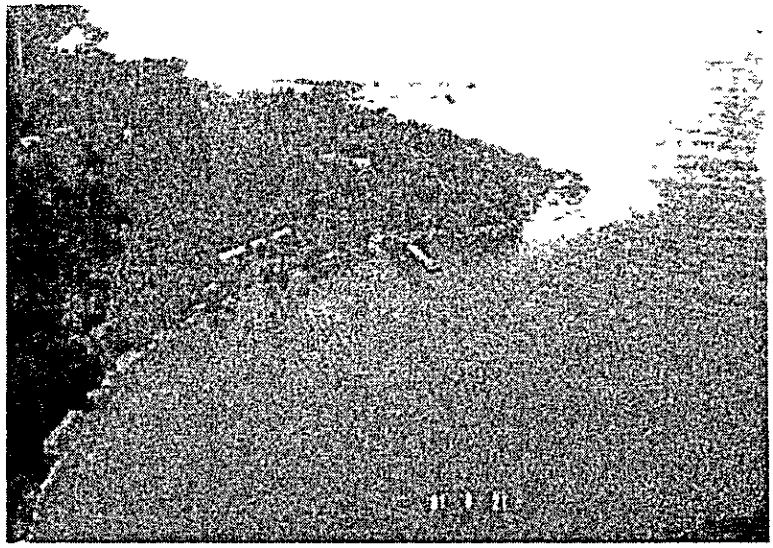
F) 参考写真

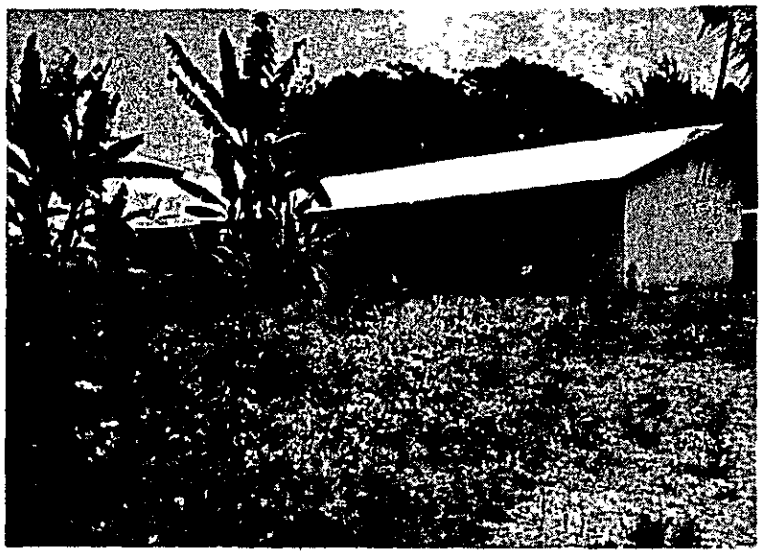


建設予定地：Afio

建設予定地：Gizo

既存施設：Gizo

建設予定地：Kira Kira

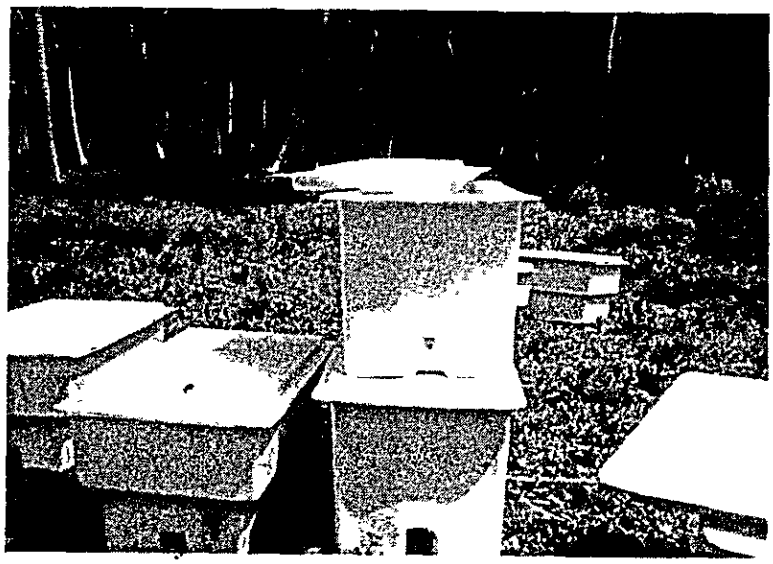


既存施設：Kira Kira

建設予定地：Yandina

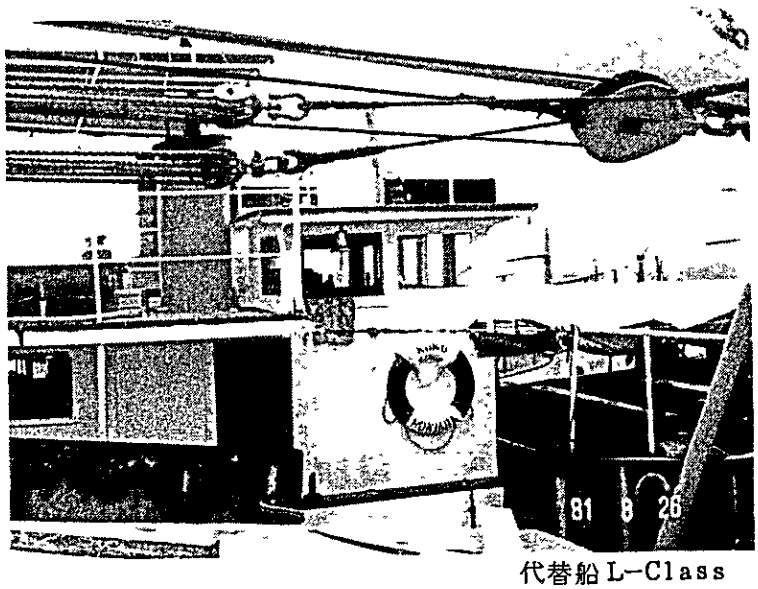
Marketing Area 内部(Kira Kira)

Marketing Area の冷蔵魚

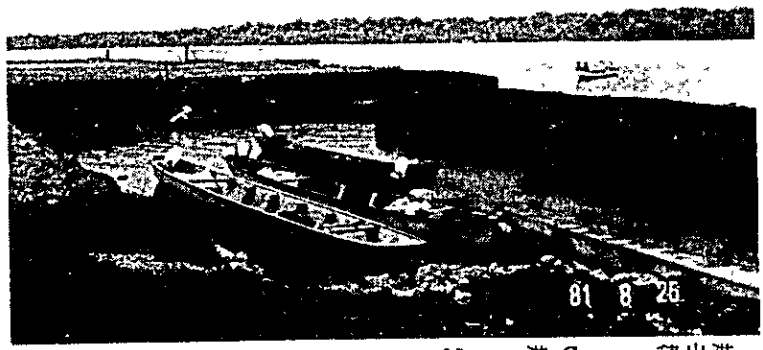


生産中のアイスボックス

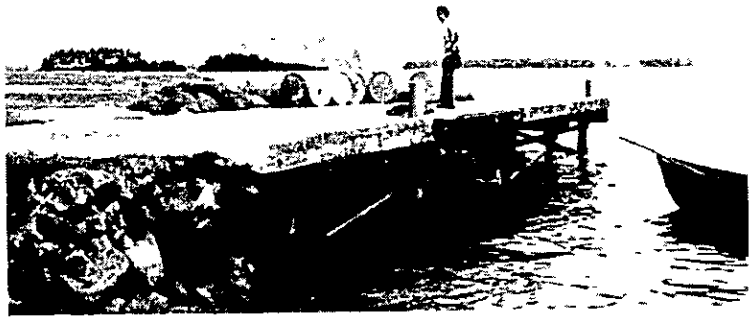
漁民の住宅



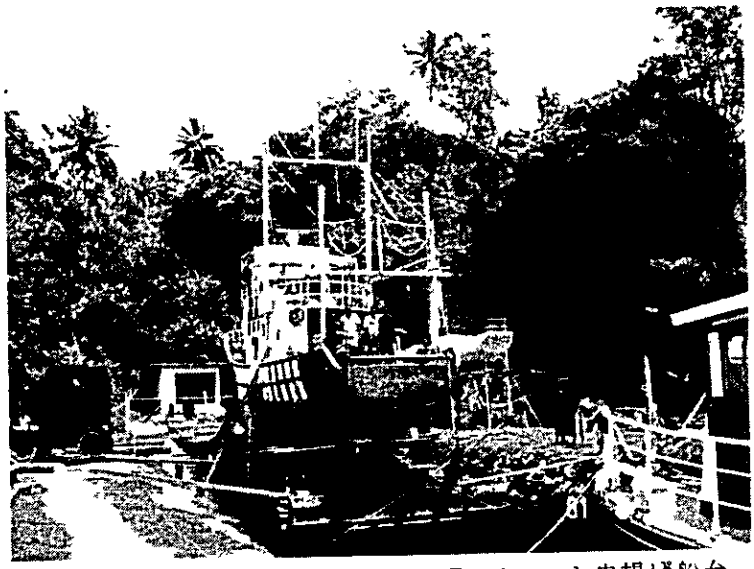
代替船 L-Class



Noro 港 Copra 積出港



Munda 港



Tulagi Dockyard 曳揚げ船台

前回供与した船（BULAWA）

Ⅱ　ソロモン諸島の概要

(1) 領　域

ソロモン諸島は，東南から北西に平行してのびる６つの大きな島とその領域には無数の小島（うち比較的大きい島は約５０島）によって形成される。

領域の総面積は約６０万Km²，陸地面積は２８,９００Km² で，四国の約1.５倍に相当する。

南緯５度～１２度，東経１５５度～１７０度の広い水域内にひろがる。

主要な島々は北から東南外側にショアズール（Choiseul），サンタ・イサベル（Santa Isabel），マライタ（Malaita），サン・クリストバル（San Cristobal）内側にニュージョージア（New Georgia），ガダルカナル（Guadalcanal）の各島で，各島の長さ145～２００Km前後，幅３０～５０Km程度で主島のガダルカナル島の面積は約5,６５０Km²，シドニーの北東へ約2,５７５Km，ポート・モレスビー（パプア・ニューギニア）の東へ約1,６００Kmのところに位置する。

(2) 地　勢

メラネシアの一部をなすソロモン諸島とサンタクルーズ諸島は長大な海嶺の最も高い部分が海面上に突き出てできた島々である。この海嶺は東に凸面をもった弧を描いている。このうちブーゲンビル島を除くと，ソロモン諸島はショアズール島からサンクリストバル島まで，全長８００Kmにわたり，ほぼ平行な２本の島弧を描いて並んでいる。北東のものは狭い海嶺の上に乗った島々からなり，それらの島々は海嶺の方向に細長くのびている。一方，南西側の島弧の島々は幅広で，東に連なる島々より配置が不規則である。

