figure required some educated guesses, based on such factors as the number of outboard engines imported into a country on a yearly basis and the expected life of such engines, the number of imported or locally-manufactured boats, and so forth. Nutritional or fisheries-use surveys that in some instances enumerated the number of boats, canoes and outboard motors in a particular locale were used to estimate country-wide figures. These estimates plus those known figures from smaller countries or those with fewer vessels give a combined total of approximately 17,080 motorized artisanal craft in the 16 countries surveyed. The estimates by country are set out in Table 1.

TABLE 1

ESTIMATED NUMBER OF MOTORIZED SMALL FISHING CRAFT

(under 10 meters, mainly outboard powered but includes inboards in Fiji (450), Tonga (35), FSM (20))

Country	Number
American Samoa	50
Cook Islands	200
Fiji	1600
Federated States of Micronesia	2000
Kiribati	600
Marshall Islands	500
Nauru	100
Niue	60
Palau	700
Papua New Guinea	8000
Solomon Islands	1800
Tokelau	140
Tonga	800
Tuvalu	200
Vanuatu	250
Western Samoa	80
total	17,080

By comparison the estimated 17,000 motorized artisanal craft of this region is the same in total number (but not by type or size) to Sri Lanka. That country is reported to have about the same number of motorized craft engaged in artisanal fisheries, consisting of 4,000 motorized traditional craft, mostly with small under 8 horsepower outboards, 9,000 5.5 meter fiberglass boats with 6 to 12 horsepower outboards and 4,000 8.5 meter fiberglass and wooden boats with 30 horsepower diesel inboard engines.

2.2 Number of Non-motorized Vessels

If it is difficult to regionally assess the number of motorized artisanal craft, it is almost impossible to do the same for non-motorized craft, i.e. canoes powered by sail or paddle. Although in many countries these craft are very active and contribute greatly to fishing activities, they are rarely included in census or enumeration figures.

In countries with the most non-motorized small vessels, (Papua New Guinea, Solomon Islands, Vanuatu and Kiribati account for roughly 94% of the total) it is as likely to be the inability of the owners to afford an outboard motor as the design of the craft itself that accounts for continued reliance on paddle or sail. In situations where the money for an engine might be available, the lack of transportation to obtain regular supplies of fuel or spare parts would also contribute to maintaining sail and paddle propulsion. Problems of both logistics and lack of income are more likely to be experienced in the remote islands or villages where census information of all kinds is often lacking and there is less contact with government authorities. For reasons of remoteness and lack of manpower (the two most common reasons cited) marine or fisheries departments generally consider it impractical to attempt such an information gathering exercise on their own. The exception is Kiribati, a country faced with fairly formidable logistical hurdles, but where the Fisheries Division has perhaps the greatest level of knowledge of domestic fishing vessel and canoe numbers of any country in the region. In countries where logistical problems are less severe and the compilation of statistical data is an ongoing feature of government planning, the reasons for the lack of information are less clear.

Maritime officials dealing mainly with shipping and search and rescue are generally less concerned with this lack of data which might be of limited, if any, value to them. Generally, non-motorized canoes operate closer to shore than motorized vessels and as such do not greatly contribute to problems addressed in this report. Fisheries officials on the other hand, might better utilize such information in compilation of basic catch and effort data in village environments. It thus falls to the government fisheries departments to encourage planning and statistics officials to include such information in regular or extraordinary census activities.

The total of over 24,600 canoes shown in Table 2 is based on previously known or published statistical information in some countries, but relies heavily on the estimates of administrators or the author's own guesses in others. For those countries possessing large numbers of canoes involved in artisanal and subsistence fishing, the figure given for Kiribati is probably the most accurate. Fiji's recent commercial licensing requirements have also put a number on the canoes being used for commercial fishing, although this may not represent the total number of canoes in the country.

TABLE 2

ESTIMATED NUMBER OF NON-MOTORIZED VESSELS (CANOES)
(engaged at least part-time in artisanal/subsistence fishing)

Country	Number
American Samoa	50
Cook Islands	120
Fiji	400
Federated States of Micronesia	600
Kiribati	5000
Marshall Islands	250
Nauru	80
Niue	240
Palau	40
Papua New Guinea	10000
Solomon Islands	5000
Tokelau	32
Tonga	200
Tuvalu	500
Vanuatu	2000
Western Samoa	100
Total	24,612

In contrast, this region's estimated total of non-motorized traditional craft, i.e. dugout or outrigger canoes, is only about 40% of the fleet of 60,000 "kattumarans" employed in artisanal fisheries on the east coast of India.

2.3 Fishing Activities

Fishing in artisanal craft revolves around three main activities: trolling for nearshore and pelagic species, dropline fishing both inside and outside the reef, and in support of inshore activities such as netting and spearing. While no records are kept, the general perception is that the majority of accidents involving boats actively engaged in fishing occur in conjunction with nearshore or offshore trolling. The target species are usually tuna which are abundant in most countries and which invite a considerable amount of effort from artisanal fishermen. The fast-swimming schools often lead fishermen in outboard-powered boats relatively far from land and have a reputation in some areas as biting better in seas that are somewhat rough. Given the type and size of boats employed and this combination of factors, it is not difficult to see why this type of fishing can sometimes lead to trouble for the fisherman.

While most non-motorized canoes and the smaller skiffs tend to stay close to shore during fishing activities, it is not unusual for outboard-powered skiffs to venture 25 to 30 miles from land while chasing schools of skipjack or yellowfin tuna. Some of the larger boats covered in this survey, particularly the Tongan vessels of 8 to 10 meters in length, venture up to 120 miles offshore when engaged in seamount bottom fishing.

Distances travelled offshore by some smaller boats and motorized canoes greatly increase when these same vessels are used for transportation, often between islands or atolls more than 50 miles apart. Examples of this kind of voyaging are common between islands in Solomon Islands and the Federated States of Micronesia (particularly from the outer Islands to Chuuk). In voyages of this type there is a tendancy to overload the boat or canoe and thereby increasing the chances for disaster.

2.4 Incidents Involving Distress; The Magnitude of the Problem

An attempt was made in each country during the survey to try to determine the number of distress incidents involving small vessels in 1989-1990 and during the first few months of 1991 (the period during which the research was taking place). Such an incident was defined as a notification by relatives, a boat owner or other concerned person regarding an overdue vessel to the authorities responsible for search and rescue which resulted in some action being taken, even if that action only verified eventual arrival of the vessel at its destination or confirmed the safety of its occupants.

While this appears to be a fairly straightforward definition, incidents did not necessarily qualify uniformly for recording in all countries. For example, a notification to the authorities of an overdue fishing boat which turned up later

that night might not make it into the records of one country, even if the authorities had taken action to locate the vessel through inquiries, radio announcements or searches of harbors or landing spots. This is particularly true if a country has a high level of fishing activity and such reports are a fairly common occurrence. In a different country, with perhaps less fishing activity, the same type of incident might have been logged and recorded, later finding its way into official reports or awaiting the visit of a consultant seeking information on the subject.

One should thus read the results tabulated in Table 3 carefully and allow for some latitude in its interpretation. Its main value is as a gauge of the order of magnitude of the problem in various countries and it is not presented here as the final word on the subject. The Table also includes estimates of fatalities derived from the same sources as the incidents, and although countries uniformly record fatalities as such, the legal situation (that is, when a missing fisherman is legally declared dead) was not investigated.

TABLE 3

ESTIMATED DISTRESS INCIDENTS INVOLVING SMALL VESSELS, 1989-1990

("incident"=report of distress or failure to return received by authorities)

A. Total estimated number of distress incidents, from available records and estimates of officials interviewed

B. Total estimated number of such incidents which involved small craft not engaged in artisanal fishing activity at the time of the incident (number of estimated or known fatalities)

C. Total estimated number of such incidents which involved artisanal fishing craft engaged in fishing activity (number of estimated or known fatalities)

	A.	B.	C.
AMERICAN SAMOA	5-6	0 (0)	5-6 (4)
COOK ISLANDS	6-8	2 (0)	4-6 (0)
FSM	40-50	10 (?)	30-40 (5)
FIJI	81	30 (7)	51 (10)
KIRIBATI	40-50	20-25 (20?)	20-25 (20?)
MARSHALLS	15	8 (0)	7 (3)
NAURU	1	0	1 (0)
NIUE	1	0 (0)	1 (0)
PALAU	24	3 (0)	21 (0)
PNG	170	85 (15)	85 (15)
SOLOMON ISLANDS	190-200	95-100 (2)	95-100 (0)
TOKELAU	3-5	0 (0)	3-5 (1)
TONGA	10-20	5-10 (0)	5-10 (4)
TUVALU	12-15	6-8 (2)	6-8 (0)
VANUATU	6-10	3-5 (0)	3-5 (1)
WESTERN SAMOA	8-10	0 (0)	8-10 (0)
TOTAL	612-667	267-286 (46?)	345-381 (67?)

It was decided to focus on two years, not only because it would reflect the latest status of the situation, but also because it was thought that in countries without records the previous two years' incidents would be relatively easy to recall from memory. While the data presented is therefore relatively fresh and perhaps more believable, for at least two countries, Solomon Islands and Western Samoa, inclusion of information from one or two years prior to 1989 would have greatly altered the totals. In the Solomon Islands case, in the few years prior to the full operation of their Search and Rescue Centre at the Marine Department, they recorded 33 people lost in canoe accidents. Western Samoa had a rash of incidents in 1987-1988 which resulted in a total of 7 deaths; whereas the subsequent 2 years recorded no fatalities.

As one would expect, record-keeping in the region varies greatly from country to country depending on the level of the problem, internal organization, legal responsibilities and in some cases the dedication or past training of individuals responsible for search and rescue.

In analyzing the Table there are several points to consider.

First, is that for some of the larger countries with communications difficulties, it is assumed by those responsible for search and rescue that not all incidents are being brought to their attention. In particular, officials in Papua New Guinea and Solomon Islands felt that they were aware of only a percentage of incidents. What that percentage might be is a matter of some conjecture. In Papua New Guinea, for example, the Defense Force estimated that the National government learns of perhaps 30 to 40% of distress incidents throughout the country. Likewise, officials in Solomon Islands felt that because of communications difficulties in the more remote regions of their country, they were not made aware of all incidents, but they could not venture a guess as to the overall number. The smaller countries on the other hand were more likely to be aware of most incidents (though this did not necessarily mean the maintaining of more complete records).

Second, in some countries it was not always possible to determine from available records whether or not a vessel had been involved in fishing at the time of its distress. Where the vessel's activities could not be determined in Papua New Guinea, Solomon Islands, Tonga, Vanuatu, Tuvalu and Kiribati, the estimated number of distress incidents has simply been divided equally between fishing and non-fishing related activities.

Even with the preceding caveats, the Table shows the relative magnitude of the problem and with the exception of the case of Papua New Guinea, is probably most accurate in citing the fatalities known to have occurred.

3. INDIVIDUAL COUNTRY SUMMARIES

While a general discussion of the region as a whole is helpful in determining the magnitude of the problem for comparative purposes or to view it from perhaps the world perspective, consideration of the unique circumstances in each country affords more concise insights into the issues under examination. The following comments are taken mainly from interviews and information provided by people listed in Appendix 10.

3.1 American Samoa

Number and type of active vessels: There is no current available census; however officials extimate that there are approximately 50 motorized vessels (28-foot aluminum "alia" catamarans manufactured in Western Samoa, fiberglass and aluminum skiffs), and about 50 small paddling canoes which are not used much except for subsistence fishing.

Fishing activities: The motorized boats often go 10 to 15 miles offshore chasing skipjack or yellowfin tuna schools. Currently there are two FADs 4 and 5 miles from shore which encourage trolling. Some boats travel up to 40 miles to bottomfish on offshore banks.

Safety equipment commonly carried on board: Although there are US Coast Guard boat safety regulations in force, most boats do not carry safety equipment. Several of the alias carry spare outboards in good condition; smaller skiffs do not have spare engines. Some larger boats fishing offshore carry a compass.

Causes of distress: The major cause cited is engine breakdown. There have also been cases of rough seas swamping or overturning open skiffs.

3.2 Cook Islands

Number and type of active vessels: There is no current available census. Officials estimate about 40 active boats in Rarotonga, perhaps 150 elsewhere. Many of the wooden boats in Rarotonga are built without plans by local builders. Of the islands other than Rarotonga, Penrhyn has the greatest number of boats. Wooden boats are preferred in Rarotonga, aluminum ones in Penrhyn. The existing canoes are concentrated in the southern group.

Fishing activities: Fishermen in Rarotonga do not go out of sight of land. Fishing for flying fish at night close to reef and harbor entrance is popular.

Safety equipment commonly carried on board: According to authorities, equipment carried depends on the fisherman and location of fishing. In Rarotonga, some have flares, oars, fresh water, tarpaulin, anchor. No information was available regarding other islands. No lifesaving aids were found available for purchase in stores in Rarotonga. The Fisheries Department orders flares or other items for fishermen on request.

Causes of distress: The major cause cited was engine breakdown.

3.3 Fiji

Number and type of active vessels: A new licensing system operated by the Fisheries Division records about 2,000 vessels employing 6,000 people. From records of those licenses there are 477 unpowered vessels (which might not include 140 sail-powered 6-8 meter canoes in Lau Group), 1,170 outboard powered boats, and 465 inboards. Inboard boats are mostly the FAO 28-foot design with a cabin.

These are considered inshore boats which can become quickly unseaworthy if overloaded, as when used for transportation. A local fiberglass company produces 19 and 23 foot fiberglass boats from a "Yamaha" design.

Fishing activities: Most artisanal fishing is done within sight of land. Activities involving vessels include bottomfishing, inshore trolling, and support of netting and spearfishing.

Safety equipment commonly carried on board: Most carry at least a paddle or pole. Fishermen generally don't carry radios. The FAO-designed 28-footers are provided equipped with anchors and lights. Lifesaving aids available for purchase in the local ship chandlery but are expensive (F$56 for one parachute rocket, F$445 for an offshore flare kit).

Causes of distress: Authorities said engine problems, and being caught out in rough weather were the main causes of distress.

3.4 Federated States of Micronesia

Number and type of active vessels: There is no census information available for the country as a whole. Yap and Kosrae have fairly good ideas of numbers of vessels by size and type category. Motorized vessels are mostly Japanese fiberglass boats with 25-40 horsepower outboards. Chuuk still has many locally-made plywood boats. Pohnpei has a few 8-10 meter canoes used inside lagoon, some of which are propelled by small outboard motors. The estimates are 250 outboard powered skiffs in Yap State, 300 in Pohnpei, 100 in Kosrae and 1,300 in Chuuk. Non-motorized canoes are found in the outer islands of Chuuk, Pohnpei and Yap. Largest of these are the 8-9 meter voyaging sailing canoes from the outer islands of Chuuk and Yap, of which perhaps 20 still exist and are in regular use.

Fishing activities: In Pohnpei and Chuuk it is common for outboards to chase skipjack schools 20-25 miles from land, but the high islands still remain in sight. On the outer islands which are all low coral atolls, an occasional trip goes beyond sight of land. There are many fishing trips taken within Chuuk lagoon which is 40 miles in width and contains many inhabited islands and patch reefs. Most fishing in Yap proper is done on the fringing reef and inside reef. In Kosrae fishing is concentrated on the fringing reef, although recent provision of 70 outboard powered boats through Japanese-aid boats encouraged some to troll further offshore.

Safety equipment commonly carried on board: This varies tremendously among fishermen. Most take at least water when going trolling. Some have an anchor in case they are blown onto the reef during an engine breakdown. Very few take tools or spare parts. One hardware store in Pohnpei sold small hand-held flares but said that only expatriates had purchased them.

Causes of distress: The most common cause cited was engine breakdown. Sometimes heavy rain squalls obscure the islands, particularly in Pohnpei, Kosrae and Chuuk main islands, making it difficult to determine direction and contributing to errors in judgement.

3.5 Kiribati

Number and type of active vessels: From recent census information the country has about 400 outboard-powered skiffs, most of plywood construction using 25-40 horsepower outboards. There are over 5,000 canoes, some small one-man paddling canoes up to larger sailing canoes, most of which are made of imported plywood with timber frames.

Fishing activities: skiffs are used for skipjack trolling and are almost all based in Tarawa. Tarawa-based skiffs fish daily, with major fishing grounds located between Tarawa and Maiana atoll to the south. At that location Tarawa is just visible on horizon. Small canoes troll around the outer reefs but usually do not venture offshore. Canoes are also used to support spearing and reef gleaning while larger canoes and boats sometimes make inter-island voyages.

Safety equipment commonly carried on board: This varies between fishermen. In Tarawa some carry basic tools, and a bucket or cup for bailing. A few have a compass but most do not. No lifesaving aids were found for sale in Tarawa, although they can and are ordered through a local hardware store for use on inter-island vessels.

Causes of distress: The main causes mentioned were outboard engine failure, overloading (on interisland or intra-lagoon trips), running out of fuel after chasing skipjack schools, and rain squalls occasionally obscuring the islands.

3.6 Marshall Islands

Number and type of active vessels: There is no census information available. It is estimated that there are 500 motorboats, mostly on Majuro, Jaluit, and Kwajalein, with perhaps as many as 200 canoes in the outer islands.

Fishing activities: Major fishing activities are trolling for skipjack; in support of spearing or netting; and some handlining in the lagoon and on the reef. Fishermen usually stay within sight of land or not far beyond the zone where islands are not visible. Trolling for skipjack is often done in rough weather when fishermen say the fish bite better.

Safety equipment commonly carried on board: Some fishermen trolling out of sight of land take a compass. A few have hand-held VHF or CB radios. Boats which have small cabins usually carry more equipment than open skiffs, e.g. anchor and anchor line. Most fishermen take some water with them when going fishing. No lifesaving aids were found for sale in Majuro.

Causes of distress: Most problems are caused by outboard motor malfunctions.

3.7 Nauru

Number and type of active vessels: There is no census information available. Officials estimated there to be about 200 mostly aluminum skiffs, powered by engines up to 40 horsepower. Some of the smaller skiffs have smaller engines and are owned by workers at the phosphate works . There are also about 80 canoes owned by expatriate workers from Kiribati and Tuvalu.

Fishing activities: Most fishing is carried out by trolling for skipjack by outboards and handlining from canoes near the mooring buoys at the phosphate works' cantilevers. Trolling boats usually stay within sight of land.