島は全般的に山がちで険しく，ガダルカナル島にはマカラコンブ（２４４７ｍ）などの高い山がそびえている。ほとんどが火山噴出によってできたもので，その後，風化作用が進んで亀裂や分断が起こった。したがって，これらの島々では平地に乏しく，わずかにガダルカナル島の北東海岸に海岸平野がみられる程度である。

ソロモン諸島はサンタクルーズ諸島と同様，数回の造陸運動を経ている。このため現在の島（火山帯には顕著な断裂と断層がみられる）は永い間海中にあったものが隆起したもので，反対に現在海底にある部分はかっては海面上に出ていた部分である。火山島の低地部のほとんどは多量の海成生物の堆積岩によっておおわれており，また海岸段丘が発達している。このほか，もっぱらサンゴ礁からなっている島々もある。

サンゴ礁は火山（おそらく非常に古い時代のもので片岩質である）の上にできていて，火山が徐々に海中に沈んでいく過程で，その上に造礁サンゴが発達したものと考えられている。火山活動はあまり活発ではないが，ホニアラから３０Kmほど離れたサボ群島の東端などに二次的

な火山現象がみられる。

(3) 気　候

気候は熱帯性で，高温多湿である。しかし，この暑さは日中と夜間で交替する風，貿易風，モンスーン性の風などによって緩和される。４月から１１月の間風力の強弱はあるが常に南東から吹きつける貿易風は，時には時速５０Kmを超えることもある。モンスーン性の風は１１月から４月にかけて主に西または北西の風である。この時期の気候は変化しやすく，しばしばサイクロンにみまわれる。

降水量は年平均3,200㎜前後であるが，地域による降水量は差は大きい。降水量の多少は海洋をわたってくる貿易風に起因し，風上側の斜面では7,500㎜にも達することがある。風下の斜面，沿岸地帯，高山によって風をさえぎられている所などでは少なくなるが，それでも220㎜という高い数値を示す。

(4) 動植物

ソロモン諸島の潜在的な植生は熱帯雨林であるが，人間の手が加えられてまばらになっている所が多い。森林地帯の林間には草地が広がり，ガダルカナル島やサンクリストバル島などでは風下に向かうにつれて徐々にサバナ地帯へと移行している。

動物相は植物相と同じようにあまり豊富ではない。諸島内に広くみられる野生の動物には野豚，有袋類のオポッサム，大河川の淡水産のワニ，多数のヘビ（ほとんどが無毒），トカゲ，およびただしい鳥類と昆虫がある。

(5) 人　口

正式には全人口調査が施行されたのは，１９７０年２月で１６０,９８８人であった。人口比率はメラネシア人が圧倒的に多く９４％を占めた。次いでポリネシアの各小島から移住したポリネシア人が多い。代表的なものはオントン・ジャワ（Ontong Jawa），Sikaiana，レンネル（Rennel），ベロナ（Bellona），の各島やチコピア（Tikopia）島である。人口動態は次のとおり。

種別＼年度	１９７０年	１９７３年	１９７６年	１９８０年
メラネシア人	149,667人	166,640人	183,665人	—
ポリネシア人	6,339	7,120	7,821	—
ミクロネシア人	2,362	2,610	2,753	—
ヨーロッパ人	1,280	1,280	1,359	—
中国人	577	580	452	—
その他	713	710	773	—
計	160,998人	178,940人	196,823人	230,873人

もっとも人口の多い島はマライタ島で，全人口の３割近くが集中している。１９７６年度の推定ではほとんどメラネシア人で６万人をオーバーしている。次に多いのはガダルカナル島で１９７０年度は３５,１８７人であったが，１９７６年度は４６,６１９人であった。

第二次世界大戦末期に新しく誕生した首都ホニアラの人口は１９７０年には１１,１９１人であったが，１９７６年には１４,９４２人，１９８０年には１８,５３９人であった。

Ⅲ 参 考 資 料

Rural Fisheries

Development Project

Solomon Islands Government

This project document has been prepared by

J.F. Martin	Senior Planning Officer Central Planning Office
N.P. Stone	Senior Fisheries Officer Fisheries Division Ministry of Natural Resources

RURAL FISHERIES DEVELOPMENT PROJECT

CONTENTS

FEATURES

Exterior has Hammertone Enamel on Rust-resisting Galvabond Steel.

Brine Tank & Evaporator are constructed of heavy gauge steel, surface treated after fabrication.

Insulation is 7.5cm. of Polyurethane.

Construction is welded steel with the refrigerating unit and brine tank assembled on separate lifting frames.

Ice Moulds are tapered. To form ice blocks with approximate dimensions of 10.2cm. x 30.5cm. x 65cm. Twelve moulds supplied in the B400 and 24 in the B800.

Maximum Nett Weight of ice block is approximately 16.5kg.

Dust Covers over ice moulds.

TECHNICAL SPECIFICATION

Condensing Unit as standard incorporates an air-cooled belt-driven compressor.

Motor: B400 2.24kW, B800: 5.22kW, totally enclosed fan cooled with "Direct on Line" starting.

Power Requirements: 415 volt 50 Hertz 3 phase with a neutral. or diesel engine 6 hp to 10 hp.

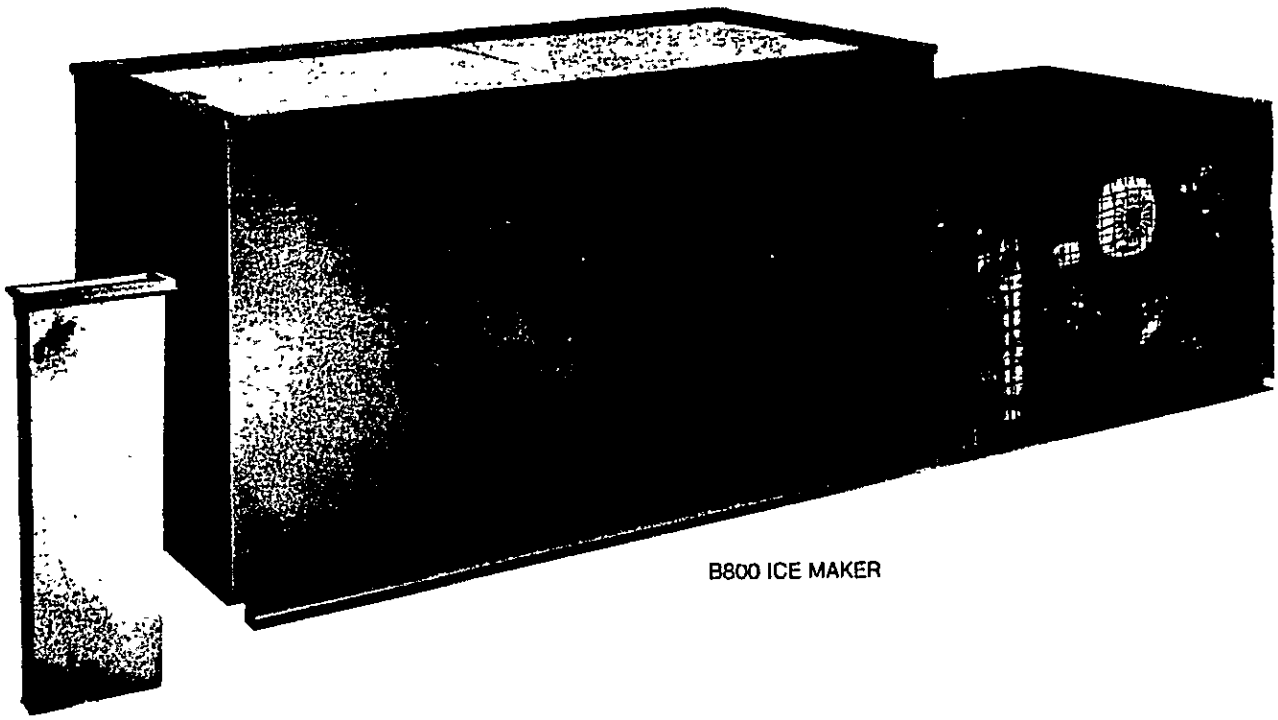
Production Capacity at design conditions of 32 C. ambient and 21 C. water is 400kg. & 800kg. based on 2 Harvests per 24 hours.

Dimensions

APPROX. DIMENSIONS	LENGTH	WIDTH	HEIGHT	VOLUME
UNCRATED				
B400	221cm.	97cm.	120cm.	2.55) m^3
B800	338cm.	97cm.	120cm.	3.93) m^3
CRATED				
B400	231cm.	107cm.	134cm.	3.28) m^3
B800	250cm.	107cm.	134cm.	5) m^3

Conversion from Metric to Imperial Units
LENGTH-(cm) to inches x .394
POWER.(kW) to H.P. x 1.341
MASS-(kg) to pounds x 2.205
VOLUME-(l) to pints x 1.76

ELECTRIC POWERED BLOCK ICE MAKER
MODEL B800



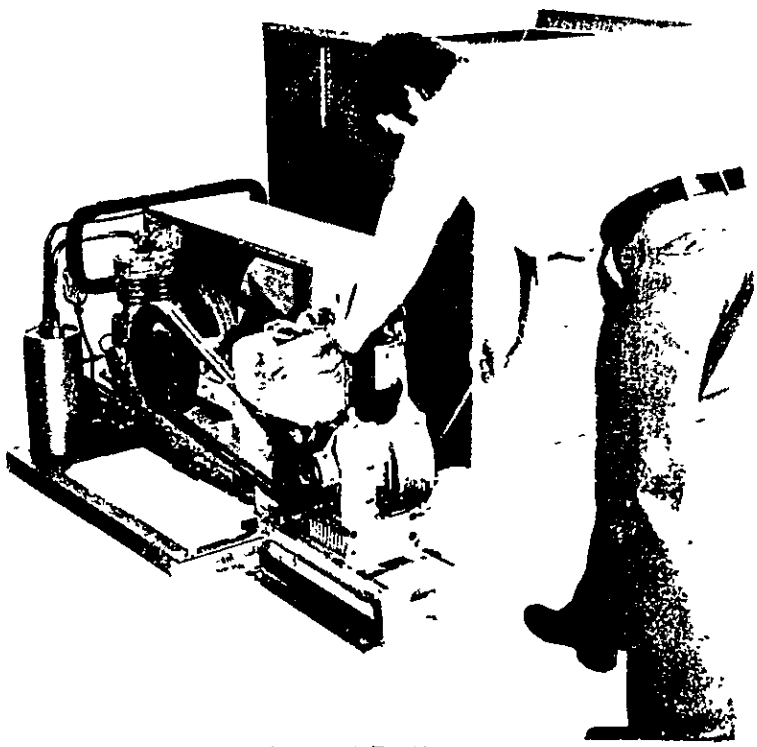
B800 ICE MAKER

ICE MOULD

WITHOUT ELECTRICITY

DIESEL POWERED BLOCK-ICE makers

the B400D to produce 400kg – & the B800D to produce 800kg – of ice blocks each 24 hours



Illustrated The Model B400D

RURAL FISHERIES DEVELOPMENT PROJECT

PROJECT FOCUS, DESIGN AND RATIONALE

I: PROJECT SUMMARY

Solomon Islands has most of the necessary elements for the successful development of an artisanal fishing industry, as well as the need for its development. The large fish resources, capable and willing fishermen and available markets indicate the potential, while the lack of income-earning opportunities in many of the rural areas of Solomon Islands indicates the need. The major constraints to development of this industry have been the lack of marketing and transport facilities, the unavailability of training and extension programmes and the lack of an appropriate organisational framework.

This project has been developed to overcome the marketing and transport constraints to development, and to provide facilities for the successful implementation of training and extension programmes. The components of the projects require the supply of 20 block ice-making machines, 500 insulated ice-boxes, 8 fisheries centres, 2 fish collection and distribution vehicles and 1 fish transportation vessel.

The project covers the needs of all seven provinces of Solomon Islands, taking into account their fish resources, fishing population, available markets and alternative income-earning opportunities. The focus of this project is in conformity with Solomon Islands' objectives of de-centralisation and income distribution, improved access to economic growth, increased job opportunities and greater self-reliance. Administration and control of the project will be in the hands of fisheries officers attached to, and responsible to, Provincial Governments. The Fisheries Division of the Central Government will assist and co-ordinate the efforts of the Provinces, and provide the necessary research and support facilities where required. Ownership of the capital equipment provided will be vested in the Fisheries Division of the Central Government.

The total cost of the project is SI$956,000 of which approximately 90 percent is foreign exchange cost. This is comprised of 20 ice-machines $177,000, 500 insulated ice-boxes $149,000, 8 fisheries centres $552,000, 2 vehicles totalling $20,000 and 1 fish collection vessel $58,000. Half of the buildings, ice-machines and insulated ice boxes as well as the fish collection vessel will be supplied in the first year, whilst the remainder, including the two vehicles, will be supplied in the second year.

Overseas aid amounting for $779,000 is being sought for the fisheries centres, insulated ice boxes, fish collection vessel and vehicles over a two year period, whilst $177,000 will be required for the purchase of the ice-machines.

When fully operative, the project is expected to enable 1,200 tonnes of ice to be produced and result in the marketing of 840 tonnes of fish annually. Employment provided by the project will be in the region of 4,200 persons, being divided into approximately 375 fishing groups located throughout the seven Provinces.

With an expected value-added of $0.60 per kg of fish produced, the Internal Rate of Return of the project, based on a 15 year life is estimated at 37 percent, whilst at the lower price level of $0.50 per kg and higher price level of $0.75 per kg, the IRR estimates were 26 percent and 55 percent respectively.

II BACKGROUND

Solomon Islands is a scattered archipelago extending over 1,400 km from one extremity to the other, covering a total area of some 29,000 sq.km. Six large islands - Choiseul, New Georgia, Santa Ysabel, Guadalcanal, Malaita and Makira - account for most of the country's 5,650 sq.km. The main islands are all mountainous, covered with thick tropical rain forests and intersected by rivers. There are few areas of alluvial plains, the major one being on North Guadalcanal.

The country is divided into seven provinces, with populations ranging from 10,000 to 60,000. The three most densely populated provinces, Malaita, Western and Guadalcanal contained two-thirds of the total population of 197,000 at the time of the 1976 census. The capital city of Honiara, situated on the north coast of Guadalcanal is distinct from the province and has 16,000 inhabitants; other urban centers have less than 2,000 inhabitants each. The populations of the remaining four provinces vary from 10,000 to 15,000. By 1980, the estimated population of Solomon Islands was 225,000.

Most of the population reside in small, widely dispersed settlements along the coasts. 60% of the people live in localities with fewer than 100 inhabitants and more than 80% in localities with fewer than 200. The country's division into numerous islands, a low population density and the dispersion of the population in small settlements make inter-island shipping the main mode of transportation.

Village life is important in the Solomon Islands. The communal ownership of most land, the extended family system and an ethic of sharing goods and property between relatives, which is known as the wantok ("one-talk") system, exercise a deep and pervasive influence on the country's socioeconomic milieu.

The most disturbing feature of the rural areas, where 90% of the population resides, is the sparsity of opportunities for earning cash income. The per capita cash incomes in rural areas are low in absolute terms as well as relative to those in urban areas. Because of the emphasis on large-scale agriculture, and the high dependence of rural households' cash income on the price of copra, the cash income of rural households from crop production has grown at a slower pace than other monetary incomes. Greater attention is therefore being given to enlarging and diversifying opportunities for earning cash incomes in smallholder primary industries since, with the subsistence activity providing a relatively comfortable standard of living, rural production and incomes can only be substantially increased through the expansion of opportunities for selling marketable surpluses for cash.

III RURAL FISHERIES DEVELOPMENT

(i) Fisheries Development

Commercial development of the fish resources of Solomon Islands is of very recent origin. In the early 1970's surveys indicating the availability of commercial quantities of tuna led to the establishment of the Fisheries Division within the Ministry of Natural Resources in 1973. Prior to this time the only commercial exploitation of the marine resources was in the traditional Pacific Island marine products such as beche-de-mer, trochus and turtle shell.

Although initial efforts were directed towards the establishment of a commercial tuna fishing industry, in 1975 attention was also focussed on the traditional fishing activities of the rural sector (artisanal fisheries) where both the skills of the fishermen and the available fish resources were in abundance.

...../4

Since that time, a bi-modal path of fisheries development has been pursued by the Fisheries Division. On the one hand, the joint venture tuna industry established with a Japanese Company has become a major income earner for Solomon Islands, bringing in valuable foreign exchange and providing employment opportunities for a large number of Solomon Island people (see Appendix I for further information). On the other hand, development of the artisanal fishing sector has provided valuable income-earning opportunities for rural villagers, enabled the training of village fishermen and increased the availability of fresh fish to both rural and urban markets. The rural fisheries scheme has become an integral component of Solomon Islands' rural development programme.

(ii) The Rural Fishing Industry

Prior to these developments, traditional fishing activities were typically of a subsistence nature, with bartering generally being the sole form of exchange. The lack of effective storage and marketing facilities was seen as a major stumbling block to the expansion of artisanal fishing. The generally low population density and transport difficulties in the widely scattered islands of Solomon Islands compounded these difficulties. At the same time, the limited opportunities for local employment or for agricultural activities (often confined to subsistence farming plus copra production) indicated an urgent need for alternative income-earning opportunities.

To overcome these limitations, a pilot fish collection and marketing scheme was launched in 1975 based on the supply of flake ice and insulated collection boxes to fishermen. Using scheduled Government and private shipping services and, where possible, the existing road structure, ice was sent out to the fishermen and the fish/ice returned to the marketing centres (principally to Honiara, the capital).

The supply of improved technology in the form of two block ice-making machines in 1976 (donated by Japan) and fibreglass insulated boxes in later years enabled a substantial increase in the potential for the regular supply of fresh fish to the rural and urban markets.

Since that time, a co-ordinated programme of development has been pursued incorporating three main activities. These are firstly, the provision of ice-making facilities and insulated boxes to fishing groups in the rural areas; secondly, the development of marketing centres (including, where necessary transport to these centres) and a guaranteed price scheme; and thirdly, the provision of training programmes in fishing techniques and

marketing organisation to fishermen and fishing groups.

By 1980, eight ice machines had been installed in the seven Provinces of Solomon Islands (see Map 1) and 123 insulated boxes supplied. Fisheries centres had been established in each of the Provinces (see Map 2). These centres provide market outlets for fish caught, house ice-making facilities, and have been the focus for training and extension programmes in the Provinces. They are operated by the Provincial Fisheries Officer attached to each Province, together with an assistant fisheries officer and appropriate support staff. Some of the centres are large and well equipped, while others, particularly newly formed centres, presently operate with minimal facilities. Appendix II provides details of present and proposed facilities for the Provinces.

The expansion in market outlets for the fish catch was advanced with the formation of SIACO, a semi-commercial company, in 1977. The initial purpose of the company was to provide improved marketing and retailing facilities for the Honiara market and ensure the effective operation of the fish pricing policy. Although experiencing initial trading difficulties, SIACO is being developed as a major component of the rural fisheries programme. By providing a direct outlet for the fish catch, maintaining an appropriate price structure, and offering a regular supply of fresh fish to the large Honiara market, SIACO is becoming a key element in the expansion of the artisanal fishing industry. A branch of SIACO has since been established on the well-populated island of Malaita.

In April 1979, a fish collection vessel, donated by the Japanese Government, came into operation. This vessel was operated by SIACO, conducting regular trips to the Provinces (principally to the resource abundant but isolated Marovo Lagoon in the Western Province) and depositing the catch in Honiara for sale by SIACO. Despite some setbacks including breakdowns, this vessel has been instrumental in the expansion of marketed fish production, particularly in the Western Province, where the lack of shipping has been a major constraint to fisheries development.

Both SIACO and the fish collection vessel have experienced problems associated with the development of a new industry. However, as the fisheries training and extension programmes are extended, ice making using facilities made available, marketing infrastructure (including transportation) developed and pricing policy monitored, the long-term future of this integrated programme is assured.

IV. PRODUCTION

Total production from the rural fisheries sector is difficult to assess due to the subsistence nature of the industry. Marketing records have, however, been kept by the Fisheries Division since September 1977. As an estimated 75 percent of all fish sold is done with the assistance of Fisheries Division staff, it is possible to monitor total fish sales.

In Table I, the quantity of fish marketed through the Fisheries Division since September 1977 is presented.

TABLE I

QUANTITY OF FISH MARKETED THROUGH FISHERIES DIVISION

YEAR	QUANTITY (kgs)	SIACO COMPONENT (kgs)
1977 (Sept - Dec)	13,374	
1978	51,470	51,470
1979	97,346	64,539
1980	135,241	

Note: 1. Estimated annual production based on amount of 67,620 kgs to June 30 1980.

Source: Fisheries Division, Ministry of Natural Resources.

From negliable amounts in 1976, when ice facilities were generally unavailable, the quantity of fish marketed has risen from 13, 374 kgs in the last four months of 1977 to an estimated 135,241 kgs for 1980. In the eight months of 1979 in which the Ufi Na Tasi was operational, 40,555 kgs of fish were marketed while in the first three months of 1980 the quantity was 30,153 kgs.

...../7

The increase in marketed fish production reflects the steadily increased input of materials and equipment to provincial areas, the benefits of good training and extension work to the fishermen, and the operation of a guaranteed price scheme. Whilst this increased production is welcomed, the total catch sales are extremely low when the bast available resource and potential demand are considered.

One of the limitations to further development of the industry is the limited availability of the necessary capital equipment. The Rural Fisheries Development Project has been conceived as a means of over-coming this limitation.