Safety equipment commonly carried on board: Some fishermen on motorized boats take basic tools or spare spark plugs. They also usually take water or something to drink. No information was obtained on locally available lifesaving aids.

Causes of distress: The major cause cited was engine breakdowns. A previous resident explained that in the past FADs were placed at sea beyond the capabilities of some of the smaller boats which nonetheless tried to fish around the FADs and got into trouble.

3.8 Niue

Number and type of active vessels: Census information shows approximately 60 small aluminum dinghies of 10-14 ft. length. There are also 240 paddling canoes used for fishing near the reef.

Fishing activities: With no safe harbor, all boats must be taken ashore after fishing. Outboards troll for skipjack and other pelagic species, however never go beyond sight of land. Some handlining is also done as well as fishing at night for flying fish. Canoes handline near the reef.

Safety equipment commonly carried on board: This was said to vary among fishermen. Almost all carry at least a flashlight, while some have oars or paddles. A few carry tools. Fisheries had ordered hand-flares in the past but sold very few.

Causes of distress: The major causes are engine malfunction and lack of fuel.

3.9 Palau

Number and type of active vessels: There is no census information available. Previous fisheries management work estimated approximately 700 boats, most being fiberglass outboards powered by large (>70 horsepower) engines. A few canoes are used, mostly on outer islands.

Fishing activities: Most fishing is for home consumption which is estimated to be 3 times greater than the artisanal commercial catch. Almost all of the main archipelago is surrounded by barrier reef and most fishing is done either inside or

just outside by spearing or handlining. There is some trolling, but historically it has not been popular. The Fisheries Division is now embarking on a FAD program to encourage fishermen to troll offshore, thereby reducing pressure on inshore species.

Safety equipment commonly carried on board: Most boats carry basic tools. A few have radios for use at other times in the tourist and diving trade. One fishing supply store had a "Marine Signal Kit" and children's life jackets for sale, but said they had not sold any. Two signal kits containing flare guns had however been shoplifted.

Causes of distress: Most problems occur when engine failures result in the boat drifting onto reefs.

3.10 Papua New Guinea

Number and type of active vessels: It is very hard to determine any kind of number as the area is so vast and there are no statistics or census figures. There are about about 3,000 outboard engines per year imported into the country which might indicate 8,000 motorized vessels, not including dugouts and canoes in estuaries and rivers. A local company is now building Yamaha-style fiberglass 19 and 23-foot outboards, expecting to sell up to 600 per year. There are very few, if any, inboards operating in artisanal fisheries. The rough estimate of non-motorized canoes is 10,000.

Fishing activities: Most fishing takes place inshore, in support of netting, handlining, trapping, and spearing. The greatest concentration of coral reef areas are in Milne Bay Province.

Safety equipment commonly carried on board: According to officials this is usually very minimal. Vessels venturing to barrier reefs would most likely have at least an anchor. No other information available.

Causes of distress: No information is available. From distress incidents that come to the attention of officials, they assume rough weather, outboard malfunction to be the main causes of distress.

3.11 Solomon Islands

Number and type of active vessels: There is no census information available. The most popular vessels are fiberglass boats similar in shape and performance to the local dugout canoes. Local firms have built more than 1,000 such boats in the past few years. The estimate of 3,000 motorized canoes is based on imports of 500-700 outboards per year.

Fishing activities: Inshore trolling, handlining, support of spearing, netting, and reef gleaning are reported as most common. The most popular engine sizes are 15

horsepower for 18-20 ft. canoes, and 30 horsepower for larger vessels. On the main islands vessels are never out of sight of land during regular fishing trips.

Safety equipment commonly carried on board: People generally do not take paddles when a canoe is powered by an outboard. Officials assume very little safety equipment carried.

Causes of distress: The most common cause of distress is engine failure, followed by a lack of fuel. Recently there has been a problem with people overpowering their canoes with larger engines which has resulted in some capsizing.

3.12 Tokelau

Number and type of active vessels: Recent census information shows 140 small 10-14 foot aluminum dinghies imported from New Zealand. They are powered by various sizes and types of outboards up to 30 horsepower. The greatest number of such dinghies are on Fakaofo atoll. Some canoes remain, most are paddled, with some large enough for 6-8 persons. A few canoes are still being made on Atafu atoll.

Fishing activities: Since boats must be carried over the fringing reef as there are no passes from lagoons, the size of boat that can be used is limited. Trolling for skipjack and other pelagics is practiced more and more with the increase in number of outboards. Handlining is still practiced, as is flying fish fishing at night. When trolling, fishermen sometimes go out of sight of land.

Safety equipment commonly carried on board: Some dinghies carry paddles. All boats are too small for spare engine.

Causes of distress: Officials cited primarily engine problems as causing distress.

3.13 Tonga

Number and type of active vessels: From Fisheries reports there are 37 larger (20 to 32 ft.) inboard powered boats built under a subsidized program, as well as about ten others of similar size. There are estimated to be about 1,000 small boats in total.

Fishing activities: The larger inboards fish offshore seamounts for bottomfish and troll along reefs. It is common for them to go up to 120 miles offshore in this fishery. Smaller skiffs are usually employed in support of inshore work and trolling.

Safety equipment commonly carried on board: Most larger vessels carry VHF radios, but often operate beyond VHF range. Originally these boats were provided with life buoys, parachute flares, smoke flares, compass, and an anchor. Fisheries currently has only handsmoke flares in stock. No other source of lifesaving aids was found in Nuku'alofa.

Causes of distress: People cite the fact that fishermen are now taking greater risks and moving further offshore as inshore stocks are depleted. Master Mariners in Nuku'alofa said that once boats are out fishing, there is a lack of concern shown for the onset of inclement weather and boats sometimes get caught out in storms.

3.14 Tuvalu

Number and type of active vessels: There is no current census information available. Officials estimate that there are approximately 200 outboard powered skiffs, with about 50% in Funafuti. Skiffs are usually built out of very thin (6 mm) plywood for cost reasons and to make launching easier. The current estimate of 600 canoes on all islands contrasts with a census conducted in 1974 which found over 700.

Fishing activities: Trolling by outboard skiffs for skipjack and other pelagic species is common. Activities are hampered by strong westerly winds during the summer months. Fishermen are characterized as usually conservative, staying within sight of land. However they do occasionally chase schools offshore. Many boats and canoes are used in support of reef and lagoon fisheries.

Safety equipment commonly carried on board: According to officials there is usually little or no safety equipment carried on board. Fishermen do not carry tools or spares. Some carry water, but only if planning to be out for longer than a few hours. The Government Fisheries store has a supply of lifesaving aids available for sale, but few have been purchased. As an example, an inshore flare pack containing 4 hand flares was priced at A$44.80. Most of this equipment was provided through foreign aid and will be outdated in a few months.

Causes of distress: People tend to overpower their boats, particularly skiffs used specifically for trolling.
Engine problems were also cited as a cause of distress.

3.15 Vanuatu

Number and type of active vessels: There are no census figures available. Fisheries officials estimate there are from 200-250 outboards, mostly skiffs built to a "Hartley" design during the Village Fishery Development Programme. However they are not sure if that many are still operational. The estimate of 2,000 non-motorized canoes is based mainly on population.

Fishing activities: Most trips are of one-day duration, for fishing close inshore or bottomfishing along a reef. Most of the active fisheries are carried out around the islands north of Efate.

Safety equipment commonly carried on board: The Village Fishery Development Programme boats were equipped with an 8 horsepower spare engine, oars, and lifejackets, but according to officials after a year or two most of this equipment was no longer on board the boats. The local yacht chandlery will order lifesaving aids if asked. It was also reported that because of a fairly large amount of

overseas aid, flares and lifejackets are available from the two fish retail outlets in Port Vila and Luganville and through the five outer island extension centers.

Causes of distress: Most causes of distress are reported to be when canoes are overloaded, but this is usually not during fishing operations.

3.16 Western Samoa

Number and type of active vessels: The current Fisheries census estimates about 65 aluminum "alia" catamarans in operation. Many more have been built but currently are not seaworthy or not in use. There are an unknown number of small paddling canoes; the estimate of 100 is a guess.

Fishing activities: The alias based in Apia mainly troll for skipjack or engage in bottomfishing. Depleted bottomfishing grounds near Apia result in trips of up to 4 days for some boats, travelling more than half that time. Village-based fisheries usually troll for skipjack bottomfish at night. Small paddling canoes are used in sheltered reef areas or sometimes beyond the reef in shallow areas for bottomfishing.

Safety equipment commonly carried on board: Fishermen on alias had been conditioned to take at least a spare engine. Although they often take a spare now, it is not necessarily in good working order. Some take basic tools and spare spark plugs. If bottomfishing, they take an anchor. Usually boats fishing commercially from Apia are better equipped and maintained than those in villages. They take food and water if going on bottomfishing trips lasting more than a day. Trollers from Apia also take some food and water.

Causes of distress: Engine malfunction was cited as major cause of distress. In the past, lack of boat handling skill in bad weather was a contributing factor, but the current fishermen have acquired adequate skill and are now usually very good boat handlers.

4. LEGAL PARAMETERS

4.1 International Conventions

There are no international conventions which provide requirements or guidelines in safety standards for design, construction and equipment of fishing vessels the size and type of which are covered by this report.

Only one international agreement, the "International Convention for the Safety of Fishing Vessels, 1977" addresses this subject in detail. This agreement, sometimes referred to as the "Torremolinos Convention" or "SFV 1977" is to be administered by the International Maritime Organization (IMO) but has not yet come into force due to a lack of signatories. If and when it does come into force, the regulations apply to "new fishing vessels of 24 metres in length and over".

The conference which drafted the convention passed a resolution stating they recognized that "the vast majority of fishing vessels throughout the world are of

less than 24 meters in length" and recommending that the IMO, "continue to develop safety standards for design, construction and equipment of such fishing vessels with a view to promoting the safety of these vessels and their crews."

In the meantime, three UN organizations, FAO, ILO (the International Labor Organization), and IMO have issued "Voluntary Guidelines for the Design, Construction and Equipment of Small Fishing Vessels" which is intended to use on decked vessels from 12 to 24 meters in length.

In practical terms, none of this would have much relation to the vessels used by artisanal fishermen in the region.

There are however specific obligations for some countries spelled out in several international conventions covering search and rescue and safety at sea. These are covered in section 6.1.1.

4.2 Domestic Safety Regulations

As stated at the outset, the definition of "artisanal" in relation to a particular size of fishing vessel was taken as those not generally covered by domestic legislation. In some countries however there are some aspects of fishing in smaller vessels which are covered, although sometimes this occurs on a provincial and not necessarily a country-wide basis.

Domestic laws and regulations can be grouped broadly into three areas: those (mostly merchant shipping) laws which exclude small fishing craft; those laws which wholly or partially regulate on a national basis; and those which provide some regulation at the local or provincial level.

4.2.1 Exclusion of Artisanal Fishing Craft from Existing National Shipping Laws:

Cook Islands: The Shipping Ordinance 1963 covers only ships, defined as "any vessel customarily used for the carriage of passengers or goods but does not include barges, lighters and like vessels".

Fiji: The Marine Act currently does not apply to any vessels under 10 meters in length, but it is planned to include them soon and draft regulations were said to exist but were not able to be made available.

Federated States of Micronesia: Title 19 of the FSM Code exempts from registration:

1. outrigger vessels of any kind
2. vessels propelled by outboard motors and
3. vessels measuring less than twenty-five feet at the water line when empty of cargo and passengers, which are not used either to carry cargo or passengers for hire or for inter-district travel.

Kiribati: The Shipping Ordinance 1977 defines a vessel as "anything made or used to carry by water or to hold or contain on water any human being or goods or property whatsoever', but is intended to regulate shipping and excludes:

> (iii) sailing or paddling canoes of native design which operate as a lagoon service vessel.

Tuvalu: The Merchant Shipping (Safety) Regulations 1989 "does not include a Safety Convention ship or a fishing vessel". Its Merchant Shipping Act 1987 defines a "fishing vessel" as

> a vessel used or intended to be used for catching whales, seals, walrus or other living resources of the sea but excluding any vessel that is-
>
> (a) engaged in harvesting or transporting algae or aquatic plants; or
> (b) primarily a carrier or mothership

Vanuatu: The Laws of the Republic of Vanuatu, Chapter 53, Part I (Shipping Laws) apply to vessels not exceeding 500 gross tons engaged primarily in trade between places in Vanuatu, but excludes

> (c) canoes of native design and not propelled by an engine.

4.2.2 Regulation on a National Basis.

Eight countries now have or will soon have the ability to regulate some form of safety on board artisanal (and in one case, fishing charter) vessels. In some cases some of the officials interviewed recommended implementing safety legislation but were not aware of certain features of their own country's existing laws which already gave them that ability.

American Samoa: The government is now drafting new small boat safety regulations which will be enforced by the Department of Public Safety. Previously, the U.S. Coast Guard had been responsible for enforcing standards based on U.S. domestic legislation.

Cook Islands: The Boat Safety Rules 1979 were promulgated under authority of the Shipping Ordinance but apply only "to any boat operating from the Islands of Rarotonga and Aitutaki with passengers carried for the purposes of fishing", i.e. charter fishing. They require vessels engaged in carrying passengers for the purpose of fishing in those two islands to carry specific types and quantities of safety equipment, based mainly on the distance the vessel operates from shore.

Fiji: The Fijian Affairs Laws (Laws of Fiji, Chapter 120, Section 6) include a section on "Safety at Sea Regulations".

> "No Fijian shall undertake a voyage in a vessel or canoe under two tons measurement when travelling beyond the protection of the reefs, where the owner of such vessel or canoe is not in in possession of a valid certificate

of seaworthiness in respect of such vessel or canoe."

The certificates are issued by a certifying officer authorized by the Minister and are valid for one year. The law specifies that vessels must carry oars, rudder, bailer, lifejackets, and sufficient food and drink. The maximum number of passengers allowed by the certificate is to be painted or carved on the canoe or vessel. The minimum length of a vessel or canoe must be 12 feet to allow travel beyond the reef. The law further provides for fines of up to $100 and a maximum of 6 months' imprisonment, or both for violations.

Federated States of Micronesia: Fishing regulations require a fishing permit for all domestic vessels over twenty-seven feet overall length. Such a permit can be refused if the vessel or its owner does not comply with FSM laws and regulations. Thus if safety laws or regulations were enacted and a vessel of that size was not in compliance, it could be prohibited from legally fishing in FSM's 200-mile EEZ.

Niue: The Safety at Sea Act 1980 requires an annual license fee to be determined by Cabinet and that

> "No person shall put to sea in a boat unless that boat has (a) a pair of oars (b) a bailer (c) three hand operated safety flares as by notice prescribed by the Fisheries Officer on the recommendation of Cabinet (d) one life preservation jacket for every passenger on board that boat (e) in the case of a boat powered by a combustion engine, spare spark plugs together with a minimum tool kit as by notice prescribed by the Fisheries Officer on the recommendation of Cabinet."

Niue has also produced a "Boat Inspection Form" to be used with implementing this law.

Solomon Islands: The Shipping (Canoes and Small Craft) Regulations 1970 were passed under authority of the Shipping Ordinance 1966. Although it is applicable to vessels engaged in trade or passenger traffic and does not specifically apply to fishing canoes, it is one of the few laws in the region specifically addressing small canoes in any context. It exempts non-motorized canoes, motorized canoes powered by outboards over ten brake horsepower, canoes not exceeding twenty feet in length propelled by an inboard engine and small craft propelled by an outboard engine from all regulation as long as the vessel in question stays within 5 miles of land. In all other cases it restricts the number of passengers to twelve, specifies equipment to be carried on board, maximum horsepower, minimum freeboard and the minimum number of paddles or oars to be carried on board.

Tonga: The Merchant Shipping (Amendment) Act 1986 includes fishing vessels and specifically vessels under 15 meters:

> "201 A. - (1) The Minister with the consent of the Cabinet may make regulations, and without limiting the generality of the foregoing, he may make regulations respecting the following matters as they apply to ships, including fishing vessels, and to seafarers, ship owners and other similar responsible persons...

(h) Safety surveys, inspections, certificates and endorsements, survey certificates and endorsements, intervals between survey of specific ships, classes of ships and ships in general.
(k) load lines, life-saving appliances, and fire detection, fire extinction and fire fighting equipment;
(w) matters set out in paragraphs (a) to (u) as it applies or may be made to apply to any ship or class of ships under 15 meters in length."

Tonga: The Fisheries Act 1989, Part II provides for the issuance of licenses for fishing or related activities but exempts local fishing vessels used solely for sport fishing or for subsistence fishing. An application for a local fishing vessel license may be refused on any of the following grounds:

"(c) that the vessel in respect of which the application is made does not have a valid certificate of inspection where so required under the laws governing merchant shipping, or is not in compliance with regulations prescribed under section 56 relating to the safety of the vessel."

The Fisheries Act 1989 also gives the Minister the power to make regulations including

"(r) prescribing standards and other measures for the safety of local fishing vessels and fishermen."

Western Samoa: The Fisheries Act 1988 gives the Head of State the power to make regulations for the purpose of carrying out or giving effect to the principles and provisions of the Act, including

"(o) Standards and other measures for the safety of local fishing vessels and fishermen."

4.2.3 Provincial, Traditional or Other Local Government Regulation:

Fiji: The Lau Islands have instituted some local regulations governing sailing canoes there. On the island of Komo it is forbidden to take children on a canoe voyage, as a result of an accident in the 1950s when two children drowned from a capsized canoe. On some other islands canoes must be inspected before setting out on an inter-island voyage.

Federated States of Micronesia: Ifaluk atoll in Yap State bans ownership of outboard motors on the island.

Kiribati: The islands of Arorae and Tamana both prohibit outboard engines to be used while fishing.

Palau: Koror State's Public Law K2-23-89 requires inspection, registration and licensing of all boats and boat motors:

> "It is the policy of the State to require all boats and boat motors to be inspected, licensed and registered and to comply with certain safety requirements and to require certain vessels to pay fees for anchoring, docking, and mooring within the state. This is done for various purposes, including the following ones: reduction of the opportunity for theft; inducement of security; help determine the number, type, and size of boats and motors used in the State and the impact of them upon its resources; and improve the public safety and welfare."

The State of Koror also has produced a standard application form for such a license.

Papua New Guinea: Milne Bay Province is reported to have a "small craft act", but a copy has not been secured.