V. THE PROJECT

1. Objectives

The Project's principal objective is to increase marketed fish catches within the rural areas of Solomon Islands and thus enable fishermen to generate increased incomes from the better utilization of its substantial fish stocks.

The project will supply the facilities required to enable new fishing groups, individuals and village communities to include fisheries as a significant element of their activities.

The project will provide hygienic and reliable marketing outlets for these catches to enable successful local marketing to be initiated and increase the availability of reasonable priced high quality protein to rural inhabitants.

The project will provide additions to the established transportation facilities to enable smooth deliveries from catching points to market areas.

The project will provide the necessary infrastructure for the efficient implementation of extension and training programmes.

2. Components

Requirements for the project are -

20 Block ice making machines

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8 Prefabricated Provincial Fisheries Centres

2 Fish collection and distribution vehicles

500 Insulated Ice Boxes

1 Fish collection vessel.

(i) Block Ice Making Machine

The 20 machines will be located within the seven Provinces to give a distribution as follows:-

TABLE 2

BLOCK ICE MAKING MACHINES

Province	Present	Number Proposed	Total
1. Malaita	2	3	5
2. Western	3	7	10
3. Makira/Ulawa	1	3	4
4. Ysabel	1	2	3
5. Eastern Outer Islands	1	1	2
6. Central	0	2	2
7. Guadalcanal	4	2	6
	12	20	32

Locations for these installations are indicated in Map I, Appendix 2. This Appendix also provides further details of the siting of these machines and their usage.

(ii) Provincial Fisheries Centres

These buildings have been designed to incorporate living accommodation for extension staff, training and office area and fish marketing and ice making facilities.

...../9

In Table 3, the locations of existing and proposed centres are provided. These may be seen in Map 2, Appendix 2. Further information is provided in this appendix.

TABLE 3

PROVINCIAL FISHERIES CENTRES

Province	Location of Completed Existing Facilities	Proposed (1) Facilities	Total Number
Malaita	Auki	Afio	2
Western	South Marovo	Gizo (2)	3
		North Marovo	
Makira/Ulawa		Kira Kira (2)	1
Ysabel	Tatamba	Kiolo	2
Eastern Outer Is.		Graciosa (2)	1
Central	Tulagi	Yandina	2
Guadalcanal	Honiara	Marau (2)	2
	5	8	13

Notes: (1) Includes fisheries bases that are to be upgraded.

(2) Facilities to be upgraded by installing fisheries centre building.

iii) Insulated Ice Boxes

The present number of insulated ice boxes and those proposed in this project are distributed within the Provinces as follows:

...../10

TABLE 4

INSULATED ICE BOXES

Province	Number		Total
	Present (1)	Proposed (2)	
Malaita	30	90	120
Western	30	90	120
Makira/Ulawa	10	50	60
Ysabel	8	50	58
Eastern Outer Islands	-	45	45
Central	5	65	70
Guadalcanal	40	110	150
Total	123	500	623

Notes: (1) Only about 70 -.80 are of the improved fibre glass type - the remainder are to be replaced.

(2) With project.

Further details are contained in Appendix 2.

iv) Transportation Facilities

The transport requirements of individual province differ significantly. Existing transportation services where available and appropriate are used. However difficulties in (i) obtaining proper handling facilities for the perishable fish/ice cargo and (ii) the irregularity of service neccesiates specific transportation for fish being made available.

The transportation facilities required for the success of this project are -

a) A fish selling van for Malaita
b) A four wheel drive fish collection and distribution vehicle for Guadalcanal Province.
c) Fish collection vessel for Western Province

Supporting information is contained in Appendix 2.

...../11

VI. BENEFITS

The immediate benefit of the project is the increase in marketed fish production with consequent beneficial effects on incomes of fishermen, employment opportunities and satisfaction of consumers.

Other benefits flowing from the project are an increased self-sufficiency in food production, reduction in imports (canned fish imports were valued at $300,000 in 1979) and a consequent saving in foreign exchange. At the present time, Solomon Islands is unable to meet domestic demand for beef, though a policy of increased beef production is being pursued. Availability of fish will ease the domestic demand for protein, with a consequent easing in demand for beef.

The project is expected to have a major impact on the production of marketed fish. From negligable amounts in 1976, the quantity of fish marketed through official channels had risen to 51.5 tonnes in 1978 and 97.3 tonnes in 1979. Expected production for 1980 is 135.2 tonnes. Increased fish production arising directly from the project is estimated at approximately 840 tonnes per annum when fully operative. This level is expected to be achieved principally by the availability of ice machines and ice boxes as well as the results of improved extension and training programmes which will be able to be undertaken through the fisheries centres. The retail value of this production in the Province is approximately $672,000 per annum ($0.80 per kg), while the gross value to the fishermen is $462,000 ($0.55 per kg). On average, 72 tonnes of ice will be able to be produced per ice machine per annum. In Appendix 3 estimates of production potential relative to the demand for fish are considered.

Employment opportunities in rural areas will be considerably expanded by the project. Since the commencement of rural fisheries development about 108 fishing groups have been established, providing employment opportunities for approximately 1,200 people. The following table indicates the present number of fishing groups and fishermen, and those expected to result from the project.

...../12

TABLE 5

PRESENT AND PROJECTED EMPLOYMENT

Province	No. of Fishing Groups			No. of Fishermen (1)		
	Present	With Project	Total	Present	W/Project	Total
Malaita	30	70	100	330	770	1100
Western	40	120	160	440	1320	1760
Makira/Ulawa	12	30	42	132	330	462
Ysabel	4	25	29	44	275	319
Eastern Outer Islands	-	25	25	-	275	275
Central	10	60	70	110	660	770
Guadalcanal	12	45	57	132	495	627
TOTAL	108	375	483	1188	4125	5313

NOTE: (1) Based on an average of 11 fishermen per group including full and part-time fishermen.

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Secondary benefits arising from the project include an increase in rural marketing activity around the project sites. It is already apparent that where ice-making and fish marketing facilities have been provided, vegetable and other produce markets are encouraged and village stores often erected. In addition, the availability of ice enables villagers to store perishable foods, and to permit clinics and health centres to store vaccines. In the longer term, the stimulus provided to the rural fishing industry will encourage the local manufacturing industry - particularly boat building and fishing gear manufacture.

VII COST OF THE PROJECT

A summary of the capital cost of the individual items and their corresponding operating (recurrent/running) costs when fully operative is provided in Table 6. A more detailed analysis is seen in Appendix IV.

TABLE 6

CAPITAL AND OPERATING COSTS OF PROJECT COMPONENTS

ITEM	NO.	CAPITAL COST					OPERATING COST	
		Per Unit ($)	Foreign Exchange ($)	Local Cost ($)	Total ($)	Including Contingency (15%)	Per Unit ($ p.a)	Total ($ p.a)
Ice Machines	20	7,678	140,200	13,360	153,560	177,000	4,109	84,180
Insulated Ice Boxes	500	258	125,000	4,000	129,000	149,000	0	0
Fisheries Centres	8	60,000	408,000	72,000	480,000	552,000	2,020	16,160
Vehicles	2	(8,660av)	17,000	320	17,320	20,000	2,600	5,200
Collection Vessel	1	50,000	48,000	2,000	50,000	58,000	20,100	20,100
T O T A L			738,200	91,680	829,880	956,000		125,640

Capital costs, including 15 percent contingency, amount to $956,000 whilst total operating costs when the project is fully operative amount to $125,640 per annum. Operating costs and replacement of capital items are provided for by income generated from the project. See details of the economic analysis in Appendix 4.

VIII ECONOMIC ANALYSIS

The total project has been subjected to an economic appraisal, details of which are provided in Appendix 4. The assumptions used and method of calculation are considered in detail in this Appendix.

In the most likely outcome, it is considered that the value added of fish caught as a result of the project is $0.60 per kg and that the provision of each ice-machine, plus insulated ice-boxes, should result in a production of iced fish of 42 tonnes per annum. As Appendix 4 indicates, both estimates are regarded as conservative. On this basis, and using relevant cost information, the Internal Rate of Return of Return from the project is 36.9 percent.

Sensitivity analysis, using value-added levels ranging from $0.50 per kg to $0.75 per kg, resulted in Internal Rate of Return estimates of 25.7 percent and 54.6 percent respectively.

The high internal rates of return reflect the fact that some of the staff and facilities for rural fisheries development have already been provided and hence small amounts of additional capital in the form of ice-machines, insulated boxes, buildings and transportation are able to generate rather large returns in the form of additional fish marketed. The high return also reflects the fact that with the high-valued fish resource readily available, returns to fishing projects, as compared to other primary industries, are shown to be very attractive.

IX ADMINISTRATION, TRAINING AND MANPOWER

(i) Administration

Solomon Islands Government is presently strengthening the powers and responsibilities of Provincial Governments. Responsibility for rural fisheries development presently lies in the hands of the Provincial Fisheries Officers and staff attached to the individual provinces. These officers will be responsible for the implementation of the project with the Fisheries Division of central government providing support and direction where required and ensuring that items made available by the project are optimally allocated.

For the implementation of the project, the insulated ice-boxes will be supplied to the fishing groups either by grant, loan or leased from the Provinces. Provinces will utilize the buildings and vehicles (where applicable) and charge for the services provided. The charges imposed on fishermen will reflect the operating costs of individual items (as indicated in Table 6), as well as the necessity to collect funds for the replacement of the necessary capital equipment. Administration of these funds will be in the hands of the Provincial Government, with audited accounts being made available to the Fisheries Division of the Central Government.

(ii) Training

Training and extension programmes are conducted by Provincial Fisheries Officers to increase the technical and managerial skills of village fishing groups. In addition, a localisation programme for Fisheries Officers also involves training of local staff. These programmes will continue over the life of the project.

(iii) Manpower

Manpower requirements for the project will principally be supplied from present and additional fishing groups. See Table 5. Fisheries Officers and staff are presently located in the provinces, hence few additional staff will be required to operate the Fisheries centres. In the longer term, additional staff may be required to assist in marketing the fish.

B

APPENDIX 1

THE TUNA FISHING INDUSTRY

APPENDIX I

THE TUNA FISHING INDUSTRY

The development of fisheries on a significant scale commenced with the establishment of Solomon Taiyo Limited (STL) in February 1973 as a joint venture between the Taiyo Fishing Company of Japan and the Government. This followed a survey conducted during 1971-72 by Taiyo which indicated that the skipjack tuna industry had significant potential. STL operates a main fishing base, including freezing and cold storage facilities, and a cannery in Tulagi, facilities for the smoking of fish in Tulagi and Noro, and a second fishing base in Noro. Expansion plans include establishment of a second cannery at Noro.

STL's catch of skipjack tuna has increased substantially, from 10,958 tonnes in 1974 to 23,843 tonnes in 1979, although the annual catch, subject to seasonal fluctuations, has varied significantly. The catch is brought in by a fleet of some 23 skipjack pole and line vessels.

Substantial fishing resources, including those of skipjack tuna, which have yet to be exploited on a sustainable basis, are thought to exist. A Project to significantly expand the skipjack tuna catch and to enable greater local participation is being implemented by the National Fisheries Development Company (NFD) which was established in 1977. This involves the construction and operation of fishing vessels for STL. The project, to be completed during 1978-82 with the participation of STL, is financed mainly by a loan from the ADB and a small technical assistance grant from the New Zealand Government. The Government owns 75% of the equity of NFD and STL the remaining 25%. Training Solomon Islanders is under way at the Honiara Technical Institute to gradually replace the Japanese crew who will initially provide the expertise to operate the boats. At full development, its catch is expected to reach some 8,000 tonnes of skipjack tuna annually.

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APPENDIX 2

PRESENT STATUS OF EXISTING FISHERIES FACILITIES IN THE PROVINCES AND FUTURE REQUIREMENTS

APPENDIX 2

PRESENT STATUS OF EXISTING FISHERIES FACILITIES IN THE PROVINCES AND FUTURE REQUIREMENTS

2.1 Malaita Province

2.2 Western Province

2.3 Santa Ysabel Province

2.4 Central Islands Province

2.5 Guadalcanal Province

2.6 Makira/Ulawa Province

2.7 Eastern Outer Islands Province

Maps 1 and 2 indicate the present and proposed location of fisheries centres and ice machines. These are discussed in the following sections on a Provincial basis, as well the other proposed developments in these areas.

2.1 Malaita Province

A large market, ice production and freezing facility are at the Provincial capital, Auki. Malaita has the highest population in S.I. and consequently, fish is in great demand locally.

A large well equipped Fisheries Centre has been built at Auki, courtesy of Japanese aid. The centre has office space, workshop and classroom/work areas as well as stores and toilet facilities. The centre has greatly assisted the working of the Provincial Fisheries Division and the rapid developments within the Province during 1980 can be attributed to the provision of the centre.

At present most fisheries development has been confined to North Malaita, in Langa Langa Lagoon near Auki, and to a lesser extent in the East. These areas are all served by road transport. The South of Malaita has received very limited attention so far due to the poor communications that exist in the area, and with no ice making facilities, the supply of fresh fish to the Auki Market is not viable. There is potential for significant development in the area, but it will require inputs of extension and resources. At present extension is very difficult to carry out in the area due to the large amounts of time wasted in travelling, general equipment shortages, and particularly storage and marketing difficulties.

It is proposed to initiate a sub station in Afio, South Malaita to be manned by 2 fisheries officers in 1980. One officer would be supplied from Auki, the other will be provided either through local recruitment or through secondment from MNR, Honiara.

The station will be the basis of the fisheries development programme for South Malaita in accordance with the Malaita Province Fisheries Division 5 Year Development Plan 1980 - 4. The station would provide:-

(a) a fish purchase and retail outlet for Small and South Malaita.
(b) ice facilities for transportation of fish within and without South Malaita.
(c) a base for an extension and development programme in South Malaita enabling a better service to be offered to the fishing community of the area.
(d) internal province devolution of fisheries.
(e) a base from which small scale training courses can be effected.

Afio has been selected as the most appropriate site for the station for the following reasons:

i) Large population in the immediate area (approx 10,000 people).
ii) Now a district H.Q. for South Malaita, with considerable Provincial development expected, including building of a clinic and construction of a road from Afio to the southern tip of the island.
iii) Good water supply (though no electricity at present).

Auki

An additional machine is required to boost ice production in the present marketing complex.

Sulufou

Heavily populated with good fish resources. An ice machine will increase fishing time for the many fishing groups in the area and enable markets to be held regularly.

Transportation

A fish marketing vehicle of the panel van type is required to assist with fish marketing to the outlying areas.

The van would also be used to collect catches from present and newly formed groups which are not served by existing transport facilities.

Ice boxes

A total of 80 insulated ice boxes would be required for the provincial fisheries program.

2.2 Western Province

There is a fisheries base at GIZO, the provincial capital. The base has ice making facilities, a walk-in freezer, workshops and stores.

Due to the high priority now being given to fisheries development in the province, the base is in need of major improvements to cope with required work loads, training and extension work.

There are considerable fish resources and local marketing opportunities within the Province area. Potential exists for exports to Papua New Guinea.

Transport - A number of commercial vessels operate from Honiara to Gizo but only one (M.V. Regina) has freezer space suitable for fish carriage, and then only from Gizo to Honiara.

Aquisition of a fish collection vessel is seen as a priority requirement for the provincial fisheries to enable effective marketing to be carried out.

The vessel would be based at Gizo and crewed by Province, operating costs would be met by freight charges on fish carried.

The boat would run a regular fish collection service around the Province for fishing groups, final market destination being Gizo. Fish could then be carried to Honiara when necessary.

There are possibilities for marketing fish in Kieta, P.N.G. Western Province would explore and, if possible, utilise this market in the event of over supply in Honiara.

Ice machines: the fisheries committee have recommended sites for seven additional ice machines throughout the province. These machines would service local fishing groups and would tie into the collection boat's operation. Approximately 100 insulated ice boxes will be required.

WESTERN PROVINCE AREAS

W.P.1 - Shortland Islands

The machine would be sited at FAURO, the island groups district and administration centre.

The machine would enable fishermen to hold their catch for local sale and shipment to Gizo.

There are strong possibilities for shipping excess fish to P.N.G. from this position.

W.P.2 - Choiseul - Choiseul Bay

Good fish resources and local markets in the immediate area. Marketable excess fish would be shipped on fish collection vessel. Great need for fisheries activity in the area as little alternatives for economic activity.

W.P.3 - Choiseul - Vaghina

Island community predominantly of Gilbertese origin. Little economic activity but fish in abundance.
Excess fish to be shipped to Honiara.

W.P.4 - Vella Lavella

Plentiful resource with easy access to Gizo market.

W.P.5 - Munda

Provincial sub-station, hospital, airfield and good population. There are considerable fish resources which can be exploited if ice is available.

W.P.6 - Roviana Lagoon

Vast quantities of fish which the fishermen are unable to exploit due to lack of ice.

W.P.7 - Marovo Lagoon (North)

An ice machine is already based in the lagoon but is unable to service the fishermen of the northern end as production is insufficient.

Fisheries development in the lagoon was initiated by MNR in 1976, initial progress was slow, the major problem being lack of shipping facilities.

A refrigerated fish collection vessel (UFI NA TASI) was requested from Japanese Government in 1978. Since grant of the vessel from the Japanese Government to Solomon Island Government and its arrival in April 1979, the ship has been used with great success.

Most of the vessel's work has been collection of fish from the Marovo Lagoon, Western Province, and carriage of the fish to Honiara.

Due to the great success of the vessel's operations, the small fisheries base in the lagoon requires upgrading.

A new base would provide training and marketing facilities plus accommodation for two fisheries extensionists. The new facility would be built at RAMATA in the north of the lagoon system.

2.3 YSABEL PROVINCE

Though various fishing surveys were completed round the province, concerted development did not start until a full time Fisheries Officer was recruited in April 1979.

In the year since his appointment the officer and his staff have concentrated their efforts on forming a small base at TATAMBA.

Housing made from local leaf materials has been built, a small fish marketing store erected and an ice machine commissioned.

Fish resources round the island are extremely good. Local fishermen are keen to exploit these resources as soon as ice becomes available. Provincial development plans include the upgrading of Kia and Kaolo to sub-station level and to promote produce marketing from these centres.

Fisheries involvement with these development plans would be to operate and ice machine in each of the new sub-stations and organise marketing, training and extension work.

Kaolo - Good fish resources and many scattered villages in the immediate area. Provision of an ice machine would enable local marketing to be carried out. There is a road from Kaolo into the interior regions of south east Ysabel which will assist fish marketing operations.

Kaolo is scheduled for high priority provincial development; a fisheries extension, marketing and training building will be sited at Kaolo.

Transport - Regular provincial shipping serves the area and this would be utilised whenever possible to ship excess catches to the Honiara market.

Kia - There is a population of over 1000 people at Kia. Fish resources are considerable and only exploited for subsistence needs.

Provision of an ice machine would enable the fishing community to hold their catch for local sales.

Marketable excess would be held for eventual shipment to the provincial capital of Buala.

Ice Boxes

A large number of ice boxes (70) will be required for this development work.

2.4 CENTRAL ISLANDS PROVINCE

A fisheries officer was provided in April this year and is now in post, based at Tulagi. An assistant has been recruited. Initial work has involved setting up a base and touring the area to set up fishing groups. Some groups are already in operation on Ngella and occasionally run fish to Honiara by canoe.

Central Islands Province takes in the Russell Group, Rennell and Bellona and it is hoped that fisheries development will commence in these areas as a result of this project.

Ice facilities will be provided at TULAGI and an extension centre and ice facilities provided at the Russell Islands.

Tulagi

The fisheries extension staff are based at the Provincial capital Tulagi, Florida Islands where ice has previously been available from the Solomon Taiyo Fishing Company.

This is a commercial company based on the seasonal tuna fishery.

Ice is supplied on the good will of the company and is subject to availability. During the frequent times that ice is not available, local fishermen are unable to preserve their catch for market.

Russell Islands

Considerable fish resources are in the area. The islands are well populated and there is a large Provincial Headquarters at Yandina where there is a heavy demand for fish.

The provision of an ice machine and fisheries extension centre will enable fisheries work in the islands to commence.

Transport.

Both government and commercial shipping will be utilised to take any excess catches to the Honiara market, as well as the Ufi Na Tasi.

Ice boxes.

Approximately 60 boxes will be required for initial development.

2.5 GUADALCANAL PROVINCE

There are ice facilities at Honiara, the country's capital, capable of producing 2 tons per day, most of which is consumed within Honiara town, leaving little excess for distribution around the island.

A small base has been in operation in Marau Sound, east Guadalcanal since 1978. Facilities include an ice machine and small retail store.

Due to intensive fishing efforts in the area, the base is no longer adequate for the demands made on it.

The project would provide a complete marketing, training and extension centre which would be the base for future development in the area.

Fisheries and Provincial development plans for the island include provision of two additional ice machines and approximately 90 ice boxes.

Lambi Bay

Situated at the Western limit of the road system, Lambi is a provincial sub-station.

An ice machine would supply the fishing groups along the coast road from Lambi to Honiara.

Avu Avu

There is a high population in the area which is situated on the south weathercoast of Guadalcanal. Though there is a good fish resource, it is only occasionally utilised due to the prevailing bad weather and inadequate boats.

Provision of an ice machine would enable fish caught during fine weather periods to be marketed during the times when fishing is not possible.

TRANSPORT

Provincial and private shipping runs regularly to Marau Sound and this would be utilised for carrying excess fish to Honiara.

There is a rough road from Marau to Avu Avu round the weather coast.

This is an area of high demand for fish protein as poor weather often destroys garden crops, food shortages are frequent and distressing to the local inhabitants.