Tokelau: Local informal regulations made by the "Faipule" of an island but not necessarily endorsed or passed by the "Fono" in practice. Under these informal regulations

--all fishermen who are fishing in daylight hours are supposed to return before dark.

--on one atoll, all fishermen are supposed to return by 5 p.m. but this is rarely followed.

Tuvalu: Niutao island prohibits the use of outboard engines on the atoll by local by-law.

Vanuatu: Department of Ports and Marine promulgated a policy whereby local government council officers were authorized to inspect and provide safety certificates for vessels under 30 feet in length. The Department of Fisheries is likewise authorized to inspect and provide a safety certificate for fishing vessels of the same size. Generally, the Fisheries Department does this only for vessels which require a survey by virtue of the insurance carried while they are leased from the Department itself.
An example of the Survey and Safety Certificate is reproduced as Appendix 3.

5. PRACTICAL CONSIDERATIONS IN SAFETY AT SEA ISSUES

Discussions with many people brought to light practical considerations that often tempered attitudes towards safety issues in general. The ones most mentioned are described below.

5.1 Financial Implications

In the context of any government response or government action, high costs of undertaking search and rescue operations and prohibitive costs of administering registration and inspection schemes are of great concern to officials interviewed. In discussing safety equipment or lifesaving aids, there was general agreement in the general inability of fishermen to afford the equipment, even if only theoretically available.

5.1.1 Registration and Inspection Schemes

The possibility of registration and inspection of artisanal fishing boats in many countries was usually rejected on the grounds that (1) there is insufficient manpower to institute and monitor such a system and (2) that without total monitoring such a system is not worth instituting in the first place. It was felt almost universally that the money which would have to be spent to implement such programs, including monitoring with annual inspections or other mechanisms of compliance, was much better spent in other ways (education and public awareness of safety for example).

It will thus be interesting to see how Fiji handles their planned inclusion of vessels under 10 meters length under their Marine Act. The Fisheries Division has already instituted a licensing scheme for artisanal fishermen in the country which has registered over 2,000 vessels and reports no major problems, although it has not been in operation for a very long period of time.

5.1.2 Cost of Life Saving Aids

While potential administrative costs may be speculative, the poor availability or high cost of "LSAs" (life saving aids or life saving appliances, such as flares, lifejackets, signal mirrors and so forth) for fishermen is a concrete reality. It was found that when such equipment was available it was almost universally more expensive than in the countries of origin, even when received as foreign aid and sold by government Fisheries Stores. In the few instances where such equipment was available in a government-run Fisheries Store and where officials often said they encouraged fishermen to carry such equipment, the costs were often no less than if the fisherman had ordered it himself from overseas (an admittedly unlikely occurrence).

From an artisanal fisherman's point of view (expressed numerous times) the prices are exorbitant, particularly when the fisherman was absolutely certain that he would have no use for the equipment in his operation. On the other hand one might argue that a $50 parachute flare is not such a great outlay of capital when compared with say, a $2,500 outboard motor or $2,000 skiff. Of course this argument can be carried to its extreme where spending even an extra $10 for fuel would have saved some fishermen from drifting away.

It was not possible to determine the level of import duties on LSAs imposed in all countries surveyed. Of the five where this information was readily available (Cook Islands, Fiji, Kiribati, Papua New Guinea and Tonga) duties ranged from zero to 15%. Kiribati in particular exempts from duty:

> "(i) Life saving equipment including life jackets, life buoys, buoyant apparatus, and sea marking dye, distress flares, rockets, and other pyrotechnic devices for use in lifesaving
>
> (ii) boat equipment including anchors, sea anchors, chains, oars, rowlocks, logs, turnbuckles, thimbles and mooring bitts
>
> (iii) communication and signal equipment including Morse signalling lamps, code flags, semaphore flags, fog horns and sirens"

In Kiribati however practically none of the equipment mentioned in (i) was available for sale in the country except by special order from a local hardware store.

In the urban areas of countries where lifesaving aids are available and fishermen are engaged in strictly commercial fisheries, the decision to purchase such equipment is more one of priorities than economics. A late afternoon meeting with the officers of one Fishermen's Association saw enough beer consumed to have purchased several of the internationally-approved hand-flares then on sale at the local Government Store.

Of course the situation is not the same everywhere, but repeated interviews with store owners or others who had initially ordered such equipment naively expecting to sell to fishermen (only to later discard outdated flares or smoke signals) showed that at one time or another many of the urban areas had LSAs available for purchase in the past.

5.1.3 Maintenance of Engines, Spare Parts Availability

While LSAs might help a fisherman after he is in trouble, keeping him out of trouble in the first place is obviously a major consideration. Since outboard engine problems were listed in almost all countries as being one of the major causes of distress, an attempt was made to obtain information on this subject from outboard dealers, mechanics and others in as many countries as possible.

Through selective import duties, some countries actively encourage purchase of smaller sizes of engines. Information was available for the following countries:

Kiribati: There is no duty assessed on outboards of 40 horsepower and less; engines over that size carry a duty of 20%.

Papua New Guinea: Outboards under 35 horsepower are free of duty while those over 35 horsepower are assessed 25%.

Solomon Islands: Outboards under 40 horsepower are charged a duty of 20%, over 40 horsepower 40%.

Vanuatu: Engines are tax exempt for certified fishermen, otherwise 25 horsepower and under are 35% plus 5% service tax; over 25 horsepower 55% plus the 5% service tax.

No country has an enforced standardization policy with respect to manufacturers, so Johnson, Evinrude, Mercury, Mariner, Yamaha and Suzuki and some other brands are all imported. No country was found to have preferentially lower duties for spare parts. In fact, although no concrete information was provided, several people complained about the high cost of spares, attributed at least in part to high import duties.

The lack of availability of an adequate supply of spare parts was cited as a problem in many countries. The usual situation is for an engine to be purchased with only those spares and tools usually supplied by the manufacturer. These vary by manufacturer but might typically include a spare spark plug, shear pin, and starter rope. Dealers uniformly reported that there was no interest by fishermen in purchase of spares until such were absolutely needed. Distributors in large countries such as Papua New Guinea or Fiji might have stocks of spares in the cities, but only supply them to their dealers in more remote areas when requested. In smaller countries dealers might stock only the basic parts, and even these change sometimes from model to model or year to year, thus discouraging dealers to keep large stocks on hand.

Engine dealers generally are aware of the conditions to which the engines will be subjected. Dealers in some countries (such as Yamaha in Kiribati, Tohatsu in Niue) provide free initial service after the first few hours of operation to check that the engine is running properly. Dealers who understand the limited mechanical abilities of their customers provide the purchaser with instruction on such things as how to check the water pump, replace a shear pin, change and clean spark plugs, carburetor, fuel filter and starter rope. This unfortunately is of little value if the purchaser intends to send the engine back to relatives in the outer islands and the knowledge so gained stays behind.

Many outboard dealers in the larger population centers of the South Pacific have at least one or two trained mechanics to provide service for outboard engines they sell. They reported that when engines were returned for repair they were often found to have had no preventive maintenance. Under these conditions most estimated that the useful life of an outboard engine was from two to four years, although exceptions on both sides of this range were always cited. While many of the people interviewed believed that there have been some technical advances which have made servicing easier and in some cases have increased horsepower output for the same engine weight, there has not been any real improvement in lengthening the life expectancy of outboard engines over the past 15 or 20 years.

5.2 Social and Cultural Considerations

The knowledge of how different cultures, including those of the developed world, view the concept of safety is of course central to arriving at possible solutions to the problem. However, due to both temporal and logistic constraints, this report

is not capable of either fully collecting or analyzing this information to draw concrete conclusions for the region as a whole. Still, some considerations are worth noting here to acknowledge their potential importance in understanding what might be motivating the behavior of fishermen in at least some countries. It should be emphasized that these cannot be taken to apply to all countries in the region, or in many cases even all districts within a single country.

It was pointed out by people in several countries that to think the undesirable is to make it come to pass. For a fisherman departing from the village to take food or even water on what was contemplated to be a short fishing trip was to contemplate disaster, something that was anathema from a cultural standpoint. A parallel circumstance would be strictures in some cultures against saying the name of an undesirable species at the wrong time, such as mentioning a shark while hauling in another fish on the line, lest the shark actually appear and take the catch.

Several other reasons were given for the undesirability of taking food or water on short trips, including the thought that people in the village would think a fisherman "less manly" if he could not survive a few hours in the sun on his canoe or boat without drinking water or a coconut. Others thought that visibly loading safety equipment onto their boat would alarm family members and that they would think the fisherman had no faith in either his engine or abilities to get them home.

In a few countries, "lost fishermen" are sometimes people who are in fact attempting to commit suicide. In the Federated States of Micronesia such incidents, usually involving drunk young men or teenagers, are known to occur once in a while. This of course is often not revealed at the time, particularly if a search has been requested and instituted by the authorities. Several cases have occurred where neither the boat nor its occupant were found. A few others have had happier endings.

As an example of this kind of behavior, in one case occurring in 1989 a young man, drunk and upset after an argument with his parents, pushed an outboard powered boat into the sea with only a few gallons of fuel and disappeared before anyone realized he was missing. Obviously changing his mind upon sober reflection the following day, he survived on rainwater and was found by fishermen three weeks later drifting near an island 220 miles to the west.

In another incident a man similarly drunk and upset pushed a paddling canoe into the surf and quietly disappeared with only a palm frond as a paddle. Awake the next morning out of sight of land he too had a change of heart and, using his knowledge of the stars, paddled his canoe with the palm frond 40 miles to the next island where he came ashore a few days later and sheepishly told his story.

In a third case, a young man sped away from Truk lagoon in a 15 foot outboard powered boat under similar circumstances and was eventually rescued by a Soviet freighter 59 days later and brought to Pohnpei.

5.3 Past and Current Programs

There have been a number of activities, both past and present, which have been instituted by countries in order to lessen the number of disasters at sea. They fall into two areas: those that deal mainly with public awareness and education, and

those aimed at vessel and engine maintenance. Those that are most recent or have a direct bearing on the subject are mentioned here.

5.3.1 Public Awareness and Education.

These are not always aimed specifically at artisanal fishermen, but as people who are actively pursuing a livelihood on the water they are almost always included as an integral part of the target. The programs are usually undertaken with the hope that they will contribute to an awareness of safety, and with the realization that there is no practical way to gauge the effectiveness in the short run. As with many safety programs, the organizers or instigators are happy if they think their efforts have even modestly contributed to saving lives.

Papua New Guinea: The Department of Transport has produced a 7-page booklet entitled "Basic Boating Safety in Papua New Guinea Waters" ("Sefti Bilong Bot Long Solwara Bilong Papua New Guinea") which is printed in English, Pidgin and Motu and has several good illustrations. It was printed with the financial assistance of the Shell Oil Company.

Nauru: The Directorate of Police has produced a short notice to all fishermen entitled "Safety Measures to Observe When Out Fishing" (Appendix 1) which is to be broadcast locally and posted in conspicuous places.

Fiji: The Fiji Navy routinely conducts visits to outer islands where they discuss the operation of the "Rural Coastwatch" system that is in effect for reporting various matters of concern to Suva (including missing or overdue ships or boats and people who may be in distress at sea). During these trips they also take the opportunity to discuss procedures for boat or canoe safety with leaders of the communities they visit. Typically these discussions include procedures prior to departure on a fishing trip, such as notifying the wireless operator of intended fishing areas and expected duration of the trip, items to take on a fishing trip, procedures to follow if broken down, and basic boat and engine maintenance.

Solomon Islands: The Marine Division provides safety messages each day on the broadcast radio at the conclusion of the "National Ship Movement Report" that is listened to closely because of the volume and importance of small ship traffic in the country. The messages are changed each day and are occasionally translated into Pidgin by the announcer. Examples:

> "The safety message for you all again today: This one is specially for canoe and boat owners and passengers. When you intend to travel by canoe or small boat on any kind of journey, spend a few minutes before you go making sure that you have all the equipment you need in case of emergency: paddles, sufficient fuel for the journey and a little reserve in case you need it and water for yourself and your passengers. If you carry these items you give yourself and your passengers a chance of survival. If you get into problems and if you fail to carry these you break the law and show everyone that you do not care about your life or those of your passengers."

"The safety message for tonight is again to remind you all to take special care when you are setting out on any journey by canoe or small boat, always watch the weather because, as you all know, it can change very quickly without much warning, so before you leave check the weather and if in doubt, stay home and remember that there is always another day tomorrow. Make sure you are around to enjoy it by being safety conscious. Think about it."

Solomon Islands: The School of Marine and Fisheries Studies of the Solomon Islands College of Higher Education has a 9 week course designed for rural fishermen which leads to an examination for a "Restricted Fisherman's License". The course includes safety, local knowledge, general nautical knowledge, practical seamanship, outboard engine maintenance and operation as well as the subjects relating to fishing.

Tonga: The Tonga Maritime Polytechnic Institute is headed by a captain and former employee of the Fisheries Division. In the past the recipients of fishing vessels built under a UN scheme received 3 weeks of training at the Institute prior to obtaining the boats. Courses included safety, communication and emergency procedures. The current Principal says that the basic problem now is that the original owners of many of these vessels are now ashore and have hired crews to run the boats for them for whom such training has not been required. He has thus held safety courses for fishermen in Vava'u during the school holidays when he was able to get away from his other duties and travel there.

Western Samoa: The Village Fishery Development Project introduced "alia" catamaran-type vessels in the 1970s and the Fisheries Division ran a comprehensive training program for recipients of the vessels which emphasized boat operation and fishing techniques, but also included aspects of safety. It was recognized that, like Tonga, the original recipients of the training were not the ones operating the vessels so the Marine Training School in 1987 attempted a one-week course for fishermen currently operating the boats. Unlike the mandatory training associated with the provision of the boats, this training was voluntary and not a single fishermen attended.

Vanuatu: During the operation of the Village Fisheries Development Project, all recipients who obtained boats received basic instruction in safety. A Training Centre was set up to provide training to fishermen who operate boats leased from the Fisheries Department (about 20 in total).

Federated States of Micronesia: A service is now available in Pohnpei where a daily weather report is available by telephone. Dialling one number gives the weather report in English, a second number provides the Pohnpeian language report. The weather reports are changed at 0700 and 1900 daily. If there is any important warning, a second message is recorded over the first to interrupt. (The main limitation of this system is the relatively small number of telephones on Pohnpei).

Marshall Islands: A weather reporting service by telephone identical to that in FSM is also available in Majuro. The same limitations apply.

South Pacific Commission: The book, "Trolling Techniques for the Pacific Islands, a Manual for Fishermen", by Preston, Chapman, Mead and Taumaia (Handbook No. 28) was produced in 1987 and contained a section, "Trouble at Sea". The eleven pages cover injuries, accidents, breakdowns, signalling for assistance and survival at sea. In spite of the numerous training programs connected with various village-level projects, it remains as practically the only source of this kind of material produced specifically for artisanal fishermen in the Pacific.

5.3.2 Vessel and Engine Maintenance

Niue: In 1989 a workshop was held on outboard motor repair in which a presentation was made by a member of the local fishing association on safety precautions that are particularly suited to Niue's small (10-14 foot) aluminum dinghy fleet (Appendix 2).

Kiribati: The Marine Department held night classes in safety for fishermen in Tarawa in 1986 and 1988 in conjunction with the Marine Training Centre. The classes reviewed basic engine maintenance, simple navigation and some survival techniques.

Federated States of Micronesia: In the early 1980's the Economic Development Authority operated a subsidized outboard motor repair shop for fishermen. A mechanic worked on engines and parts were provided at reduced cost. According to people in charge of search and rescue at the time, the number of investigated distress incidents dropped from over 40 per year to about 12 to 15. The service was discontinued in later years, and last year the number of incidents was reported to be 28.

Tuvalu: An outboard motor mechanic sponsored by the International Labor Organization was in Tuvalu in 1989 and travelled to all islands giving workshops and demonstrating preventive maintenance as well as fixing outboard engines.

5.4 Survival at Sea

When all the foregoing points have been considered, one essential aspect of safety remains to be discussed: that of how to survive while drifting at sea. There are many such incidents in the Pacific, some famous and others unknown. It will never be known how long some drifting fishermen lasted aboard their boats or canoes before the abandoned craft were washed ashore or onto reefs or were noticed drifting on the high seas by a passing vessel.

On Satawal Island, Federated States of Micronesia (located at 7 deg. North, 147 deg. East) in the past few years two aluminum dinghies, three dugout canoes and a surfboard have all either washed ashore or drifted within sight. None carried passengers, dead or alive. None of these craft are known in Micronesia, the Fyran aluminum dinghies are made in New Zealand and not marketed in FSM; the dugout canoes are of a type more common to Melanesia; only the surfboard's origins could probably be traced, having probably washed off the deck of a passing yacht.

Of course it should be kept in mind that canoe or boat accidents in the region have not commenced with the advent of commercially motivated artisanal fisheries. Survivors of canoe voyages that had gone awry began meeting Spanish Priests in the Mariana Islands in the 1600's and were probably the first to have their stories recorded.

One of the most famous survivors, for Tuvalu at least, was Elekana, a church deacon from Manihiki in the northern Cook Islands who never made his destination of Rakahanga and drifted to Nukulaelae, one of five survivors out of the nine that had begun the voyage. Little is known of his circumstances except that he certainly did not suffer engine problems. He is credited as being the first man to bring Christianity to Tuvalu, arriving there in 1861.

While Kiribati loses perhaps the greatest number of people to sea disasters in any one year of the countries covered in this report, they also have had several people survive remarkable drifts and live to explain how they persevered. In talking to people in Tarawa it seems that almost everyone knows or is related to someone who has survived a long period at sea.

One who was mentioned as far away as Tuvalu was a man, now deceased, named Nabatari who was working on Banaba (Ocean Island) when the Japanese invaded in World War II. Thinking he would be killed, he paddled away in a small canoe and according to various accounts survived 6 or 7 months at sea before drifting to an island in Papua New Guinea where he was cared for by the people. He returned to Kiribati after the war and passed away during the 1970's.

We can only learn from the survivors, and while this report is not a survival manual, it is nonetheless worthwhile to note some anecdotal details here as hopefully some of this kind of information will be sought out in the future and recorded in such a way that others might learn.

Nabatari was friends with another man (from Makin) at Banaba whose son is now an instructor at the Marine Training Centre on Tarawa. The instructor, Bwebwetara Uaua, went fishing from Tarawa with two others on a plywood skiff in February, 1986. They experienced engine problems and drifted for 155 days, eventually being rescued by a Soviet Navy tanker near Santa Cruz in Solomon Islands. Bwebwetara is somewhat unique in that as a professional seaman and mariner, he is able to relate aspects of his ordeal that are put into an instructional tone.

Bwebwetara related his experience and offered the following:

It took about 3 weeks for fish to congregate under the boat. It was most difficult until the fish arrived, afterwhich they survived on rainwater, fish caught under the boat, turtles that were captured, and sharks. In catching fish under the drifting boat, it was best to use a small grapnel (he fashioned his from fish hooks) and snag the fish rather than try and bait a hook as sharks invariably took the hooks. In bad weather a raincoat was wrapped around a plastic fish basket and used as a sea anchor to keep the bow into the waves during storms. Early in their ordeal they emptied out the gas tank and used it to store rainwater. He knew it was necessary to ration the water, and sometimes his companions, one of whom was older, were upset at his rationing and wanted to drink more.

They had tried to dry their initial tuna catch in the sun for later use, but got violently ill when they tried to eat it. However later while drifting they caught a shark and the dried shark meat was palatable and did not cause them to get sick. As it was impossible to catch a shark using a hook, they rigged a noose with a piece of heavy line and enticed the shark into the noose to catch it.

A total of six small turtles of about 18-24 inches were captured around the boat during their drift. When they had more than one, they kept one alive for several days before killing it.

The biggest worry he had was that fish actually were eating the plywood boat. Whenever he lay down on the floorboards to sleep, he could hear fish eating the wood. Later after their rescue, the boat was put onto the deck of the ship and left off at Banaba. He saw that the timber keel was completely eaten away and figured it would not have lasted much longer.

When asked what kind of equipment a fisherman might carry that would help in this situation, he said that he had dreamed of a small cast net to catch the small fish under and around the boat. He said that with a cast net to get the fish quickly on the boat, a drifting fisherman would not want for food and would survive as long as there was rainwater.

6. SEARCH AND RESCUE

Search and Rescue (SAR) is defined simply by the United States Coast Guard as "the use of available resources to assist persons and property in potential or actual distress". In the following discussion of the topic's various components, the reader is again reminded that this is not a "how to" manual but rather an explanation of existing practices and activities. However because of specific items brought to the author's attention during the course of the study, an additional section dealing with life saving aids (LSAs), including emergency position indicating radio beacons (EPIRBs) has been included.

6.1 Legal Framework

6.1.1 International Conventions

There are five international conventions which have a bearing on search and rescue. The two most directly concerned are the International Convention for the Safety of Life at Sea, and the Search and Rescue Convention.

International Convention for the Safety of Life at Sea ("SOLAS") including 1981 and 1983 amendments

Regulation 15, "Search and Rescue" requires each signatory government to undertake search and rescue when and if it can:

"(a) each Contracting Government undertakes to ensure that any necessary arrangements are made for coast watching and for the rescue of persons in distress

at sea round its coasts. These arrangements should include the establishment, operation and maintenance of such maritime safety facilities as are deemed practicable and necessary having regard to the density of the seagoing traffic and the navigational dangers and should, so far as possible, afford adequate means of locating and rescuing such persons.

(b) Each Contracting Government undertakes to make available information concerning its existing rescue facilities and the plans for changes therein, if any."

According to the Forum Secretariat, countries in the region that have acceded are Fiji (4/3/83), Papua New Guinea (12/11/80), Tonga (12/04/77), Tuvalu (22/08/85), and Vanuatu (28/07/82).

International Convention on Maritime Search and Rescue, 1979

(from the U.S. Coast Guard Search and Rescue Manual):

"The objectives of this Convention are to standardize SAR worldwide, facilitate intergovernmental direct contact, ensure cooperation between surface and air SAR units and provide guidance where needed for development of national SAR services.

Chapter 2 deals with the structure of national SAR organizations. Parties to the Convention are required to take urgent steps to assist any person in distress at sea, regardless of nationality, status, or circumstance. Chapter 3 concerns coordination with neighboring nations. It discusses territorial issues and provides for development of bilateral and multilateral SAR agreements."

According to the Forum Secretariat, the provisions of this Convention were extended to Niue and Cook Islands by New Zealand on 26/04/85.

International Telecommunications Convention (1973)

Article 25 specifies that "The international telecommunications services must give absolute priority to all telecommunications concerning safety of life at sea, on land, in the air, and in outer space, as well as to World Health Organization epidemiological telecommunications of exceptional urgency."

Article 36 specifies that "Radio stations shall be obliged to accept, with absolute priority, distress calls and messages regardless of their origin, to reply in the same manner to such messages and immediately to take such action in regard thereto as may be required."

United Nations Convention on the Law of the Sea (UNCLOS)

Article 98: "Duty to Render Assistance" states that,

"1. Every State shall require the master of a ship flying its flag, in so far as he can do so without serious danger to the ship, the crew or the passengers:

(a) to render assistance to any person found at sea in danger of being lost;
(b) to proceed with all possible speed to the rescue of persons in distress, if informed of their need of assistance in so far as such action may reasonably be expected of him;
(c) after a collision, to render assistance to the other ship, its crew and its passengers and, where possible, to inform the other ship of the name of his own ship, its port of registry and the nearest port at which it will call.

2. Every coastal State shall promote the establishment, operation and maintenance of an adequate and effective search and rescue service regarding safety on and over the sea and, where circumstances so require, by way of mutual regional arrangements co-operate with neighboring States for this purpose."

International Convention for the Safety of Fishing Vessels, 1977 ("Torremolinos Convention") or "SFV 1977")

This convention is not yet in force, owing to a lack of signatories. Its contents and intentions are covered in Section 4.1 above.

6.1.2 Domestic Legislation

Formal legislation designating search and rescue organizations or assigning responsibility varies throughout the region. In the Cook Islands for example, the Police Act tasks the Commissioner of Police with conducting search and rescue and acting in other emergencies. In some countries such as the Federated States of Micronesia and Marshall Islands the assignment of responsibility for coordinating search and rescue is done administratively. In other countries these responsibilities are concurrent with others such as in Palau where the National Emergency Management Organization both handles search and rescue and coordinates activities during periods of natural disaster.

Vanuatu's legislation (Laws of the Republic of Vanuatu, Chapter 89, Search and Rescue) clearly defines responsibilities and is an example of direct legislative authorization. (see Appendix 5)

In the absence of direct legal authority or authorization, it is usually the organization with the greatest resources (e.g. boats, radios, manpower) that undertakes the responsibility for search and rescue. In countries with a Marine Department or Transportation Department containing trained Master Mariners, these departments were usually given a major role in search and rescue. No country was found to rely solely on its Fisheries Department for search and rescue, although resources from the fisheries offices might sometimes be called upon to assist.

6.1.3 Bilateral Cooperation

Several countries now have or are contemplating getting a Memorandum of Understanding for the purpose of formalizing cooperation in search and rescue. Fiji and New Zealand are partners in such a Memorandum, as are the Federated States of Micronesia and the U.S. as well as the Marshall Islands and the U.S.. Typically, these agreements acknowledge the desire of the parties to cooperate, but they can also cover other issues such as the waiving of landing fees for planes involved in searches. In the case of the Marshalls and FSM, the responsibilities to assist in search and rescue undertaken by the U.S. Coast Guard are part of the overall assistance negotiated under political agreements with the U.S. at the termination of the Trusteeship.

6.2 Organization

The organization and coordination a of search and rescue effort are critical to its success. On an international level several organizations, mainly sponsored by the United Nations, are responsible for both encouraging national organizations and coordinating international efforts. Regional organization is often divided among competent national authorities such as the Coast Guard or Civil Aviation.

6.2.1 International Organizations

Because search and rescue at sea encompasses both aircraft and vessels in distress, the international maritime organizations often have corresponding aeronautical organizations. Functions are clearly defined and there is a large amount of coordination and cooperation between them.

International Maritime Organization (IMO): The IMO, based in London, coordinates and issues international procedures for search and rescue at sea. It acts as the secretariat for the International Convention for Safety of Life at Sea (SOLAS). Relevant IMO publications are listed in Appendix 6.

International Telecommunications Union (ITU): The ITU is based in Geneva, and prescribes the frequencies and signals to be used in the various levels of distress messages. It can provide, Rescue Coordination Centers and other competent organizations concerned with safety of life at sea, with information on ships in distress or in need of assistance.

International Civil Aviation Organization (ICAO): The ICAO administers the Convention on International Civil Aviation. The Convention promotes safe, orderly, and efficient growth of international civil aviation and recommends comprehensive standards, practices, and procedures for SAR by aircraft.

International Association for Sea Survival Training: The Association was formed in 1980 and now has over 50 members in more than 15 countries. Membership is open to organizations which are actively and professionally involved in sea survival training, education or related matters. Associate membership is open to individuals or organizations whose business or interests are related to emergency response training in a maritime environment. Conferences and meetings are regularly hosted by the Association and its members in locations worldwide. The Association is concerned in looking after the training needs of the shipping, fishing, leisure and offshore industries--in fact for all those who are involved in activities, on or over the water. Between them, the Association's members cover every aspect of emergency response training, including sea survival, fire fighting, first aid and search and rescue. (information from: Secretary, IASST, S.I.H.E.-Warsash Campus, Warsash, Southampton, SO3 6ZL, England)

6.2.2 Regional Search and Rescue Organization

The area of the Pacific region relevant to this study is divided into several zones, each covered by a "Rescue Coordination Center" (RCC) which coordinates search and rescue on a regional level. Some of these are located with Civil Aviation Authorities, others are more aligned with maritime activities. Coordination does not necessarily mean placing resources into the search, however one of their jobs is to ascertain what resources are available and what might be used in a particular search.

An RCC can be activated in Honolulu, Nadi, Tahiti, Noumea, Wellington(Lower Hutt) and Port Moresby. In addition to these six there is a Joint Rescue Center located in Guam which acts under the Honolulu RCC and "RCC Westpac" which is located at Kadena Air Force Base in Japan and which can offer resources to Guam for search and rescue. Auckland can operate as a sub-center for Wellington, as can Suva for Nadi. Additional assistance is available from the Federal Sea Safety Center in Canberra, although their geographic responsibility does not extend into the island region. Each of these centers has areas of responsibility within the western and southern Pacific and they are operated by their respective national authorities. Once an incident is brought to their attention and assistance requested, the incident's location determines which of these centers is responsible for coordinating activities.

It is important to note that the coordination role is somewhat limited, and that the Rescue Coordination Center is not obligated to join the search with its own country's resources.

A center is activated during a search, and physically may be in different locations for different kinds of searches. For example, Port Moresby's RCC at Jackson Airport would be in charge of searches for downed aircraft, while the Search and Rescue Centre in the Marine Division of the Department of Transport would coordinate sea searches and liaise with Jackson Airport RCC if aircraft were included in the search.

It is neither required nor necessary for an individual government to contact the relevant RCC if it is conducting search operations on its own. However it is the usual practice to notify the RCC to ensure that maximum notification of a distress is disseminated. Since the authorities at RCCs are able to be in constant contact

with each other, a report made to one that is not in a geographic location to assist should result in the appropriate RCC being notified in a timely manner. For example, if a yacht or ship were visiting a remote island or village in the South Pacific and learned of a distressed canoe or fishing boat, a radio call direct to the US Coast Guard in Honolulu would result in the appropriate RCC learning of the situation within a matter of minutes. The RCC would then notify relevant national authorities as required.

There is often sharing of RCC responsibility within a single country. The Gilbert Islands of Kiribati fall in the Nadi zone, while the northern Line Islands and Phoenix group are handled through Honolulu. The reason for this sharing of responsibility is not political, but rather to coordinate with aeronautical activities. Since the RCC boundaries are usually drawn to coincide with the Flight Information Regions (FIRs) which control international air traffic in the region.

6.2.3 Local Organization

With the exception of only a very few countries, most in the region are aware of the need for a domestic search and rescue (SAR) organization in their own country and have either already created one or have taken steps towards doing so. Training and advice has been provided by Australia, through their Pacific Patrol Boat project, and the U.S., through attendance at their Search and Rescue School in Virginia, USA and follow-up training.

American Samoa: The Department of Public Safety is in charge of SAR. They have a Marine Patrol unit that is used in SAR activities. The U.S. Coast Guard representative in Pago Pago is available for consultation and advice and to liaise with the Coast Guard in Honolulu if required.

Cook Islands: The Superintendent of Police is in charge of coordinating SAR. Procedures followed are listed in the Ship's Standing Orders for the Police patrol vessel, TE KUKUPA (see Appendix 7). Reports of overdue boats usually come first to the police. On Rarotonga they first ascertain that the boat is overdue by checking alternative landing spots. If a search is required, contact is made with the harbormaster, Posts and Telegraphs for possible communications, and the airport for alerting or possible use of aircraft.

Federated States of Micronesia: Each state operates its own SAR organization with the national government providing coordination as needed. In Pohnpei State the SAR Coordinator is the Chief of Fire and Disaster Control; in Chuuk it is the Chief of Public Safety, assisted by the Director of Transportation. In Yap it is formally the Governor's office, but actual operations are coordinated by the Department of Transportation. Kosrae reported it is a joint effort among the Administrator of Marine Resources, the Director of Public Works, and the Chief of Police. Pohnpei's "Search and Rescue Form" that is used to gather information prior to a search and list its results is reproduced in Appendix 8.

Fiji: The Fiji Navy is responsible for SAR. Because of Fiji's being signatory to several of the Conventions mentioned, the Nadi RCC's area extends beyond the 200 mile limit and is activated mainly for class 3 searches (which are for aircraft). Suva also has an RCC physically located within the Maritime Surveillance Centre

in Suva, manned 24 hours. It is used for class 2 searches (for surface craft within the 200 mile EEZ).

Kiribati: The Marine Superintendent is in charge of coordinating SAR. He has a roster of volunteers who serve as "Duty Search Master" when required. A form (Appendix 9) is always completed when a report first comes, usually to the police who forward it to the Marine Department. A copy is immediately sent to the Communications Department to ensure that a radio message is broadcast by the Marine Guard radio to all ships in the area. When the Duty Search Master receives the report and has signed it, it is up to him to take the next steps necessary. These may include contacting the Secretary or Deputy Secretary of Transport to authorize the release of funds for carrying out a search by air or chartering available ships, etc..

Marshall Islands: The Office of the Chief Secretary is in overall charge of coordinating SAR. A SAR committee consisting of the Department of Transportation, Marshall Islands Marine Resources Development Authority, Airline of the Marshall Islands, Public Safety and a representative from a local government council if required is often called to assist and coordinate. There is a standard form for collecting information on an overdue vessel to be used in planning a search.

Nauru: The Secretary of Island Development and Industry is the coordinator for all SAR activities. He is assisted by and coordinates the efforts of the Director of Civil Aviation, the Director of Police, the General Manager of the Nauru Phosphate Corporation, and the Nauru Phosphate Corporation Harbormaster. Currently, the Nauru Flight Information Region (FIR) is not fully implemented and only operational during Nauru flights. However it is planned to open as a regular FIR which could act as RCC for searches in near future. To use Air Nauru planes for a search, the Minister must authorize the Director of Aviation to do so.

Niue: The Police are responsible for SAR, under the direction of Chief of Police. He can call on Fisheries for assistance and also enlist the aid of local fishermen.

Palau: The National Emergency Management Organization, NEMO, based in Koror is in charge of all SAR activities involving artisanal fishing boats. They have a "Boating Accident Report Form", and "Incident Form" for use with searches.

Papua New Guinea: The Department of Transport, through its Marine Division's Marine Search and Rescue Coordination Unit, is responsible for coordination of sea searches. The staff there consists of a coordinator and two master mariners from the Marine Division's staff. The RCC at Jackson Airport, Port Moresby, is also part of search coordination and execution, particularly involving aircraft. When a SAR action concerns rescue of a PNG Defence Force ship, boat, aircraft, personnel or land parties, the Defence Force is the overall coordinator.

Solomon Islands: The Marine Division is responsible for SAR. The main office in Honiara includes a SAR Center. On weekends and holidays a SAR duty officer is assigned to the Center. They have produced an "Initial Report Form", "Search Operation Briefing Form, and "Search Operation Debriefing Form" using the U.S. Coast Guard Search and Rescue Manual as a guide. A "Distress Call Interrogation Form" is meant mainly for radio operators picking up a distress call on the radio.

For the limited resources available, the Marine Division has put together a good SAR center with reasonable communications capabilities and a trained staff.

Tokelau: On the local level on each of the three atolls the person responsible for SAR organization is the Mayor. For arranging contacts and assistance from New Zealand, the Office of Tokelau Affairs (OTA) in Apia is responsible. When a Mayor is notified of an overdue vessel, he contacts all able-bodied men to organize a search, concurrently contacting OTA. If a vessel has not returned by night-time, it is common to put a hurricane lantern in the tallest coconut tree to serve as a guide. When/if local resources are exhausted, OTA can contact New Zealand Foreign Affairs in Wellington which then hands it over to SAR officials in New Zealand who take over coordination at that point.

Tonga: Police are in charge of SAR. When advised of a missing vessel, they usually notify or involve the Marine Department, Tonga Defense Services, Civil Aviation, Health Department, Fisheries Department, Tonga Telecom, and the Harbormaster. The current policy for involvement of the Tonga Defense Services is to activate SAR if there is enough information available to warrant a mobilization of resources and at least 60% probability that the mission will be successful.

Tuvalu: Police are responsible for coordinating SAR. They often ask the Tuvalu Marine School and the Fisheries Department to assist. Police have been instructed to limit themselves to searches inside the lagoons only, and rely on others with sea-going ships for larger searches.

Vanuatu: Department of Ports and Marine are responsible for SAR.

Western Samoa: Police are responsible for SAR.

Many of those responsible for search and rescue complained of the delays in notification of lost fishermen by families or friends. They note that such a delay can seriously impair their abilities to find and rescue a missing vessel.

In addition to searches which are mobilized by authorities for a search effort, it is recognized that search and rescue efforts in many countries are undertaken on an ad hoc basis by villagers, other fishermen or relatives of missing fishermen with or without the knowledge of government authorities. It is logical to assume that on a regional basis far more searches take place on this ad hoc basis than those launched by authorities. In most cases these searches would take place in the more remote areas where assistance from authorities was not expected or requested. In some instances searches that have been launched for fishermen missing in bad weather for example, result in lost searchers. More than one instance has been reported where the actual object of the search turned up safe later on, only to learn of the disappearance of one or more of the searchers.