A four wheel drive vehicle would be required to transport fish to the area during periods of under supply and to bring excess fish from the area during fine weather periods when catches are good.

2.6 MAKIRA/ULAWA PROVINCE Kira Kira

A fisheries base is at Kira Kira on Makira with ice and market facilities. This market is scheduled for hand over to a fishermen's cooperative enterprise in the latter half of 1980. The cooperative will handle all fish marketing operations within the province boundaries

and profits will be redistributed to the fishermen.

Other fisheries facilities are in need of urgent up-grading to enable suitable training and extension work to be effected.

The project would provide a fisheries centre at Kira Kira with an ice machine to boost existing production.

Two additional ice machines would be placed round the island at:-

M.U.18 Makira Harbour

Good resources are little utilised due to lack of storage facilities. The proposed ice machine would enable fishermen to preserve their catches and utilise weekly provincial shipping to market at Kira Kira.

M.U.19 Star Harbour

There is a small fisheries base at Star Harbour but no ice facilities. Ice is presently shipped on an irregular basis from Kira Kira.

Transportation - Fish and ice is transported around the province by a small collection vessel.

Ice boxes - A large number of insulated boxes (70) is required to meet the expanding program.

2.7 EASTERN OUTER ISLANDS PROVINCE (EOI)

Extension efforts commenced in E.O.I. in early 1980.Fisheries facilities are negligable though an ice machine has been provided to commence marketing operations.

A suitable base is required to enable intensive training and extension to be given to the newly formed fishing groups. The centre would be constructed in the Provincial Centre of Graciosa Bay.

There are tremendous resources of fish in the province and provision of ice will enable regular marketing to commence. It is planned to commence similar marketing in VANICOLO (20) where an ice machine will be required.

Transport - local sea transport will be used to bring fish into the marketing centre. Excess fish will be stored for shipment to the Honiara market.

- approximately 45 insulated ice boxes will be required.

B

APPENDIX 3

DEMAND/SUPPLY CONSIDERATIONS AND PRODUCTION POTENTIAL

APPENDIX 3

DEMAND/SUPPLY CONSIDERATIONS AND PRODUCTION POTENTIAL

(i) Demand for Fish

Estimates have been made of the potential domestic demand for fresh fish. These are based on the following assumptions

(i) average of 227 gms (8 oz) unfilleted fish consumed per head of population per meal

(ii) 2 meals (low estimate) and 4 meals (high estimate) of fish per week

(iii) the price of fish is at a level to make this demand effective.

On these assumptions, per head consumption per week is between 454 grms and 908 grms or approximately 25 kgs and 50 kgs per head per annum.

Demand for marketed fish is expected to arise primarily from urban centres and rural non-village centres rather than from villages where subsistence production may be expected to continue to supply a certain amount of the villages' fish requirements. Four urban centres were identified by the 1976 census. Honiara (considered in Guadalcanal Province) with 15,000 people; Gizo (Western Province) with 1,600 people; Auki, (Malaita Province) with 1,200 people and Kira Kira (Makira/Ulawa Province) with 600 people. Rural non-village areas would principally be government or commercial areas (including plantations) as well as outerlying areas of the urban centres.

The estimated population in urban centres and rural non-village centres ("Non-village" population) in 1980 and 1982 (when the project will be operative) are set out in Table 3.1 together with the corresponding figures of low and high demand. This simple classification is likely to underestimate demand, particularly for the well-populated provinces, but will provide some indication of effective demand since villagers with limited cash incomes will have less potential to purchase fish.

TABLE 3.-

ESTIMATED DEMAND FOR MARKETED FISH BY PROVINCE IN 1982

Province	Population (1) 1980 Estimated TOTAL	Population (1) 1982 Estimated TOTAL	Population (2) 1982 Non-Village	Demand (3) Low Estimate tonnes/ annum	Demand (3) High Estimate tonnes/ annum
Malaita	68,600	83,800	3,500	87.5	175.0
Western	46,100	56,300	7,600	190.0	380.0
Makira/Ulawa	17,000	20,800	1,400	35.0	70.0
Santa Ysabel	11,900	14,500	1,300	32.5	65.0
Eastern O.I.	12,500	15,300	1,000	25.0	50.0
Central	15,500	18,900	4,000	100.0	200.0
Guadalcanal	53,300	65,100	25,000	625.0	1,250.0
TOTAL	224,900	274,700	43,800	1,095.0	2,190.0

NOTES: (1) Based on annual growth rate 3.4 percent since 1976 Census.

(2) 1976 census figures for "Urban" and "rural non village" sectors projected at 3.4 percent per annum.

(3) Low:25 kg/head/annum; High:50 kg/head/annum using "non-village" population figures.

(ii) Supply of marketed fish

It is estimated that each ice-machine will produce on average 72 tonnes of ice per annum. The quantity of fish potentially able to be marketed as a result of the operation of one ice machine (plus insulated ice boxes) is estimated at 60 tonnes per annum. Actual performance is likely to be only 70 percent of this, or 42 tonnes of fish per ice-machine per annum. On this basis, the present and proposed ice-machines are likely to enable the following quantities of fish to be marketed from the Provinces (Table 3.2).

TABLE 3.2

SUPPLY OF MARKETED FISH ARISING FROM ICE-MACHINE OPERATION

Province	Number of Ice-Machines			Fish Production(1) (tonnes/per annum)		
	present	proposed(2)	total	present	proposed	total
Malaita	2	3	5	84	126	210
Western	3	7	10	126	294	420
Makira/Ulawa	1	3	4	42	126	168
Santa Ysabel	1	2	3	42	84	126
Eastern Outer Islands	1	1	2	42	42	84
Central		2	2		84	84
Guadalcanal (inc. Honiara)	4	2	6	168	84	252
TOTAL	12	20	32	504	840	1344

NOTES: (1) Based on 42 tonnes fish per ice-machine per annum.
(2) With project.

(iii) Relating demand/supply

Whilst estimates of demand may be considerably understated once subsistence production and sales of fish through channels other than the Fisheries Division are taken into consideration, some indication of the likely deficit or surpluses within provinces can be obtained (Table 3.3).

TABLE 3.3

FISH PRODUCTION ARISING FROM ICE-MACHINES RELATIVE TO DEMAND

	Estimated Production (tonnes p.a.)	Potential Demand (tonnes p.a.)		Difference[1] (tonnes p.a.)	
		low	high	low	high
Malaita	210	87.5	175.0	- 122.5	- 35.0
Western	420	190.0	380.0	- 230.0	- 40.0
Makira/Ulawa	168	35.0	70.0	- 133.0	- 98.0
Santa Ysabel	126	32.5	65.0	- 93.5	- 61.0
Eastern O.I.	84	25.0	50.0	- 59.0	- 34.0
Central	84	100.0	200.0	- 16.0	- 116.0
Guadalcanal (inc. Honiara)	252	625.0	1,250.0	541.0	1,166.0
TOTAL	1,344	1,095	2,190.0	- 81.0	1,014.0

NOTES: (1) Demand (low and high) minus supply.

It can be concluded that Guadalcanal Province will require substantial imports from other provinces to meet demand, with Central Province also likely to require some imports. The remaining five Provinces will all have fish available beyond their local requirements which is able to be exported to Guadalcanal or Central provinces. The figures for Malaita are likely to overstate the quantities available for export, but it is anticipated that Western, Makira/Ulawa and Santa Ysabel provinces will have substantial quantities available for export.

Of interest to note is that at low demand, there will be a surplus of 81 tonnes of fish per annum, whilst if demand is in the vicinity of the high estimate, an extra 1,000 tonnes per annum will be required to meet the demand.

By relating the average of the low and high differences to the production estimates, a rough guide of the proportion of fish production that will have to be exported (or imported) can be made. These figures are

TABLE 3.4

PROPORTION OF PRODUCTION TO BE EXPORTED/IMPORTED

Province	Proportion (%)
Malaita	38
Western	32
Makira/Ulawa	69
Santa Ysabel	61
Eastern Outer Islands	55
Central	- 79
Guadalcanal	- 339

Individual Provinces seek to satisfy local demand first before considering export to other Provinces. Guadalcanal and Central Provinces are likely to be unable to satisfy demand, whilst the bulk of Makira/Ulawa', Santa Ysabel' and Eastern Outer Islands' fish production is likely to be available for export to Honiara. Whilst Malaita and Western Provinces will also have substantial amounts available for export, the high population on Malaita and export opportunities to Bougainville from Western Province may reduce quantities available for supply to Honiara.

B

APPENDIX 4

ECONOMIC APPRAISAL

APPENDIX IV

ECONOMIC APPRAISAL

The total project has been subjected to an economic appraisal. The various assumptions used and the basis for these are discussed in section 1. Tabulation of cost and revenue items and the resulting estimates of the IRR are presented in section 2.

SECTION 1: TECHNICAL AND PRICE PARAMETERS

The life of the project is assumed to be 15 years. The project allows for replacement of ice-machines and vehicles after five years, ice-boxes after six years and vessel after ten years. The fisheries centres are considered to have a salvage value of 27.5 percent of the initial investment after 15 years. Replacement of individual capital items is undertaken using funds accumulated from the project.

2. Costs

Capital costs have been taken from estimates made by Fisheries Division. Operational (running) costs of ice-machines are based largely on actual performance, while while those of other capital items are based on reasonable estimates and assumptions. Labour costs specifically included in the project are the ice-machine operators and the drivers of vehicles. Staff requirements for the buildings are already available and not included as a cost to the project, except for one additional general assistant for each centre.

Since no information is available on the extra costs incurred by the fishermen as a result of this project (principally) labour, transport and possibly additional equipment), it was assumed that these costs amounted to 20 cents per kg of fish caught as a result of the project. This will be affected by a number of factors including ease of catching fish, distance to fishing resource and nearest marketing centre, boat and fishing technology adopted and the opportunity cost of fishermen's time (which would be very low, given the general lack of alternative income-earning opportunities).

To avoid double-counting, the value of ice produced (which is also a cost to the fishermen) is excluded. Only running costs of ice-machines are included in the economic analysis of the overall project.

3. Benefits

The primary benefit arising from the project is iced fresh fish available at a marketing facility. The valuation of this fish and estimates of quantities are considered below. In this analysis, distributional aspects are not considered, although more than half of the benefit will accrue to fishermen.

(i) Value

The value of fish depends in part on the point in the marketing chain that the fish reaches as a result of the project. As the building of fisheries centres in the Provinces will allow the retailing of fish, the fish may be valued at retail prices existing in the Provinces. Because transportation to Honiara is not incorporated in the project the retail price of fish in Honiara is not appropriate for analysis. It is implicitly assumed that for fish transported to Honiara, the increased freight costs are exactly offset by the increased returns.

The present pricing structure provides for a payment of between $0.50 to $0.60 per kg for fish supplied to the fisheries centre varies between $0.66 to $0.90 per kg, depending on the Province. The retail price of fish transported to Honiara is $1.25 per kg.