6.3 Search and Rescue Resources

6.3.1 Domestic Resources

As with most aspects of this report, the resources available with which to conduct search and rescue operations vary tremendously from country to country. In smaller countries all available vessels and aircraft might be used to search for a missing artisanal fisherman. Larger countries might rely on institutional resources and utilize navy or defense force vessels. In all countries it is understood and expected that under general practice any vessel capable of rendering assistance would do so, and in that sense becomes an asset which is available to take part in a search or rescue.

American Samoa: The Department of Public Safety has a 44. ft. vessel dedicated to SAR, and will soon be taking delivery of 25 ft. Boston Whaler outboard. Use has been made of helicopters from US purse seiners awaiting to offload in Pago Pago for searches. Polynesian Airlines and Samoa Air are available for charter, or to look for missing boats on their regular routes.

Cook Islands: In addition to the police patrol boat from the Australian Pacific Patrol Boat project, the police have one small 18 ft. aluminum boat and 4 portable radios. They also make use of one privately-owned charterboat, the SEAFARI, a 38 ft. diesel-powered vessel equipped with a VHF radio. Two local airlines can be chartered, but funds for payment would be a problem, according to the police.

Federated States of Micronesia: There are two patrol boats from the Australia Pacific Patrol Boat project operated by the FSM National Police based in Pohnpei, and one ex-US Coast Guard cutter operated by FSM National Transportation Department. In addition, Pohnpei State can call upon six 32 ft. fiberglass fishing boats operated by the Pohnpei State Economic Development Authority. Pacific Missionary Aviation operates one Beechcraft Queen Air plane and one Beechcraft-18 based in Pohnpei, and one Queen Air in Yap. Yap State also has one 95 ft. ex-US Coast Guard cutter. Chuuk State government operates two 700 ton interisland ships, Yap State Government operates one of the same size.

Fiji: The Navy has four patrol vessels and can call on additional Marine Department vessels if required. The Army has one helicopter that can be used and they can also charter civilian aircraft if required. The Civil Aviation Authority in Nadi has portable radio sets which they prefer to use when on site so everyone is working on same frequency.

Kiribati: Until recently they could utilize 4 pole-and-line tuna vessels belonging to Te Mautari, the local government fishing company whose operations have been suspending pending financial review. They now rely on Kiribati Shipping Corporation vessels, the MOANAROAI, about 1800 tons and two 299-ton interisland vessels. Air Tungaru operates two Tri-Islanders, and one CASA airplane on interisland routes daily.

Marshall Islands: The government has two patrol boats based in Majuro operated by the Marshall Islands Marine Resources Authority: one ex-Coast Guard 95 ft. patrol boat, and one 100 ft. ex-crew boat. There are also two government ships, MICRO PALM and MICRO CHIEF, both 700 tons, that can be chartered for searches or diverted from their usual itinerary. Air Marshalls has two Dornier D-228s, one Dash 100 and one Dash 200 which fly interisland flights throughout the country and which can be used for searches.

Nauru: Air Nauru operates three Boeing B-737s which can be diverted or chartered for searches.

Niue: Fisheries has one outboard 28-ft. alia, and can request use of private boats on the island. Samoa Air flies twice per week from Pago Pago using Twin Otter or King Air planes and can be chartered.

Palau: The government has one 95 ft. former US Coast Guard patrol boat. Marine Resources operates one 35 ft. Japanese-style boat for research that could be used for SAR. The National Emergency Management Organization (NEMO) has one 27 ft. outboard powered boat with twin 225 horsepower engines. Paradise Airlines currently operates a 6-passenger Cessna on routes between the Koror airport and Angaur and Peleliu islands two times per day.

Papua New Guinea: The Defense Force operates four patrol boats from Australia. Defense Force aircraft include several Nomads for surveillance, four RAAVA aircraft also for surveillance, three DC-3s and three Iroquois helicopters. Numerous small boats are based at provincial centers that could be chartered if required.

Solomon Islands: The government has two patrol vessels provided by the Australian Patrol Boat project. The Marine Division operates its own small ships in the country on passenger and cargo services and can use them for SAR activities. One Bell Jet Ranger helicopter is available locally for charter. The government can also charter aircraft from Western Pacific Air (Seventh Day Adventist Missionary) or Solair, the local airline although the latter requires prepayment because of past problems.

Tokelau: Only local boats are available on the islands, these being small 10-14 ft. aluminum dinghies. A supply ship is chartered to come from Apia about once per month and can be used to search if circumstances warrant.

Tonga: The Harbormaster's pilot boat is sometimes used for incidents around Nuku'alofa. Tonga Defense Service has three patrol boats from Australia, as well as six other vessels. The Marine School has a 45 ft. training boat. The Police have a 22 meter former Japanese pole-and-line vessel which is to be mainly used for SAR. The Fisheries Department operates five fishing boats which might be used for SAR: MV EKIAKI, 19 meters; MV NGUTULEI, 12.7 meters; MV ALBACORE, 12 meters; FV LOFA, 37 meters; FV VETE, 8.5 meters. Friendly Island Airways has two Twin Otters which can be chartered.

Tuvalu: The Police have one 18 foot aluminum outboard powered boat, but no radios or walkie-talkies. All of the following resources based in Funafuti: Fisheries extension boat, MANAUI, 19 meters; interisland ship, NIVANGA II, about 600 tons; Maritime School launch KAI MALIE, 13 meters not equipped for offshore; five 9-meter Japanese-aid diesel fishing boats.

Vanuatu: The Police have one patrol vessel, TUKORO, from the Australian Pacific Patrol Boat project. The Fisheries Department operates four vessels: ETELIS, 10 meters, YASUR, 14 meters, TUKOSMARA 10 meters, ALBACORE 8 meters. The local domestic airline operates Twin Otter aircraft.

Western Samoa: The Police patrol vessel, NAFANUA, from the Australian Pacific Patrol Boat project is available to assist in SAR. Likewise, the Fisheries Division vessel, TAUTAI MATAPALAPALA, a 43 ft. fiberglass fishing/research vessel can be used. Polynesian Airlines operates small aircraft to/from Savaii and Pago Pago and can be chartered. Two government ferries, the SALAMASINA and LADY SAMOA II operate regular schedules to Savaii and Pago Pago. A landing-craft type cargo ship, FOTU-O-SAMOA operates irregularly and can also be chartered.

6.3.2 External Assistance Available

Several countries noted that they are able to call formally on Australia, New Zealand, the USA or France for assistance in search and rescue. In the absence of any formal arrangements between two countries, the concept of asking for outside assistance in searching for artisanal craft brings some local officials a dilemma: if they ask too early they worry the missing boat might show up (having sheltered from bad weather, for example) and compromise future search and rescue assistance from their benefactor (a "cry wolf" situation). Yet the longer they wait, the greater the search area becomes, and the lesser the chance of success. There is no simple solution to this. However simple geographic realities and logistics sometime provide an answer by just not making outside assistance practical.

One area of concrete assistance to some countries comes in the form of the Australian Pacific Patrol Boats mentioned above. The 31.5 meter patrol boats provide a means to undertake search and rescue in some countries with limited capabilities, but perhaps even more important, countries without professional capabilities in this area have a qualified Australian naval officer to assist and train local staff. The existence of the Pacific Patrol Boat Project also gives a country easy and direct access through the Australian Navy or diplomatic means to the Federal Sea Safety Centre in Canberra which can provide several important services for local searches. These include the calculation of a datum (point of departure for a search to be undertaken), access to information from AUSREP and AMVER (see below), and provision of contact with other regional search and rescue agencies and authorities.

Aside from the considerable assistance the United States Coast Guard provides the FSM and Marshall Islands, they also provide training for regional participants at their Search and Rescue School at Yorktown, Virginia. Numerous participants from countries in the region have successfully completed the courses there, which are described as both comprehensive and intensive. Access to this training is usually by diplomatic means through discussions with U.S. officials in the region. Local training has also been recently conducted in the FSM, Marshall Islands and Palau by the US Coast Guard Auxilary which held classes in piloting and seamanship attended mainly by government employees involved in ocean-related occupations.

France is responsible for search and rescue in a large portion of the Pacific through the RCCs in Noumea and Tahiti. They are also said to have significant resources which might be employed to assist the countries covered in this report. Unfortunately, while researching this report, it was not possible to learn of their capabilities in greater detail.

New Zealand is also active in providing assistance in search and rescue where possible. Each of their High Commissions or Embassies is aware of the methods and procedures by which the RCC in Wellington can be contacted for assistance. Both the C-130 Hercules and P3K Orion aircraft that New Zealand has provided for searches in the past have a "radius of action" of about 1200 nautical miles and can search for about 5 to 5 1/2 hours. They can be equipped with droppable "Lindholme Supply Units", 3-piece units consisting of a life raft and stores tied together with floating line which are dropped ahead of the distressed vessel.

AMVER (Automated Mutual-Assistance Vessel Rescue System):
If a missing craft is spotted by an aircraft, sometimes a large ship in the area is diverted to assist. One of the ways that search and rescue authorities know the location of large ships throughout the world is through the AMVER system (a similar system operates in Australia and is designated AUSREP). Merchant vessels send voluntary movement reports and periodic position reports to the AMVER headquarters on the East coast of the U.S. via selected radio stations. This information includes SAR capabilities of the ship and any specialist equipment carried on board.

This information can be valuable if a country undertakes its own search and locates a distressed vessel using locally-based aircraft but has no local ship in the vicinity to effect the rescue. A request to a RCC for information on ships in the area by a competent national authority is the quickest way to gain access to this information. If necessary the RCC can request the vessel to alter course and assist.

6.4 Communications

The countries surveyed have varying levels of communications problems, particularly with outlying areas or islands. The lack of good communication within a country of course makes the work of search and rescue even more difficult. From verifying initial reports and obtaining information to eventually operating a coordinated search, the availability of good communications is absolutely critical.

The range of communications equipment available to those organizations responsible for search and rescue is generally reflective of the communications situation in the country as a whole. For example, in Tuvalu where communications in general can be a problem, their police have absolutely no communications equipment available to them other than the country's telephone system. Fiji's police and navy on the other hand are fairly well equipped to handle local rescue operations, a state of affairs that is fairly reflective of the state of most communications in Fiji.

6.4.1 Communications Use and Problems

During the course of gathering information in each country on safety at sea in general, items regarding communications were often pointed out.

American Samoa: A new VHF radio system is now operated by the Department of Fisheries and Wildlife Resources. The system cost about US$15,000 to install and includes a duplex repeater capable of reaching most areas around the island. The cost of radios which are compatible with this new VHF system is about US$730. So far only about 6 or 7 units have been sold to fishermen.

Cook Islands: Local authorities are reluctant to give out VHF licenses for shore stations other than Rarotonga Radio because they fear chaos on the marine band will result. It was felt by some that the "chaos" could be managed, and that the more fishermen were encouraged to purchase VHF radios and the more traffic was on the many channels available, the better chance there would be someone would hear a vessel in distress. It was also suggested that Rarotonga needs a duplex frequency on VHF with an antenna sited on the top of the mountain which now blocks transmission when boats are close to the reef. Some complained that Rarotonga Radio's operators were almost "too professional", requiring phonetic spelling, being curt and in a sense showing off their knowledge of radio procedures; and that this attitude deterred local fishermen from talking the radio station.

Federated States of Micronesia: There is no monitoring of 2.182 MHz on HF frequencies by government radio stations in FSM. There is also not very much attention paid to Channel 16 VHF except by some harbormasters or fisheries departments but this is usually during working hours only. In Pohnpei, a VHF radio-telephone was installed at Pakin atoll 20 miles from Pohnpei by the Telecommunications Corporation which was valuable in determining if fishermen reported overdue had overnighted on the island during inclement weather. This often saved search time, but the phone was disconnected when the residents failed to pay their telephone bill. A US Coast Guard Auxilary team visiting Pohnpei recently to conduct training classes reported mis-use of VHF Channel 16 and no 24 hour watch on that channel.

Fiji: The Navy and Marine Department report that management of use of VHF Channel 16 is very lax, and there is often too much irrelevant correspondence on the frequency making it difficult to contact other stations.

Kiribati: Because of a lack of communications, the Marine Department has difficulty determining if fishermen reported overdue are sheltering at other islands. This causes time and money to be wasted in needless searches. In cases where they are not ashore, it can delay the commencement of search and rescue activities. Air Tungaru reports a problem in good, reliable communications with Betio that should cover 100 miles or more between the plane and the aeronautical radio guard, but typically they can manage only 50 miles at best. There is also a technical fault somewhere which prevents reliable communications on 8.846 MHz between planes and Betio, while that frequency is always good between the planes and Nadi or Majuro.

Marshall Islands: Radios at the Marshall Islands Marine Resources Authority are only monitored during working hours. A US Coast Guard Auxilary team visiting Majuro recently to conduct training classes reported excessive mis-use of VHF Channel 16 and no 24 hour watch on that channel.

Nauru: Fishermen do not take radios or walkie-talkies, even though many of their boats have electric start and could be equipped with them.

Niue: A VHF radio can only be heard from the western side of the island from the Telecomm station at Alofi. Telecomm prefers not to issue a base station licenses for marine VHF unless it is under supervision of a responsible group, such as a fishing club, commercial marine enterprise, or the like.

Palau: The government communications station monitors only government frequencies, not 2182 KHz. Communications during SAR can be complicated. Most tour boats and local government operate on a Motorola 450 MHz radio-telephone system with a repeater on a small mountain. Boats sometimes take portable units with them. Some other boats and the Patrol Boat from Koror have 156 MHz VHF. The 27 foot marine rescue patrol boat operated by the National Emergency Management Organization (NEMO) does not have a marine VHF. If an airplane is used, it only talks to its office or the tower at the airport and then must be relayed by telephone to another office in town to relay to boats.

Papua New Guinea: Port Moresby Radio goes off the air at 10 PM and returns again at 6 AM because of security problems associated with its location.

Solomon Islands: The biggest problem is communications along the coasts of most of the islands; it often being difficult to pass messages to or from many villages.

Tokelau: Officials from the Office of Tokelau Affairs resident on the atolls reported a big problem communicating with New Zealand or Apia at any times other than working hours. When a plane is involved in a search they cannot talk directly to it to give relevant local information (wind, currents, and so forth), but must relay through Apia to New Zealand and back to the plane.

Tonga: The Police boat which is used for search and rescue is not equipped with a 156 MHz marine band VHF radio.
Artisanal boats that fish seamounts offshore are mostly only equipped with VHF and they spend most of their time beyond VHF range. Some complained that although Nuku'alofa Radio has well-trained operators, it is sometimes "too professional" when talking to local boat operators and puts them off, requiring phonetic spelling of boat names and so forth. As in Rarotonga, some thought there should be more informality when talking to local boats to encourage them to report regularly.

Tuvalu: The Police have no radios at all to use. The Fisheries Division has no radios of its own and relies on the National Fishing Corporation (NAFICOT) for communications. Operators at Funafuti Radio (T2U) are on duty from 0545-0100 daily.

Vanuatu: A marine VHF repeater operating on channel 60 is located on a high part of the island of Efate and is maintained by an organization of charter boat owners and tour dive operators, yacht charterers, etc. who all contribute to its maintenance. It provides coverage up to 60 miles outside of Port Vila and is considered of great assistance in maintaining communications with vessels operating offshore within VHF range.

Western Samoa: There is often a problem with Apia Radio not monitoring Channel 16 VHF or 2.182 MHz HF. They recently repaired the 2.182 radio. The local ferries often monopolize channel 16.

6.4.2 Communication Between Drifting Boats and Merchant Ships

For people who are drifting helpless at sea, one of the most frustrating circumstances is to be ignored by a large merchant ship passing close by. As an example, A. Smith and J. Prado (FAO) reported that:

"The crew of one of the boats (drifting from Sri Lanka to Indonesia in 1987) were demoralized by the callousness or indifference of passing ships. (One of the boats encountered 17 ships, two of them passing very close, yet none offered aid). 'We kicked up a racket, yelling, waving and gesturing, but the ships did not respond and went on their way'."

Smith and Prado conclude that, "The 'callousness' of passing ships is perhaps due to two factors:

(a) a large vessel is far easier seen from a small boat against the horizon, whereas a small boat seen from a large vessel is usually seen against a sea background and is of course a smaller target, so there is a possibility that the distressed vessels were not seen by the passing cargo ships.

(b) in some areas there are still problems with pirates, insurgents, and refugees, and the fishermen might not have been recognized for what they were: distressed fishermen.

While the latter may be true in some locations, from his experience as a deck officer on the bridge of large ships, Tony Boyle of the Australian Maritime College explains:

"Small craft are a difficult target to sight by a ship's radar or visually at night if unlit. Due to their low freeboard they are often difficult to see at any distance if the sea conditions are rough. On a 10 CM radar used on watchkeeping, a 50 to 60 foot steel hull fishing boat in calm seas could theoretically be observed by radar at 7 to 8 nautical miles. Smaller vessels, wood or FRP, are much more difficult to see by radar.

In the case of a merchant vessel being asked to take part in a search, there will be many pairs of eyes involved. However on a normal passage there may be only one set of eyes on the bridge (some nationalities are suspected of often having the bridge unmanned for periods on ocean crossings). Much criticism has been levelled at merchant vessels for failing to see a small vessel which was in trouble. Whilst poor watch keeping may be to blame for some of these incidents, normal watch keeping duties prevent the officer of the watch from maintaining a 100% visual lookout for his/her entire watch.

On many ships this problem is avoided by the presence of a lookout in addition to the officer of the watch. However the pressures of reduced manning in the merchant navy have resulted in the lookout working around the wheelhouse area during the day and spending the night watches on 100% visual lookout.

For example, on a 140,000 DWT bulk carrier, the bridge would typically have two persons on duty at all times. During daylight hours, one of the people assigned to the bridge lookout duty would be a seaman who would be assigned other activities while physically on the bridge. (This occurs as a result of different interpretations

of Rule 5 of the International Regulations for Preventing Collisions at Sea, 'Every vessel shall at all times maintain a proper lookout by sight and hearing as well by all available means appropriate in the prevailing circumstances and conditions so as to make a full appraisal of the situation and of the risk of collision'.

Ironically, during the night is the time when there is the least amount of extraneous work to be done on the bridge by those assigned there, and the officer in charge probably has the greatest amount of time to keep a visual lookout."