For this analysis, the following price structure (price margins) has been adopted:-

Gross Value of fish resulting from project - (retail price in Province from Fisheries centre)	$0.80 per kg
Less Costs incurred in catching and transporting - fish to fisheries centre.	$0.20 per kg
Net Value of Fish arising from project (margin) -	$0.60 per kg

Because of variation between provinces, uncertainties in regard to the level of costs, and possible increase in fish prices, sensitivity analysis has been undertaken on margins within the range of $0.50 to $0.75 per kg. The expected value is considered to be $0.60 per kg. However, with the present upward movements in beef, pork and other protein foods, this figure is considered conservative.

It is considered that import or export prices for chilled fresh fish would be substantially higher than those presented here. Valuation of benefits is therefore likely to be understated.

(ii) Quantity

The quantity of fish able to be marketed is determined by the ice available from the ice-machine, and the availability of insulted ice-boxes. It is considered that an average, each machine will be operative 200 out of 365 days per year, giving an ice-production of 72 tonnes of ice per annum, net of wastage. Experience to date suggests one tonne of ice could enable the effective preservation of one tonne of fish, giving a potential of 72 tonnes of fish marketed per machine per annum. For the present analysis it is conservatively assumed that 60 tonnes of fish per machine per annum will be the maximum produced though this will vary between locations. To allow for bad weather, possible break-downs and other unforeseen circumstances, only 70% of this amount is considered to be achieved. Thus estimates in this analysis are based on a production of 42 tonnes of fish per machine per annum.

It is considered that full production of fish from each machine will be achieved in year 3. Fish production will rise from 50% in year 1 to 75% in year 2, and 100% (42 tonnes) in year 3.

It is assumed that without the project, fish production would be very low, only meeting subsistence needs. With the project, the above totals of iced-fish would be caught, in addition to the amount produced by subsistence fishing.

The costs involved in producing this extra chilled fish (delivered to the fisheries centre) are considered to amount to 20 cents per kg (see above) of chilled fish production, which represents the additional cost to the fishermen (including his labour) arising from the project. Thus theoretically, subsistence production and its accompanying costs are assumed unaffected and only the additional costs and benefits arising from the project are included.

SECTION 2: COST AND REVENUE PROFILES AND THE IRR

1. Capital and running costs of the project

The cost of individual items of the project is presented in Table 4.1 divided into local and foreign exchange costs and including and contingency element of 15 percent. The total capital requirements and their phasing are summarised in Table 4.2. The total investment cost is $954,362, rounded to $956,000.

Operating costs (running costs) are presented in Table 4.3. When the project is fully operational, total running costs of the individual items will amount to $126,00 per annum.

TABLE 4.1

CAPITAL COST

			Total Cost
1.	Ice Machines		
	(i) Foreign Exchange		
	1 x Electric "Resco" B.800 at $5800		$5,800
	12 x Diesel "Resco" B.800 at $7,800		$93,600
	7 x Diesel "Resco" B.400 at $4,400		$30,800
	50 x 100 ltr Glycol antifreeze at $200ea.		$10,000
	Prices are C.I.F. Honiara Sub Total		$140,200
	(ii) Local Purchases		
	Cement 20 bags/machine x $7 per bag: $140 per machine		$2,800
	Freight for machine: Honiara to Province av $200/machine		$4,000
	Labour for constructing base/housing for machine 10 men x 3 days x $2 per day: $60/machine		$1,200
	Rainwater holding tanks: $218/machine		$4,360
	Iron roofing: 5 lengths x $10: $50/machine		$1,000
	Sub Total		$13,360
	(iii) Total Capital Cost	$7,678/machine -	$153,560
2.	Insulated Ice Boxes		
	(i) Foreign Exchange		
	500 insulated fish/ice holding boxes at $250ea c.i.f. Honiara		$125,000
	(ii) Local Purchases		
	Freight: Honiara to Provinces $8 per box		$4,000
	(iii) Total	$258 per box	$129,000
3.	Fisheries Centres		
	(i) Foreign Exchange		
	8 Fisheries Centres at $51,000ea c.i.f. Honiara		$408,000
	(ii) Local Purchases		
	Furnishing/Fittings at building	$3,500 per	$28,000

		Freight to Provinces at $500 per buidling	$4,000
		Site Preparation at $2,000 per building	$16,000
		Erection and Installing facilities at $3,000 per building	$24,000
	(iii)	Total $60,000 per building	$480,000
4.	Fish Collection Vessel		
	(i)	Foreign Exchange	$ 48,000
	(ii)	Local purchases	$ 2,000
	(iii)	Total	$ 50,000

TABLE 4.2

TOTAL CAPITAL REQUIREMENTS AND PHASING

TOTAL ITEM COSTS

(i) Requirements

Item	Per Unit Cost ($)	Foreign Exchange ($)	Local ($)	Total ($)
20 Ice Machines	7,678	140,200	13,360	153,560
500 Insulated Ice Boxes	258	125,000	4,000	129,000
8 Fisheries Centres	60,000	408,000	72,000	480,000
2 Vehicles - Van	8,000	8,000	200	8,200
- Land Cruiser	9,120	9,000	120	9,120
1 Fish Collection Vessel	50,000	48,000	2,000	50,000
Contingencies (15%)				124,482
TOTAL				954,362

(ii) Phasing

Item	Number	Year 1	Number	Year 2
Ice Machines	10	$76,780	10	$76,780
Insulated Ice Boxes	250	64,500	250	64,500
Fisheries Centres	4	240,000	4	240,000
Vehicles			2	17,320
Vessel	1	50,000		
Sub-Total		431,280		398,600
Contingencies (15%)		64,692		59,790
TOTAL		495,972		458,390

TABLE 4.3

OPERATING COSTS

Item	Operating Cost per Unit ($p.a.)	No. of Units	Total Operating Cost ($ per annum)
(i) Ice Machines			
Fuel: 38¢/l x 31.7¢/l/h x 200 harvests p.a.	2,409		
Labour: operator $85.00 per month	1,020		
Maintenance: 10% of cost of B800 machine	780		
	4,209	20	84,180
(ii) Insulated Ice Boxes			
(iii) Fisheries Centres			
Maintenance $1000 per building	1,000		16,160
Labour: $85 per month	1,020		
	2,020	8	16,160
(iv) Van/Land Cruiser			
Fuel:	1,100 each		
Labour:	600 each		
Maintenance:	800 each		
Insurance etc.	100 each		
TOTAL	$2,600 each	2	5,200
(v) Fish Collection Vessel			
Fuel/Oil	6,800		
Slipping/Annual Survey	1,000		
Insurance	2,500		
Repairs/Maintenance	4,000		
Crew Wages	4,800		
Incidentals	1,000		20,100
	20,100	1	20,100
(vi) TOTAL			125,640

TABLE 4.4

COST PROFILE OF PROJECT

Year	ICE MACHINES (1) Captl. $	ICE MACHINES (2) Opera. $	ICE BOXES (3) Captl. $	ICE BOXES Operat. $	FISHERIES CENTRES (4) Captl. $	FISHERIES CENTRES Operat. $	VEHICLES (5) Captl. $	VEHICLES Operat. $	VESSEL Captl. $	VESSEL Operat. $	TOTAL Capital $	TOTAL Operating $	Total
1	88,500	42,090	74,500	0	276,000	8,080			58,00	20,100	497,000	70,270	567,270
2	88,500	84,180	74,500	0	276,000	16,160	20,000	5,200		20,100	459,000	125,650	584,640
3		84,180		0		16,160		5,200		20,100		125,640	125,640
4		84,180		0		16,160		5,200		20,100		125,640	125,640
5		84,180		0		16,160		5,200		20,100		125,640	125,640
6	88,500 (6)	84,180		0		16,160		5,200		20,100	88,500	125,640	214,140
7	88,500	84,180	74,500 (7)	0		16,160	20,000 (8)	5,200		20,100	183,000	125,640	308,640
8		84,180	74,500	0		16,160		5,200		20,100	74,500	125,640	200,140
9		84,180		0		16,160		5,200		20,100		125,640	125,640
10		84,180		0		16,160		5,200		20,100		125,640	125,640
11	88,500	84,180		0		16,160		5,200	58,000 (9)	20,000	146,500	125,640	272,140
12	88,500	84,180	74,500	0		16,160	20,000	5,200		20,100	183,000	125,640	308,640
13		84,180	74,500	0		16,160		5,200		20,100	74,500	125,640	200,140
14		84,180		0		16,160		5,200		20,100		125,640	125,640
15	(17,700) (10)	84,180	(62,080) (10)	0	(151,800) (11)	16,160	(4,000) (10)	5,200	(29,000) (10)	20,100	(264,580)	125,640	(138,940)

NOTES:

(1) 20 machines installed over 2 years
(2) See Table 4.3 for breakdown of operating costs
(3) 500 Boxes supplied over 2 years
(4) 8 Fisheries Centres constructed over 2 years
(5) 2 Vehicles supplied in year 2
(6) Life of Ice-machine assumed 5 years
(7) Life of Ice-boxes assumed 6 years
(8) Life of vehicles assumed 5 years
(9) Life of vessel assumed 10 years
(10) Positive residual values (salvage value) based on proportion of expected life.
(11) 27.5 percent of original investment.

2. Benefits

Valuation of benefits from the project is presented in Table 4.5. The Value of expected production is based on three price levels of $0.50/kg to $0.75/kg. After year three, expected production from the project is constant at 840 tonnes per annum.

TABLE 4.5

VALUATION OF INCREMENTAL BENEFITS

Year	Production Potential[1] (tonnes per annum)	Expected Production[2] (tonnes per annum)	Value of Expected Production		
			$0.50/kg	$0.60/kg	$0.75/kg
1.	300	210	105.0	126.0	157.5
2.	750	525	262.5	315.0	393.8
3.	1,050	735	367.5	441.0	551.3
4.	1,200	840	420.0	504.0	630.0
5.	1,200	840	420.0	504.0	630.0
6.	1,200	840	420.0	504.0	630.0
7.	1,200	840	----------as above----------		
8.	1,200	840	"		
9.	1,200	840	"		
10.	1,200	840	"		
11.	1,200	840	"		
12.	1,200	840	"		
13.	1,200	840	"		
14.	1,200	840	"		
15.	1,200	840	"		

Notes (1) 50% of production assumed in year 1 from the installation of each ice machine, 75% in year 2, 100% in year 3.

(2) Based on 70% of potential, or 42 tonnes of fish per ice-machine per annum.

3. Net Benefits and the IRR

Based on estimated costs and returns, the net benefits over the life of the project are presented in Table 4.6. On the basis of the net benefit profiles using the three different price levels of output, the Internal Rates of Return (IRR's) of the project were calculated.

At the low price level (i.e. price margin) of $0.50 per kg, the IRR was estimated at 26 percent, whilst at a higher margin of $0.75 per kg, the IRR was 55 percent. At the expected margin of $0.60 per kg, the IRR was 37 percent.