Boyle concludes that a small boat is actually more likely to be spotted at night than in the daytime, because at night "flares, or flashing light are easily spotted from a ship" and believes that in the absence of anything else, these methods give a small drifting boat the best chance of attracting the attention of a large merchant ship.

6.5 Life Saving Aids

6.5.1 General

The Master Mariners and professionals contacted were unanimous in recommending that if LSAs were to be purchased or ordered, only "SOLAS-approved" life saving aids be considered. On two separate occasions during the course of this project some flares which were not of the "SOLAS" type (and thus less expensive) were found to have experienced a significant number of failures upon testing, reinforcing the recommendation that only "SOLAS-approved" aids be obtained.

All such approved LSAs will have a notice that states, "Conforms to SOLAS 83" clearly on the outside packaging or cannister. Such equipment is manufactured and the products are routinely tested to conform to the minimum standards set by the Safety of Life At Sea Convention. For example, a rocket parachute flare must fire the flare to a height of 300 meters, ignite and descend on a parachute. The flare must burn for a minimum of 40 seconds, with an intensity of 30,000 candela. Such a flare can be visible for up to 40 kilometers and would be far more valuable than a smaller "mini-flare" that would be designed to go to a height of only 10 meters or so and burn for 5 or 6 seconds at far reduced intensity.

As an example of what such items might cost, Appendix 4 lists those from one ship chandlery in New Zealand that is active in soliciting orders in the region and is known to many Fisheries Officers.

Fisheries departments that get quantities of equipment through Japanese aid should be able to obtain those manufactured to the SOLAS specifications. But because of their higher price generally the temptation might be to get greater quantities of the cheaper and generally less effective non-SOLAS LSAs. This should be resisted and only SOLAS-approved equipment obtained.

6.5.2 Emergency Position Indicating Radio Beacons (EPIRBS)

An EPIRB is basically a radio transmitter activated in an emergency which gives position information to a receiving station that is usually an airplane flying

overhead and routinely monitoring the frequency as a standard procedure. These emergency transmitters in various forms have been in use for 30 years, assisting in providing information primarily about vessels and aircraft in distress.

The systems presently in use rely on different units which transmit on two different bands, Very High Frequency (VHF) and Ultra High Frequency (UHF). The VHF units broadcast signals on 121.5/243 MHz and are usually called "121.5 EPIRBS". The newer models use 406 MHz and are sometimes called "406 EPIRBS", even though some transmit simultaneously on both 121.5 and 406 MHz.

Although the 121.5 EPIRBS are now relatively inexpensive (under US$200) and have been effective in assisting with thousands of search and rescue operations, there have been a number of difficulties associated with the system. In North America only 3% of the activations result from actual emergencies; the remainder are false alarms. The introduction of EPIRBS into one of the region's artisanal fisheries in the late 1970's (with mainly the Western Samoa alia fleet) also produced false alarms received by aircraft that were of concern to regional rescue coordinators. Standard procedures on commercial aircraft receiving the signals are to report the reception of the signal and give their location or track when it was received. Either because of the high number of false alarms worldwide, the lack of precision in a signal providing a position or for other reasons, rescue officials in the region routinely do not launch a search immediately when a 121.5 EPIRB signal suspected as coming from a surface vessel is received, but usually wait for a second, confirming report.

In order to overcome these and other difficulties a new EPIRB system has been developed which uses a 406 MHz transmitter in conjunction with satellites. Multiple satellites in low near-polar orbit pick up the signals and relay to ground stations. Satellites use doppler shift to determine the position of the transmitting beacon. The ground station relays the information to a Mission Control Center which in turn alerts an appropriate Rescue Coordination Center (RCC). Currently, perhaps because of its greater accuracy (this system can give positions accurate to 3 nautical miles) and placement aboard most large ships, search and rescue officials with the capabilities launch a search almost immediately upon receiving the information from a 406 EPIRB. The greatest drawback is that currently such an EPIRB costs from US$1,500 to US$3,000 and is thus beyond the reach of artisanal fishermen in the region.

The 121.5 EPIRBs are much less expensive, and there are pros and cons about their suitability for use in artisanal fisheries, the best argument being their current price. At under $200 and a minimum battery life of 5 years (some are guaranteed for 10 years), on a yearly basis the insurance an EPIRB represents would not appear too great.

However the low price is partly because they are being phased out in many parts of the world. They are no longer allowed in parts of Europe, and will not satisfy U.S. Coast Guard rules after 1994. Australia on the other hand is encouraging use of the 121.5 units in coastal waters because of their ability to detect signals with satellites using a ground station in Australia as a relay (no such station exists in the Pacific Island region).

A more basic problem is that for a variety of reasons, not all of the domestic airlines operating in the region routinely monitor the 121.5 frequency. Some have only one VHF radio on board and use it for routine radio traffic, others complain

of the noise (it is not a frequency dedicated for emergency use) and turn down the volume. Airlines flying international routes do however monitor the frequency. The signal of a 121.5 EPIRB can be heard within 50 to 75 miles either side of the track of the plane, depending on the plane's altitude. Thus for areas under the general flight path of international flights at least, detection of a 121.5 EPIRB signal can be fairly well assured.

Another problem particularly with the small compact models of EPIRBs now on the market, is that most are required to be able to transmit continuously for only 48 hours. Instances have been recorded of drifting yachts turning on their EPIRBs for only a few minutes a day to conserve batteries, resulting in an inability to determine the signal's position or worse, a search being discontinued or even not being launched at all. It is recommended that the best course is to activate the EPIRB and leave it on continuously, although the advisability of doing this in an area which has only one or two international flights per week overhead would appear dubious.

6.6 FINANCIAL CONSIDERATIONS

6.6.1 Annual Budgetary Allocations

The annual amounts made available by governments for domestic search and rescue activities vary considerably. In some countries with very restricted budgets these amounts are only a token while in a few others it is intended to cover all costs. In six countries where the allocations for search and rescue are identified within departmental budgets, the amount varies from the equivalent of about US$300 (Cook Islands) to US$15,000 (Pohnpei, FSM). Several of the others, mostly larger countries, included search and rescue into the overall calculation of operations for their Marine Department or Defense Force and it could not be segregated. The identifiable budgetary allocations for search and rescue for the island countries in the region as a whole are estimated to be around US$100,000 per annum.

In several countries there were complaints that departments within the government were owed by other departments for costs incurred in search activities. In others it was the private sector, airlines and shipping, that complained of not getting paid by governments. In the few countries that had imposed a policy of having the rescued parties pay for all or a portion of the costs incurred, total failure in collecting these costs was reported. The first case, that of disagreements between government departments on issues of finance is not unique to just search and rescue costs; the second could be far more serious in that in a few instances (where experience had perhaps been bitter), commercial airlines had refused to participate in searches unless they were assured of payment. In the third instance, it was felt that only legislation would enable a country to collect from individuals, and that this was a very delicate matter.

In all cases where budgets were identified, officials in charge of search and rescue, many of whom use up their entire annual budget on the first exercise of the financial year, were unanimous in declaring the total insufficiency of their budgetary allocations.

6.6.2 Search and Rescue Costs

Costs are basically those incurred by governments from their own resources (such as patrol boat operation), those that are obtained from outside the government (such as aircraft charter or hire), and those that are provided gratis by foreign countries, such as flights by the New Zealand Air Force, or the U.S. Coast Guard. Air Nauru has also provided such services to its neighbors on occasion. The following are costs quoted for services of SAR resources in the region, and of course can fluctuate with such variables as fuel costs.

Cook Islands: The patrol boat costs an average of NZ$2,800 per day to operate, exclusive of personnel costs.

Federated States of Micronesia: Pacific Missionary Aviation based in Pohnpei charges for fuel costs only during searches, a charge of about US$180/hr. Government field trip ships cost about $3,500 per day.

Fiji: Cost of private helicopter charter is roughly F$550-600/hr; larger military helicopters are charged at F$1000/hr.

Kiribati: Air Tungaru's costs are A$1,200/hour for the CASA, $900/hour for Trislander. One day's search with the CASA to Nauru/return costs about $9,000. Te Mautari has in the past chartered their pole-and-line boats with 1/2 crew at $750/day.

Marshall Islands: The government patrol boats cost about US$265/hr to operate, including fuel and personnel costs.

Nauru: Air Nauru's costs to fly a B-737 is about A$6,500 per hour.

Palau: Paradise Air will charter their six-passenger Cessna for US$275-300/hour. The former USCG patrol boat is considered very economical, and uses only about 20 gal/hour (US$35/hour) at cruising speed.

Solomon Islands: The charter of local airlines averages SI$1,000/hour; helicopter charter rate is SI$2,500/hour.

Tonga: Friendly Islands Airways will charter their Twin Otter at T$1,200/hour. The Defense Services estimate the cost of operating their patrol boats at T$2,000/day for fuel only.

Western Samoa: Polynesian Airlines will charter a Twin Otter for WS$650/hour; the Fisheries research vessel incurs about WS$300/day in fuel costs.

For countries outside the region which provide search and rescue services, the most common form of quantifiable assistance comes in the form of aircraft, usually either P-3 Orions or C-130 Hercules. Depending on the country (Australia, New Zealand or the US) the costs quoted to operate both types of aircraft are from US$6,000 to $8,000 per hour. Given these figures, a three day search based in the region could easily exceed US$150,000, including transit time to the country involved.

It was hoped that it would be possible to calculate actual costs of search and rescue on an annual basis in the countries visited. However because of problems in apportioning costs within governments and variability in the level of record-keeping, this was not entirely possible. Nevertheless, general conclusions can be drawn from either the actual costs incurred or extrapolation from the usual costs (but not necessarily charges) of vessels and aircraft employed in search and rescue operations.

On this rough basis, including estimated levels of external assistance (mainly aircraft flight time) and internal budgeting, it can be estimated that in the past few years in the region as a whole at least US$750,000 to $1,000,000 is expended each year on search and rescue efforts.

7. PERCEPTIONS AND SUGGESTIONS NOTED DURING THE SURVEY

Most who were interviewed during the project were asked for their perceptions of the local fishing community's attitudes towards safety, their seamanship and survival abilities, and for suggestions towards alleviating some of the causes of vessel distress in their country. Several of the suggestions relating to these areas of concern have been discussed above, as in the case of communications. As would be expected, responses varied considerably from country to country as well as within each country. On the basic level, some fisheries departments did not perceive a safety problem even existed, while Marine Department or Defense Force personnel in these same countries considered themselves innundated with distress reports. On more specific questions such as competence in outboard motor repair, people were generally in greater agreement.

7.1 PROBLEMS CONTRIBUTING TO DISTRESS

7.1.1 Mechanical

Motorized artisanal vessels in the region are for the most part powered by outboard motors. Mechanical problems associated with outboards were cited by officials in many countries as being one of the major factors contributing to distress. The reasons given for engine failure almost all revolve around the lack of maintenance which, as with almost anything mechanical, infers a certain amount of replacement of worn parts as well as the mechanical knowledge to effect the repair. (see 5.1.3 regarding availability of spares).

7.1.2 Weather

Much of the artisanal fishing involves trolling for skipjack, and in some areas fish are said to bite better in rough weather which can be dangerous relative to the size of boat usually employed in this fishery. Weather can also change quickly in the tropics, and some boats are caught in unexpected squalls which can cause swamping or obscure the island and cause disorientation.

Generally, the boats engaged in artisanal fisheries operate within a few hours of their home port or village, and thus do not run the risk of being caught in

approaching cyclones or typhoons. However in areas where there is a distinct storm season, bad weather can occur quickly and surprise even the most cautious. Fishermen have the opportunity to judge weather on a daily basis before departing and, with the availability of regional weather forecasting and radio reports, can usually avoid major storms. The exception to this might be the seamount bottom fisheries of Tonga and Fiji, where boats are gone for up to 5 or 6 days at a time and run a greater risk of being caught by such a storm.

7.1.3 Misjudgment; Poor Seamanship

Fishermen, particularly those out trolling, have to constantly monitor their fuel supply and make sure an adequate amount remains to enable them to return to port. Knowing when to break off the chase of a skipjack school when fuel supplies are running low, or distances are becoming too great, is of course critical. Sometimes the emotion of the chase (or economic imperatives of catching fish) overrides common sense. In other times, calculation of options results in some fishermen continuing to chase the schools with the intention of calling at a different island or village to obtain fuel for the return home. This delay in their return causes the alarm to be raised and perhaps a search to be launched. In other areas, fishermen will continue to fish with the intention of making it back just inside the reef with the hope of borrowing fuel from another fisherman for the final run to port. In all cases, errors in judgement can have disastrous consequences.

It was noted that when FADs are placed in locations beyond the usual range of boats used in a fishery, they may serve to entice fishermen to push beyond the safe limits of their boats. In some countries fishermen in quest of speed also exceed safe limits by using engines of too high horsepower on small or narrow boats.

Fishing near reefs, particularly anchoring at night while the crew is asleep, can result in disaster when anchor lines are not periodically checked and the anchor drags or lines part. Fishermen who have engine problems can get blown towards a reef and, failing to possess an anchor and/or sufficient line, find themselves in serious trouble.

7.2 SUGGESTIONS FOR IMPROVING SAFETY

In each country, people were asked for their suggestions on the general topic of improving safety. Their responses were quite varied. Clearly, a majority of those queried were of the opinion that only education and a campaign of public awareness over time would bring meaningful results. This was particularly true for those who are closest to artisanal fisheries and the sea, i.e. members of extension services in fisheries departments, professional mariners, some outboard dealers or distributors, and the like. Some went into detail, saying that any such activities needed to be in the vernacular and where literacy was not common, the use of media such as the radio or posters with few written words would be best. Others suggested an intensification of such publicity campaigns prior to the hurricane season where the weather was at its worst and incidents most common. All recognized this was a long-term undertaking no matter what media might be used ("memorable and informative advertisements, T-shirts, posters, pamphlets, radio announcements, etc...").

Interestingly, few recommended legislation or regulation of artisanal fishermen. They noted obvious problems in enforcement and regulation, and in a few cases cited failed legal attempts in the past. Of the few that do recommend a reliance on regulation some (American Samoa, Nauru) are seriously thinking about or planning to introduce it in the near future. It will be worthwhile monitoring their progress.

Following are a number of other suggestions that were offered by individuals, but are not necessarily reflective of governmental policy:

*workshop on safety for local fishermen (Cook Islands)
*videos or other teaching aids explaining the proper use of life saving aids (FSM)
*a VHF repeater on a high mountain to increase radio range (FSM, Western Samoa, Tonga)
*fishermen should tell friends or relatives where they are going fishing and when they are to return (a popular recommendation)
*subsidies for engine repair and spare parts for fishermen, cheaper than searches later on (FSM, Solomon Islands)
*emergency sails on skiffs; need to have program to introduce them to fishermen (Kiribati)
*training in survival skills would be helpful (Kiribati)
*CB walkie-talkies to take out fishing (Kiribati)
*motorized canoes equipped with sails rather than outboard powered skiffs (Kiribati)
*in-country training course for local fishermen on aspects of safety, use of LSAs (Nauru, Tonga, Tuvalu)
*future training should include first aid training (Palau)
*training of government people involved in local search and rescue (Palau)
*utilization of radios. Need a centralized radio system for control and coordination. (Palau)
*education should include explaining dangers of overpowering boats and canoes with large outboards (Solomon Islands)
*incidents caused by negligence should be publicized in the newspaper and radio, citing the cause of the distress and preventative measures that might have been taken (Solomon Islands)
*should stop treating survivors who go missing because of negligence as heroes in the press (Western Samoa)
*for larger (up to 12 meter) vessels, sea anchor is helpful in steadying vessel so that repairs can be made to engine; also helpful in keeping head up in storm (Tonga)
*vessels which fish beyond VHF range should all carry HF radios (Tonga)
*better local weather forecasting (Tonga, Niue)
*more navigational aids, i.e. lights, on usually unlit islands would help fishermen find their way back (Tuvalu)
*training could be a one-month sea safety course with adequate supplies of safety equipment for demonstration, literature on safety and survival (Vanuatu)
*extension services for outboard motor repair coupled with safety instruction in villages (Vanuatu)
*training aimed at general public as most people who are lost are being transported, not fishermen (Vanuatu)
*public radio announcements reach more people than newspapers (Vanuatu); but cost money because of privatization of the local radio station (Kiribati)
*demand for safety should come from fishermen themselves if it is to be effective (Vanuatu)

*fishermen should carry a small portable compass at all times and be instructed in its use (US Coast Guard Auxilary)
*safety education of youngsters should begin in the schools at an early age and continue to expose them to aspects of boating safety (US Coast Guard Auxilary)
*the enforcement of current and future safety regulations should not be tempered by deference to "the island way" (US Coast Guard Auxilary)

7.3 SUGGESTIONS FOR IMPROVING SEARCH AND RESCUE

At the same time as individual suggestions on improving safety were offered, some that might also improve search and rescue were voiced:

*all imported open boats brought into the country should be required to have the inside of the hull painted orange (FSM)
*all imported or locally produced boats should have the bottom of the hull painted red or orange (PNG)
*a small, watertight flare kit should be made available for fishermen to purchase (FSM)
*a national government SAR center would help coordination (FSM)
*trollers could be equipped with a lightweight kite that could be flown on a windy day if in distress to alert other fishermen in the area
*need to educate people on importance of promptly reporting overdue boats (Kiribati, and others)
*better search service could be provided if interisland planes were equipped with GPS for navigation (currently use only beacons) and good quality radar such as Bendix weather radar, 1500 series (Kiribati)
*cyalume chemical light-sticks which are much cheaper than flares should be taken to be used at night so a drifting boat can be spotted more easily by searchers (Niue)
*need to publicize where they should report missing vessels so as to minimize time delays in commencing searches. This might be placed in front of all telephone directories, for example (PNG)
*upgrading of equipment at SAR Center (Sólomon (Islands)
*dedicated equipment capable of being dropped from an airplane to survivors would help local airlines to assist. Would agree to maintain the equipment if it could be provided (Tonga)
*should be able to call in outside assistance before local assistance exhausted, because by that time search area is too wide (Tonga)
*boats should be equipped with a small mast and radar reflector to enable sighting by searching vessels (Western Samoa)

Professionals responsible for search and rescue also emphasized the importance of obtaining information from survivors to plan improvements in procedures. This important stage can help to plan future SAR efforts, but seems to have been disregarded to a great extent in the region. In particular, where aircraft have been used but the survivors are not located by aircraft, it is important to know if they saw or heard the planes, attempted to attract attention and so forth. An example of a US Coast Guard format for interviewing survivors and determining this type of information is provided along with the answers given in an actual case in Appendix 11.

The same professionals also caution about conducting local aerial searches using people unfamiliar with air travel as spotters. In numerous cases friends or

relatives are placed aboard a plane to assist in spotting during a search, only to have their value as spotters greatly diminished by their unfamiliarity with flight. (Several pilots have also experienced glancing over their shoulder to see the potential spotters fast asleep, induced by the monotonous sound of the droning engines.) The spotting crew should thus be chosen wisely, and their vigilance rotated on 15 or 20 minute cycles to prevent fatigue.

8. CONCLUSIONS

As noted at the beginning of the report, the same boats and canoes used by artisanal fishermen are those often used for transportation or commerce. In the village or island setting, the operators of these vessels are often artisanal fishermen one day and "water taxi drivers" the next. As integral members of the community, attitudes towards safety held by fishermen are really those of the community as a whole. In fact, as has also been stated earlier, in many countries it is often only those with technical training such as professional mariners who perceive there is a problem at all. Fishermen either knowingly accept the risk or adopt the attitude that "it cannot happen to me".

8.1 Past Attempts at Improving Safety at Sea

There have been several programs mentioned above which can be said to have initially contributed to safety. The training of potential fishermen and provision of boats in village-level projects in Vanuatu, Western Samoa and Tonga for example, all contained at least some aspects of safety awareness, and provided safety equipment and some life saving aids with the vessels. Since many of the participants in those projects were initially unskilled or inexperienced and not familiar with the technology being introduced, they certainly would have been worse off with no training at all. Now however, in many cases an entirely new generation of fishermen is working in the fishery and it is not clear how much of the training has been passed along to them from the earlier activities.

Safety training must be viewed as an ongoing process. In countries where extension work included help in outboard motor maintenance and repair, these were usually not ongoing programs but rather one-time attempts to either fix existing problems or quickly attempt to teach the basics to fishermen at the village level. The lack of ability for these kinds of programs in the long term to alleviate mechanical problems in village-based fisheries might also be due to new participants in the fishery with little or no knowledge being passed along to them. This would seem to be the case in outer villages or islands where increased use of outboards is taking place, and new owners or operators did not possess an engine during earlier training and thus had no incentive to participate.

8.2 Current Activities

The sheer volume of suggestions on how to improve safety from those people ostensibly responsible for promoting it and interviewed for this project shows that there is considerable room for improvement in current activities.

It is perhaps understandable that institutional responses have taken some time to get going, particularly when they must compete for time and funding with other priorities and tasks. In some countries, the speed with which outboard motors and skiffs have taken over artisanal fisheries is phenomenal. For example, today in one atoll in Tokelau there are over 100 aluminum skiffs powered by outboards and only four operational canoes. As late as 1985 this same small atoll had far fewer outboard skiffs and 44 operational canoes. Last year, in its first full year of operation, a fiberglass boatbuilding company located in Milne Bay, Papua New Guinea reportedly sold over 600 outboard skiffs. This accelerated implementation has caught some officials off guard, wondering how to (or even if they should) organize safety programs with relevance to the new technologies being employed. The momentum of the increase in outboard powered artisanal fishing on a regional scale represented by such statistics can be daunting; and there certainly is no consensus on the proper steps to take to ensure that introduction of safety measures keeps pace.

8.3 Some Recommendations for Future Action

Financially it does not appear that many countries are in a position to significantly increase their activities relating to safety at sea. However there are areas such as communications where advances or improvements that might take place independent of safety considerations would have a positive effect. For example, the solution to some of the current problems in communications listed in section 6.4.1 would clearly enhance safety at sea in some countries.

In planning even modest programs it must be realized that safety at sea is something which must be taught and continually reinforced. It is recognized that heightened awareness of safety in industrial societies is due to constant reinforcment. In the island countries, it is the almost total lack of exposure to safety awareness on a recurring basis that results in it being ignored. Programs should thus emphasize the necessity for their continued, long term existence. Concurrently there should be an increase in the availability of safety equipment, spare parts and training; but the experience of countries surveyed shows that these three items in themselves will not provide the desired results.

Thus, education through publicity campaigns, repeated and reinforced over a long period of time and backed up by a good supply of equipment and spare parts, and training seems to offer the best chance for improving safety at sea for artisanal fishermen.

Sources of funding can sometimes more easily be arranged for programmes emphasizing education than for acquisition of equipment. In the fisheries sector there are several agencies that have been interested in supporting education, training, and transfer of technology, all of which broadly cover the areas noted. However even though the problems identified in this report are fairly common, the level of complexity varies tremendously between countries. In considering what types of activities are most appropriate, it should be kept in mind that each country possesses a unique set of circumstances surrounding safety at sea and programs must be specifically tailored to each. For the funding of future activities to become a reality, the impetus must come from the countries themselves.

APPENDIX 1

SAFETY MEASURES TO OBSERVE WHEN OUT FISHING (NAURU)

The Directorate of Police would like to request all fishermen to observe the following measures for their own safety.

1. Have a **Flash Light** or any other equipment which can be used to give signals during night time.

2. Have a **piece of mirror** or any other object that could be used during the day time to reflect sunlight and assist a searching vessel or aircraft to sight the missing boat.

3. Have **enough petrol** on board the fishing boat for your return to shore.

4. As far as possible, have a **spare small outboard motor** or **oars** on board in case the **main outboard motor** fails.

5. Advise your **relatives and/or friends** of the time of your return and the area in which you intend to fish.

6. Have **signal flares** on board to be used in case of **emergency.**

7. **Fish in pairs or groups** i.e. two or more boats at a time. This could enable fishermen to help each other in case of emergency or where help is needed.

The above measures are for your own safety and would assist the searching vessel or aircraft to locate a missing boat.

APPENDIX 2

(lecture notes from Niue safety workshop by
Graham Marsh, Niue Fishermen's Association)

SAFETY AT SEA: HOW MUCH DO YOU VALUE YOUR LIFE?

If something happens through your carelessness you are not only endangering your own life but that of your rescuers etc. You only cause family hardship and worry if you are lost at sea.

THINGS TO FOLLOW:

1. Planning your trip
(a) where you are going
(b) what you intend doing, e.g. bottom fish, trolling, etc.
(c) time you intend to return to port or home

2. Preparation: Clean spark plugs, ensure fuel is mixed properly and clean, boat and motor are in good seaworthy condition.

(a) make sure you have all the appropriate safety equipment aboard your boat
(b) life jackets
(c) flares
(d) anchor and rope (fishing line will do)
(e) oars and rowlocks.. Much easier to row "palagi" style (2 each)
(f) bailer--fishing gear container as spare
(g) knife of good quality
(h) tool kit and spare parts (spark plugs, shear pin, starter rope, etc.) to suit your motor
(i) first aid kit and know how to use it
(j) torch and matches or preferably a cigarette lighter
(k) water tight container to keep tools and spares in, etc.
(l) your fuel is mixed properly and to the right ratio. Make sure you have sufficient fuel to get you there and back plus spare for the unknown "too many fish" rough weather (may have to go the long way round)
(m) Also tie your fuel tank to your dinghy. This will act as extra buoyancy in case of swamping your dinghy

Extra things that I think could be useful and should be taken are:

(n) a two litre container of frozen water. Its very hot if you have to row and paddle, etc., or trying to pull in that big one that got away.

(o) a 2 meter x 3 meter piece of bright orange colored light-weight tarpaulin material. This can be used for a number of things as follows:

(1) covering your fish
(2) in an emergency it could be used to signal help
(3) as a sea anchor
(4) to collect rain water

(5) to protect yourself from exposure i.e. the sun if drifting and cold wind and rain, etc.
(6) It also provides better visibility if people are looking for you
(7) It could be rigged as a sail if needed
(8) rubber innertube: good for burning to attract attention

PERSONAL PREPARATION:

(a) an advantage if you can swim
(b) wear or take clothing to protect you from the weather, e.g. hat, shirt, long pants, parka (raincoat) sunglasses,

Overalls: good for protection, freedom of movement, but not good for swimming. "if you do wear overalls make sure you wear underpants"
Footwear: sandshoes with a sole that grips to the aluminium possibly best. can use them for climbing out on the reef, etc.
Gumboots: good protection and grip, but not good for swimming and very hard to get off when wet.

BEFORE ACTUALLY GOING TO SEA:

(1) Check the weather conditions: Radio Sunshine not too reliable. Tongan Radio forecast is possibly alot better but local knowledge and experience is best.
Tell someone your plans as in where you intend going and what time you expect to be back.

AT SEA:

Make sure everything is secure. If things move around it can reduce the stability
Do not overload your boat, as fuel consumption is greatly increased and results in reduced stability

Make sure the balance of the boat is correct:
(a) too much weight at the front and the front will dig in to the waves swamping the boat
(b) too much weight in the back and a following sea may swamp the boat; also the wind may pick up the front and tip you over.

Make sure outboard is adjusted properly for trim or else same problems as above. (SEE OPERATORS MANUAL)

GOLDEN RULES:

Speed kills on land and at sea. If weather gets rough, slow down and do not fight the sea because it is a lot bigger and stronger than you.

If your motor is stopped and broken down in a rough sea you should try and rig up a sea anchor as quickly as possible to keep the front of the boat pointing into the wind. This is to stop waves breaking over the side and back and swamping the boat.

If you have broken down in reasonably calm water and have to row against the wind it is easier if you half fill your boat with water as it makes it harder for the

wind to blow you backwards and once you get going th extra weight helps keep up the speed.

If you get a line caught around your propeller it is much safer to lift your motor into the boat to untangle it--in rougher weather you should move the fuel tank and other weight to the front before lifting the motor in to save swamping the boat at the rear.

At all times in a small boat try and keep the centre of gravity as low as possible to keep the boat more stable.

A note of warning about these long flat outriggers some boats are using: these can be dangerous if they dig into a wave or you get a big strike on one outside line.

The other dangerous practice on a 12 foot dinghy is trolling four or more lines.

(a) after landing a fish especially a paala, clean the bottom of the boat otherwise it will be very slippery and could cause an accident
(b) keep all your hooks and baits and lures in a container out of the way so your lines will not catch in them and pick them up where they might dig into you.
(c) keep your boat and gear tidy at all times.
(d) Always have your knife in an accessible place in case a line gets caught around your arm or leg

Your personal skill for handling your boat and gear will get better with experience but also remember that familiarity breeds contempt (means you are likely to take more risks with the more experience you gain).

For the above reasons it is a good idea especially if you are starting out using a dinghy and even for some more experienced ones to have a checklist somewhere, where you will notice it before you go out fishing and look through it and check you have all the items on the list.

You can add to the safety gear list mentioned earlier some fishing things like your gaff and dong-knocker. "I used to do this then thought I did not need the list any more and that is when I started to forget things sometimes"

ALCOHOL AND BOATING DON'T MIX

IT IS THE LAW OF THE SEA THAT YOU SHOULD ASSIST ANYONE IN NEED OF ASSISTANCE

In conclusion I would like to say that experience is the best teacher, but you must follow some basic rules which we have just been over to get that experience, in a safe manner without endangering your life and equipment as well as other people and their equipment.

AS WITH MOST THINGS, REMEMBER PREVENTION IS BETTER THAN THE CURE

APPENDIX 3

SURVEY AND SAFETY CERTIFICATE FOR SMALL BOATS UNDER 30 feet (9 mtrs) in length

(VANUATU)

EXPIRES ONE YEAR AFTER DATE OF SURVEY

NAME OF BOAT.....AGE.....(YEARS) SPEED.....(KNOTS)

VILLAGE AND
ISLAND.....

OWNERS NAME.....
ADDRESS.....
.....

LENGTH.....METRES BREADTH.....METRES CABIN - YES/NO

CONSTRUCTION - WOOD / ALUMINUM / FIBREGLASS

ENGINE..... AGE..... YEARS HORSEPOWER.....

NUMBER OF PASSENGERS..... NUMBER OF COPRA BAGS.....

This boat was surveyed on ...../...../.....
At.....by.....
and was found to be in a seaworthy condition and to have onboard the following equipment:

Two Oars and Rowlocks	YES/NO	GOOD/POOR CONDITION
One Bailer or Bucket	YES/NO	GOOD/POOR CONDITION
One Hurricane Lamp or Torch	YES/NO	GOOD/POOR CONDITION
30 feet (9 m) rope	YES/NO	GOOD/POOR CONDITION
Water Container	YES/NO	GOOD/POOR CONDITION
One heliograph	YES/NO	GOOD/POOR CONDITION
Four Mayday Streamer	YES/NO	GOOD/POOR CONDITION
Four Dye Markers	YES/NO	GOOD/POOR CONDITION

REMARKS.....
.....
.....

Signed .....Date...../...../.....

One copy for the Owner;
One copy for the District Commissioner; and
One for the Harbour Master at Vila or Santo.

APPENDIX 4

EXAMPLE OF COST OF SOLAS-APPROVED FLARES

Prices in New Zealand dollars. All are SOLAS Approved, manufactured by Hansson-Fleming. Packed in floating screw-top containers, shipped by sea freight only.

"Powerboat Pack": 2 red handflares, one orange handsmoke NZ$ 63.92

"Inshore Pack": 2 red handflares, 2 orange handsmokes, $95.84

"Cruiser Pack": 1 parachute rocket, 2 red handflares, 1 orange handsmoke $110.32

"Coastal Pack": 2 parachute rockets, 2 red handflares, 2 orange handsmokes $156.72

"NZYF CAT 1,2,3 Pack": 4 red parachute rockets, 2 red handflares, 2 orange handsmokes, 2 white collision signals $343.84

Available from:

A. Foster & Co. Ltd
P.O. Box 1951
Auckland 1, New Zealand
ph: (09) 303-3744
fax: (09) 377-987

APPENDIX 5

LAWS OF THE REPUBLIC OF VANUATU, CHAPTER 89, SEARCH AND RESCUE

"1. In this act 'Minister' means the Minister responsible for Home Affairs.

ESTABLISHMENT OF AIR SEARCH SERVICE

2. From the date of commencement of this Act there shall be set up an emergency air search service headquarters at Bauerfield Airport, Port Vila, and a maritime aid headquarters at Port Vila.

CONTROL OF AIRCRAFT AIR SEARCH RESCUE

3. The Director of Civil Aviation under the authority of the Minister, shall direct the air search service emergency headquarters in case of aircraft accidents occurring within the territory of Vanuatu and surrounding waters. He shall be responsible for the organization of search and rescue of human life. He shall co-ordinate all the departments taking part therein, and shall have authority, for this purpose, over the maritime aid headquarters.

CONTROL OF MARINE AIR SEARCH SERVICE

4. The Director of Ports and Marine, under the authority of the Minister, shall direct the maritime aid headquarters in case of maritime accidents occurring within the territory of Vanuatu and surrounding waters. He shall be responsible for the organization of search and rescue of human life. He shall co-ordinate all the departments taking part therein, and shall have authority, for this purpose, over the air search service emergency headquarters.

REQUISITION OF AIRCRAFT AND SHIPS

5. The Director of Civil Aviation and the Director of Ports and Marine shall be entitled, if the means at their disposal proved insufficient to enable them to bring search and rescue operations to a successful conclusion, to requisition any crews, aircraft or ships, the use of which they consider essential, on condition they inform the Minister of this without delay.

EXPENSES OF SEARCH AND RESCUE OPERATIONS

6. Expenditure resulting from the exercise of the powers contained in section 5 shall be met out of Government funds.

DUTY OF PERSONS TO REPORT ACCIDENTS

7. Any person who witnesses any accident or who discovers the wreck of an aircraft or vessel shall forthwith inform the nearest administrative authority (whether District Commissioner, police, meteorological station or otherwise) and furthermore, if the accident has occurred at sea, the coastal stations or the Civil Aviation or Ports and Marine Department directly.

REGULATIONS

8. The Minister may by order provide regulations for the general organization of search and rescue of human lives in case of aircraft or marine accidents occurring within the territory of Vanuatu and surrounding waters.

OFFENCES AND PENALTIES

9. Any person who contravenes any provision of this Act or who obstructs or hinders the execution or implementation thereof commits an offence and shall be punishable upon conviction by a fine not exceeding VT100,000 or by imprisonment for a term not exceeding 6 months or by both such fine and imprisonment."

APPENDIX 6

PUBLICATIONS OF THE INTERNATIONAL MARITIME ORGANIZATION RELEVANT TO SEARCH AND RESCUE

1. The IMO **International Code of Signals (INTERCO)** includes sections on emergencies, distress and SAR.

2. The IMO **Merchant Ship SAR Manual (MERSAR)** contains procedures for merchant ships involved in SAR. It is required by SOLAS signatories' ships to be carried on board. Its purpose is "to provide guidance for those who during emergencies at sea may require assistance from others or who may be able to render such assistance themselves. In particular, it is designed to aid the master of any vessel who might be called upon to conduct SAR operations at sea for persons in distress"

3. The IMO **Search and Rescue Manual (IMOSAR)** assists governments in meeting objectives of various international SAR conventions and provides for internally standardized SAR policies and procedures. Part I is the Search and Rescue Organization, and Part II Search and Rescue Procedures

4. The IMO **Code of Safety For Fishermen and Fishing Vessels** is meant to be applied to vessels of 24 meters in length and above. It is divided into two parts: the first part (A) deals with Safety and Health Practices for skippers and crew and is primarily aimed at industrial fisheries. Part (B) includes safety and health requirements for the construction and equipment of fishing vessels

These publications of the IMO can be ordered from:

International Maritime Organization
4 Albert Embankment
London SE1 7SR
United Kingdom

APPENDIX 7

Ship's Standing Orders for Cook Islands patrol vessel, TE KUKUPA, Chapter 15, on Search and Rescue:

General

1. Should any vessel go missing in the Cook Islands area the resultant search will probably be coordinated by the Police. The search will normally be initiated following a request for help, by telephone or personal appeal, by the person concerned about the missing person/people.

Procedure

2. Before initiating any further action the following details are to be obtained where possible.

a. When was the vessel/aircraft due to return?
b. How many people were on board? Determine names and ages if available.
c. What size was the vessel/aircraft?
d. What type of construction was the vessel?
e. What colour was the vessel/aircraft?
f. Does it have a radio? If it does, what frequency was it tuned to?
g. Did the vessel have life rafts? If so, what type and colour were the rafts?
h. What was its destination?
i. What were the crew's plans for the passage?
j. Has Radio Rarotonga already been informed?
k. How much food and water is being carried?
l. What are the weather conditions?

3. Once the details listed above have been compiled the following personnel are to be immediately advised.

a. Commissioner of Police.
b. Superintendent
c. Te Kukupa's Commanding Officer

4. Once the Superintendent has been briefed as to the nature of the emergency he may, with the approval of the Commissioner of Police, task Te Kukupa to assist in the search and rescue.

Other Authorities

5. The Superintendent, on deciding that a need exists to commence a search, will also inform the following agencies as required:

a. Radio Rarotonga, if not already informed;
b. Department of Civil Aviation;
c. Harbormaster;
d. Department of Post and Telecommunications;
e. Cable and Wireless; and
f. Rarotonga Hospital if applicable.

6. The following additional equipment is to be carried for search and rescue tasks:

   a. first aid kits
   b. blankets
   c. victuals

APPENDIX 8

POHNPEI STATE
SEARCH AND RESCUE FORM

Person Reporting: _____ Date _____
Time_____
Type of Assistance Required: _____
List of Missing Persons (names)_____
_____
_____

Description of Boat: type _____ Length_____
colors: Hull_____Cabin_____Trim_____
Deck_____Sail_____In Boat_____

Name or Number on Boat_____

Type of Motor _____

Location:Departed From:_____Date/Time_____

What were his plans & expected return (location and time)_____
_____
_____

Where last seen_____Date/Time_____

Equipment: Life raft, life jackets, flares, mirror, flashlight, matches, food/water_____ fuel_____, oars, paddles, tools, other:
_____
_____ _____
_____

Weather since boat departed: Wind_____Rain_____Seas_____
Currents_____
_____

Reliability of Information:_____

General Information:_____
_____
_____

Final Results of Search:_____
_____
_____

APPENDIX 9

SEARCH AND RESCUE ORGANISATION
MISSING CRAFT REPORT
(KIRIBATI)

SAR REPORT NO._____
STATION_____

1. Date and Time Reported:_____
2. Person Reporting:_____
3. Officer Receiving Report:_____
4. Type of Craft:_____
   (Craft/aluminium boat/catamaran etc.)

   Descriptions: Length:_____ Beam:_____
   Colour of Hull:_____ Colour of Sail:_____
   Engine Size (if any):_____ Fuel carried _____
   Safety equipment Carried _____

5. Destination:_____
6. Date/Time/Place
   Last Seen: Day_____ Date_____ Time_____
7. Persons on Board

	Name	Age	Address/Home Is.
1.			
2.			
3.			
4.			
5.			

(continue overleaf if necessary)

ACTION TAKEN: Duty Search Master informed: _____
Date/Time & Signature DSM

Marine Guard informed: _____
Date/Time & Signature M G

Copies to: Secretary for Comms
Marine Superintendent
Commissioner of Police
File

_____
Result:

APPENDIX 10

U.S. COAST GUARD SURVIVOR DEBRIEFING FORM

(from actual incident)

1. Craft Name, Flag and Registration number:

no name, no flag, no number. 22 ft. white hull boat with 15 horsepower Yamaha outboard

2. Date/Time of Casualty:

03 November 1987 at about 2100 local time. Had departed Ngulu at 1800

3. Weather and Sea Conditions at Time of Distress:

light winds, 3 to 4 foot swell from NE. Clear skies

4. Weather and Sea Conditions for each day after the distress:

light winds first 2 days. little to no winds last 5 days. 3 to 4 foot NE swell throughout. clear skies every day.

5. Nature of casualty and cause, if known:

Engine problems. Engine restarted 3 days later. Headed East but ran out of gas about 6 hours later. On the same evening a Chinese fishing vessel gave them gas. Engine ran again until out of gas.

6. Names, ages, addresses, phone numbers and nationality of persons on board:

Mike Lugereg, 68, Ngulu, Henry Liyerang, 17, Ngulu. No phones. FSM

7. Condition of survivors (i.e. dehydrated, any injuries, alertness, etc.):

Elder-increased blood pressure, had cataracts therefore couldn't check pupils for dehydration. otherwise in good health. Younger in good health

8. Description and condition of lifesaving equipment on board craft:

No lifesaving gear. Had a flashlight.

9. What type of navigation equipment was used to determine craft's position prior to distress?:

no navigation equipment. Used "local knowledge"

10. What method of navigation was used after the distress:

None. Headed East when engine re-started

11. What radios and frequencies were available to the craft?

none.

12. Type of protection from environment (i.e. covering, clothing or other equipment):

long pants, long sleeve shirts, baseball caps. Had plywood propped up to shield sun rays. Large red cloth also shielded them from the sun.

13. What food or water was available to the survivors:

Originally 1 gallon water, 1 coconut, and fish caught first night out. Ate 4 fish first 2 days, rest spoiled. Coconut and water gone by 4th day. Chinese FV gave them 3 tins of cookies, 1 bag of rice, 24 sodas, and filled a large cooler with water. This was on 4th night out. When rescued, still had 7 sodas, 2 tins of cookies, 1/4 cooler full of water.

14. What food or water did survivors obtain from the environment:

caught many fish first night out. caught 2 dolphin fish on 6th day, ate one, other spoiled.

15. How much time elapsed from the incident time until the time of the original distress call:

3 days

16. Was a float or flight plan filed:

No. it was a routine local fishing trip.

17. Were any distress signals used as an aid in showing the survivor location? Include their description and times of day or night they were used:

Heard aircraft on 5th night. Shined light in its direction, but never saw plane.

18. Did the craft have an EPIRB:

No

19. If vessel was adrift was any attempt made to alter vessel's drift direction or rate (i.e. sails, sea anchor or drogue):

said anchor was used first 3 days out. anchor line was too short to be effective as boat was in water too deep to drag

20. Were any search craft heard or sighted at any time (if so, when):

see 17. Also spotted aircraft off in the distance on 6th day at approximately 0900

21. Were any attempts made to contact search craft? (If so, how were these attempts made:

see 17.

22. Were any landmarks or landmasses sighted? What were these and when were they sighted:

No land sighted after they drifted away from Ngulu

23. Who was in charge during and after the distress:

the old man

24. Do you have any comments or suggestions:

None

25. Comments by debriefing personnel:

Chinese FV found them on 4th day out at about 1700. Vessel named "TAI BAI HAI". Vessel gave food and gas as mentioned. Apparently did not offer to tow them to Ngulu. Communicating between them was a problem. Both men felt fine through the 7 days. Ample food was always available. Only ships spotted were the Chinese FV and the rescue vessel (US Coast Guard Cutter BASSWOOD)

APPENDIX 11

PERSONS CONTACTED DURING THE SURVEY

FIJI 21-30 January, 1991

Dr. Tim Adams	Acting Director of Fisheries
Charles Evening	Principal Fisheries Officer
Paul McDonnell	former shipping Adviser, Forum Secretariat
Capt. Apenisa Vata	Principal Marine Officer, Fiji Marine Dept.
Johnson Seeto	Teaching Fellow, IMR, USP
Sunia Lavaki	Engineering Instructor, IMR, USP
Cdr. T. Lesikivatukoula	Acting Commander, Fiji Navy
Cdr. Stan Brown	Commander, Fiji Navy (retired)
Lt. Col. Craig Mayer	US Defense & Naval Attache, US Embassy
James E Forshaw	Head of School of Maritime Studies, Fiji Institute of Technology
J. Cruon	Second Secretary, Regional Development, French Embassy
Jale Wiliame	Officer in Charge, Maritime Surveillance Centre, Suva
Donald Will	First Secretary, New Zealand Embassy
Cdr. John McAree	Defense Attache, Australian Embassy, Suva
Maj. M. Mua	Director, Maritime Surveillance Centre
Robert Y. Fong	Director of Operations and Safety, Civil Aviation Authority of Fiji
Chris Rupen	Director, Maritime Division, Forum Secretariat

COOK ISLANDS 30 January-2 February 1991

Lt. Cdr. Paul Lashko	Marine Surveillance Advisor
Julian Dashwood	Secretary, Dept. of Marine Resources
Kelvin Passfield	Fisheries Research Officer
Elgin Tatachuk	Owner and operator, FV SEAFARI
Henry Puna	Secretary Dept. of Trade, Labour and Transport
Goldie Goldie	Superintendent of Police
Pamela Ingram	Chief Executive, General Licensing Authority
Greg Wilson	Cook Islands Divers
Chip Boyle	Cook Islands Aquarium Fish

WESTERN SAMOA 4-7 February

Ueta Fa'asili	Chief Fisheries Officer
Savali Time	Fisheries Officer
Tina Hellesoe	Foreign Affairs
Peter Watt	SPC Masterfisherman
Tavita Nikolau	W. Samoa Police, Captain, patrol boat NAFANUA

J. Thurbon	Royal Australian Navy, patrol boat NAFANUA
Capt. Faalogo	Harbormaster, W. Samoa
Peter Lange	Adviser, Marine Training Centre
Perive Lene	Principal, Marine Training Centre
LCDR. Chris Churcher	Royal Australian Navy Maritime Surveillance Adviser
Tanielu Galuvao	Deputy Commissioner of Police

TOKELAU (Office of Tokelau Affairs, Apia) 5 February 1991

Foua Toloa	Director of Agriculture and Fisheries
Maka Toloa	Atafu Administrative Officer
Pio Tuia	Nukunonu Administrative Officer
Felima Teao	Fakaofo Administrative Officer
Mika Sese	Office of Tokelau Affairs Administrative Officer

AMERICAN SAMOA 6 February 1991

Henry Sesepasara	Director, Department of Marine and Wildlife Resources
Phil Langford	Deputy Director, Department of Marine and Wildlife Resources
Lt. Lua Moliga	Marine Enforcement Unit, Department of Public Safety

NIUE 6-8 February 1991

Sisilia Talagi	Director, Agriculture, Forests and Fisheries
Scott Coffen-Smout	Fisheries Development Officer
Sioneheke Leolahi	Fisheries Officer
Graham Marsh	Chairman, Fishermen's Assn.
Billy Talagi	Member, Fishermen's Assn.
Sauni Tongatule	Secretary, Fishermen's Assn
Laga Lavini	Treasurer, Fishermen's Assn; Airport Superintendent
Steve Brady	Chief of Police
John McFadzien	Government Solicitor
Graham Jackson	Senior Technician, Telecom
Terry Coe	Dive tour operator, High School Principal
John Martin	Niue Business Centre

TONGA 12-14 February 1991

Mailefihi Tuku'aho	Director of Marine Dept.
'Alipate Tufui	Marine Officer, Marine Dept.

Vilimo Fakalolo	Fisheries Planning, Fisheries Dept.
Silika Ngahe	Fisheries Dept.
Hama Naati	Controller, Traffic & Licensing Div., Tonga Telecomm Commission
Capt. Tuitupou Fotu	Harbourmaster
Malakai Tapealava	Principal, Tonga Marine Polytechnic Institute
Meliane Ti'o	Acting Asst. Superintendent of Police
Lennie Niit	Maritime Projects Tonga Ltd.
Leonard Niit	Maritime Projects Tonga Ltd.
Paul Mead	Fisherman, Vava'u
Fetuutolu Tupou	Commander, Tonga Defense Service
Aisea Tupou	Boatyard Manager, Tonga Fisheries Dept.
Mosi Moengangaongo	Friendly Island Airways, Administration Manager
Kanda Sami	Friendly Island Airways, Engineering Manager
Dennis Hoskin	Friendly Island Airways, General Manager

HONOLULU US COAST GUARD 18-19 February 1991

Skip Glasscow	US Coast Guard Micronesian Liaison, Honolulu, 14th USCG District
Paul Dilger	US Coast Guard Office of Search & Rescue, Honolulu, 14th USCG District
George Wilkins	US Coast Guard Auxilary, Kona

MARSHALL ISLANDS 22-25 February 1991

Steven Fulk	Regional Station Director, Air Marshalls
Roger Stretton	Director, Flight Operations, Air Marshalls
CPO Jesse James	Australian Navy Patrol boat project
Charles Dominick	Businessman, boat owner
Willie Poznanski	Port Captain (Retired), fisherman
John Bungitak	Marshall Islands Marine Resources Authority
Dr. H.M. Gunasekera	Senior Economic Policy Advisor
Danny F. Jack	Chief, Outer Islands Affairs
Shozo Hiwatashi	OFCF Arno Fisheries Project
James A. Broom	General Manager, Marshall Is.Development Authority
Botlang A. Loeak	Chief of Admin. Services, Office of Chief Secretary
Steve Muller	Marshall Islands Development Authority

FEDERATED STATES OF MICRONESIA 26 February-2 March 1991

Peter Reichert	Chief Pilot, Pacific Missionary Aviation
Mike Gawel	Adviser, FSM Marine Resources
Moses Nelson	Administrator, FSM Marine Resources
Bob Ritchie	FSM-US Coast Guard SAR Coordinator

Chitumwo Nimwes	FSM Disaster Control Office
Dais Lorrin	Chief, Fire & Disaster Control, Pohnpei State
Cris Friberg	FSM National Fisheries Corp.
Bernard Helgenberger	Businessman, fisherman
Tashiro Ludwig	Pohnpei State Chief of Marine Resources
Valentine Martin	Pohnpei State Marine Resources
Pedro Harris	Pohnpei Economic Development Authority
Dick Croft	Businessman,former Chief Fisheries Officer
Lester Ruda	Chief of Marine Surveillance, FSM Police
Reedson Edwin	Operation Manager, FSM Dept. of Transportation and Communications
Weiner Hadley	Administrator, FSM Dept. of Transportation & Communications
Robert Weilbacher	Secretary, FSM Dept. of Transportation and Communications
James Movick	FSM National Fisheries Corp.

GUAM, US COAST GUARD 4-5 March 1991

Lt. M. Tosatto	Marianas Section, US Coast Guard
CPO J. Graham	Marianas Section, US Coast Guard

PALAU 6-8 March 1991

David Idip	Director, Resources & Development
Noah Idechong	Chief, Marine Resources
Toshiro Paulis	Chief, Marine Resources (retired)
Steve Swords	Operations Officer, Marine Enforcement Program, Dept. of Transportation, Communications and Marine Enforcement
Abel Suzuky	Coordinator, National Emergency Management Organization
Caleb Ulitch	National Emergency Management Organization
Morningstar Olkeriil	Administrative Officer, Police Dept.

PAPUA NEW GUINEA 11-12 March 1991

John Natera	Secretary, Dept. of Fisheries and Marine Resources
Rai Alu	First Asst. Secretary, Dept. of Fisheries and Marine Resources
Terry O'Keeffe	Marine & Equipment Product Manager, Ela Motors, Port Moresby
Api Roy	Manager, Safety Services Dept., Engineering & Marine Services
Toka Vare	Rural Refrigeration Technician, Dept. of Fisheries
Guao K. Zurenuoc	First Asst. Secretary, Marine Division, Dept. of

	Transport
Laurie Duncan	Safety Branch, Marine Division, Dept. of Transport
Don Youldow	Safety Branch, Marine Division, Dept. of Transport
Capt John Wilson	PNG Defence Force
Capt. S. Esrom	Commanding Officer, Surveillance Centre, PNG Defence Force

SOLOMON ISLANDS 13-16 March 1991

Albert Wata	Chief Fisheries Officer, Fisheries Division
Holmes Saeve	Principal Fisheries Officer, Rural and Provincial Development
Malcom MacGregor	Fisheries Division
John Collins	Head, School of Marine and Fisheries Studies, Solomon Islands College of Higher Education
Colin C. Brown	Sr. Lecturer, School of Marine and Fisheries Studies
C. Piper	Automotive Mgr., Mendana Motors (Evinrude)
Mike Bowman	Superintendent of Marine
Niel Isihanua	Search & Rescue Officer, Marine Division
Lee Kwok Kuen	Suzuki outboard dealer
Malcom Kausemai	Mariner outboard dealer
Paul Nichols	Coordinator, Pacific Regional Marine Resources Development Programme (EC/FFA)

VANUATU 18, 22 March 1991

Lt. John Taleo	Commanding Officer, National Emergency Operations Centre, Police Headquarters, Port Vila
Wycliffe Bakeo	Director of Fisheries
Robert Lindley	Principal Fisheries Extension Adviser
Bruce Wilson	Maritime Surveillance Adviser, Police Headquarters
Capt. Norris Hamish	Director of Ports and Marine
Bruce Robertson	Administration, Fisheries Department
Capt. Roan Heru	Marine Training School, Port Vila
Kenneth Tabi	Engineering Instructor, Marine Training School
Paul Derrick	General Manager, Pentecost-Vanua Trading Ltd. (Evinrude dealer)

NOUMEA 19-21 March 1991

Peter Cusack	Fisheries Development Officer, SPC

TUVALU 27-30 March

Satalaka Petaia	Fisheries Extension Officer
Dick Lee	General Manager, NAFICOT
Mike Savins	FAO/UNDP Boatbuilder
Tim Gentle	Fisheries Division
Viliamu Alefaio	Chief Officer, Tuvalu Maritime School
Eti Esela	Marine Officer, Tuvalu Maritime School
Vincent Bick	Chief Engineer, Tuvalu Maritime School
Uaelesi Taafaki	Inspector, Tuvalu Police
Sio Patiale	Head, Marine Department
Siuola Esau	Radio Operator, Funafuti Radio

KIRIBATI 31 March -3 April

Capt. Beiaiti Highland	Marine Superintendent and Harbormaster
Murray Turley	Operations Manager, Air Tungaru
Teekabu Tikai	Chief Fisheries Officer
Being Yeeting	Senior Fisheries Officer
Colin Foster	Manager, Te Mautari
Charles Corbett	Kiribati Island Exporters
Cliff Farr	Yamaha Distributor
Hans Fockenga	Captain Superintendent, Marine Training Centre
Bwebwetara Uaua	Instructor, Marine Training Centre
Tatonga Federhan	Instructor, Marine Training Centre
Nakala Kapoa	Captain, FV BAEAO, Te Matauri
Sekone Toua	Captain, FV MOAIKA, Te Matauri

NAURU 8,15 April (by telephone)

Peter Jacob	Department of Island Development and Industry (Fisheries)
Barry Cranston	Director, Civil Aviation

APPENDIX 12

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