TABLE 4.6

NET BENEFITS OF THE PROJECT AND IRR

Year	Gross Benefit Value of Fish Produced ($)			Total Cost ($000)	Net Benefits ($000)		
	$0.50/kg	$0.60/kg	$0.75/kg		$0.50/kg	$0.60/kg	$0.75/kg
1.	105,000	126,000	157,500	567.3	(462.3)[1]	(441.3)	(409.8)
2.	262,500	315,000	393,750	584.6	(322.1)	(269.6)	(190.8)
3.	367,500	441.000	551,250	125.6	241.9	315.4	425.7
4.	420,000	504,000	630,000	125.6	294.4	378.4	504.4
5.	420,000	504,000	630,000	125.6	294.4	378.4	504.4
6.		as above		214.1	205.9	289.9	415.9
7.		" "		308.6	111.4	195.4	321.4
8.		" "		200.1	219.9	303.9	429.9
9.		" "		125.6	294.4	378.4	504.4
10.		" "		125.6	294.4	378.4	504.4
11.		" "		272.1	147.9	231.9	357.9
12.		" "		308.6	111.4	195.4	321.4
13.		" "		200.1	219.9	303.9	429.9
14.		" "		125.6	294.4	378.4	504.4
15.		" "		(138.9)	558.9	642.9	768.9
	Internal Rate of Return				25.7	36.9	54.6

NOTES: (1) Parentheses indicate negative values.

B

APPENDIX 5

SPECIFICATIONS OF VARIOUS CAPITAL ITEMS (INDICATIVE)

ICE BOX SPECIFICATIONS

BOX SIZE	-	2ft x '2ft x 4ft:long:exterior dimensions
WALL THICKNESS	-	4 inch
MATERIAL	-	Closed cell polyurathane foam.
COVERING	-	At least 2 layers of chopped strand fibreglass securely bonded over entire foam surface.
ADDITIONAL PROTECTION	-	Additional layer of glass fibre at all exterior corners.
LID	-	3 inch polyurathane foam with 2 inch foam insert.
COVERING	-	2 layers of chopped strand fibreglass securely bonded over entire foam surface.
SEAL	-	Neoprene joint of at least ½ inch thickness moulded to lid to form efficient seal.
COLOUR	-	White throughout
MARKINGS	-	"Fisheries Division" in 3 inch capitals on lids and boxes.

Equipment and fittings for Fisheries Buildings

Accommodation Area

Kitchen –
- 1 - Sink with draining board.
- 1 - Cooking stove with oven (bottled gas)
- 2 - Gas cylinders for above.
- Built in cupboards and shelving.

Bathroom –
- 1 - Toilet
- 1 - Shower

Bedroom –
- 2 - beds, steel frame with mattress. (6' x 4')
- 2 - Chests of drawers.
- built in wardrobe and shelving.

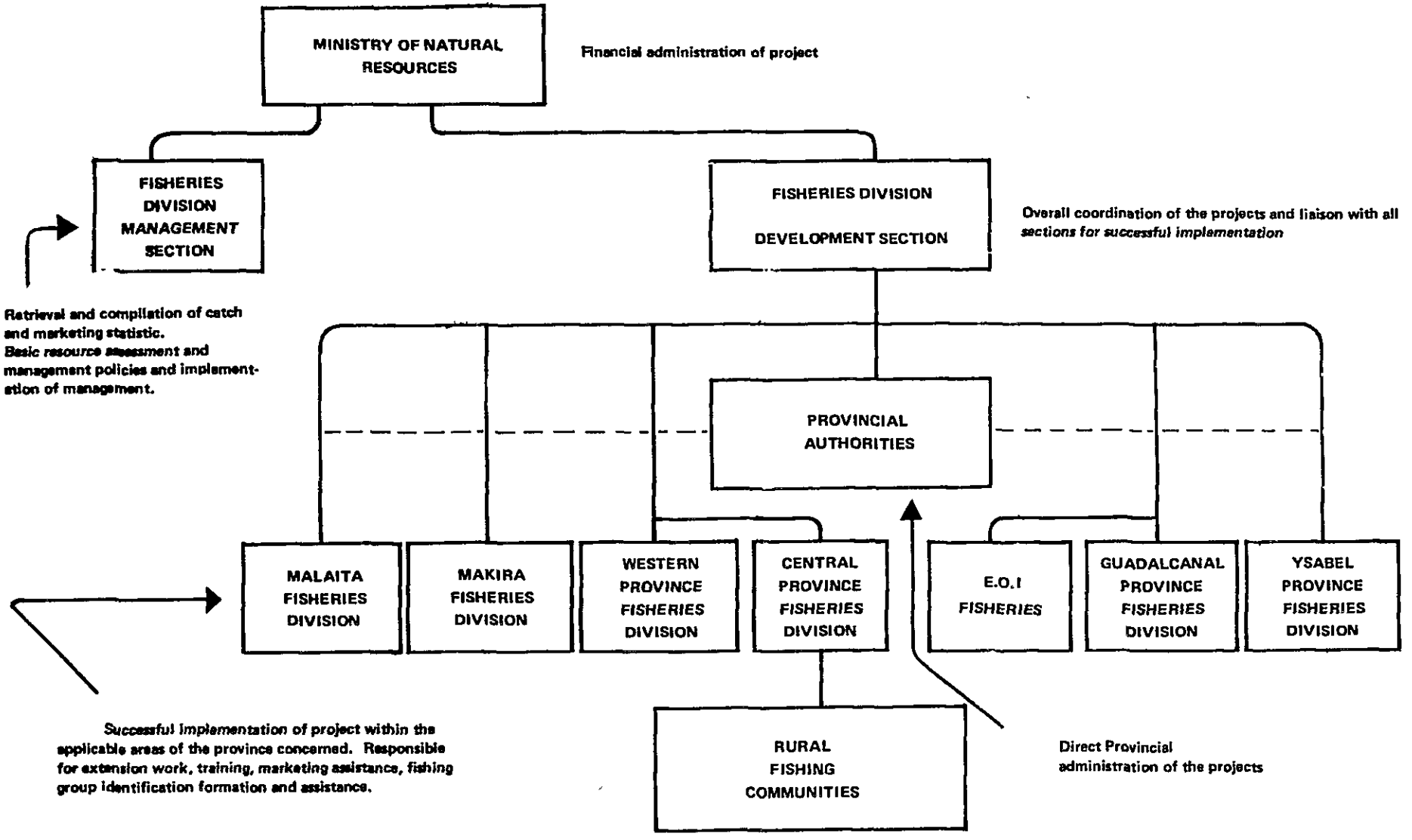
Living room –
- 1 - Bed divan
- 2 - Arm chairs
- 1 - Bookcase
- 1 - Dining Table
- 4 - Dining chairs

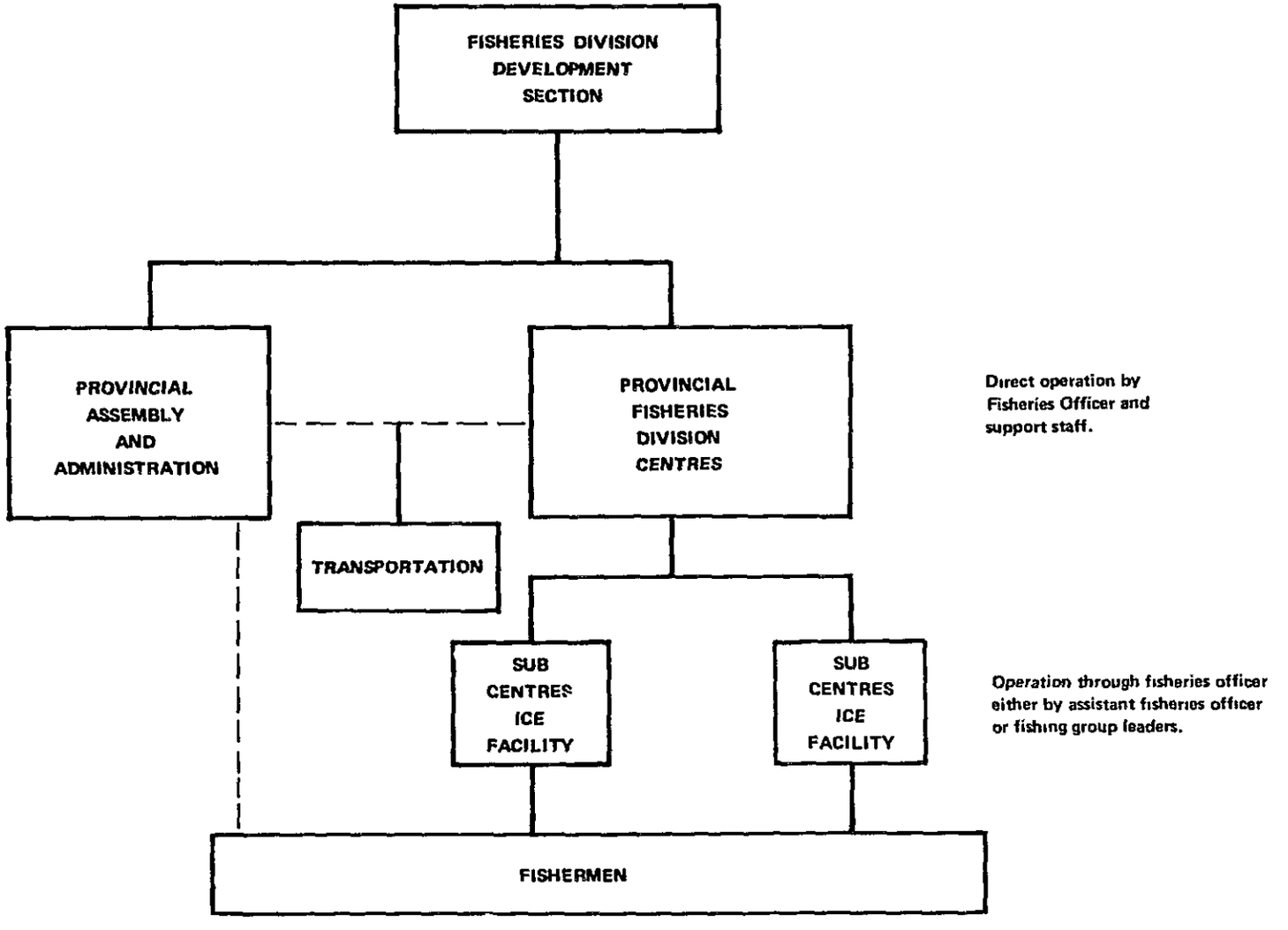
Training area –
- 1 - Wall Blackboard
- 2 - Equipment Cupboards
- 1 - Office Desk
- 2 - Office chairs

Marketing Section –
- 1 - Sales counter with built in shelving
- 1 - Pan scale 0-6 kg.
- 1 - Storage cupboard
- 1 - Desk top calculator
- built in shelving and ice storage bin.
- 12 - Fish carrying baskets.

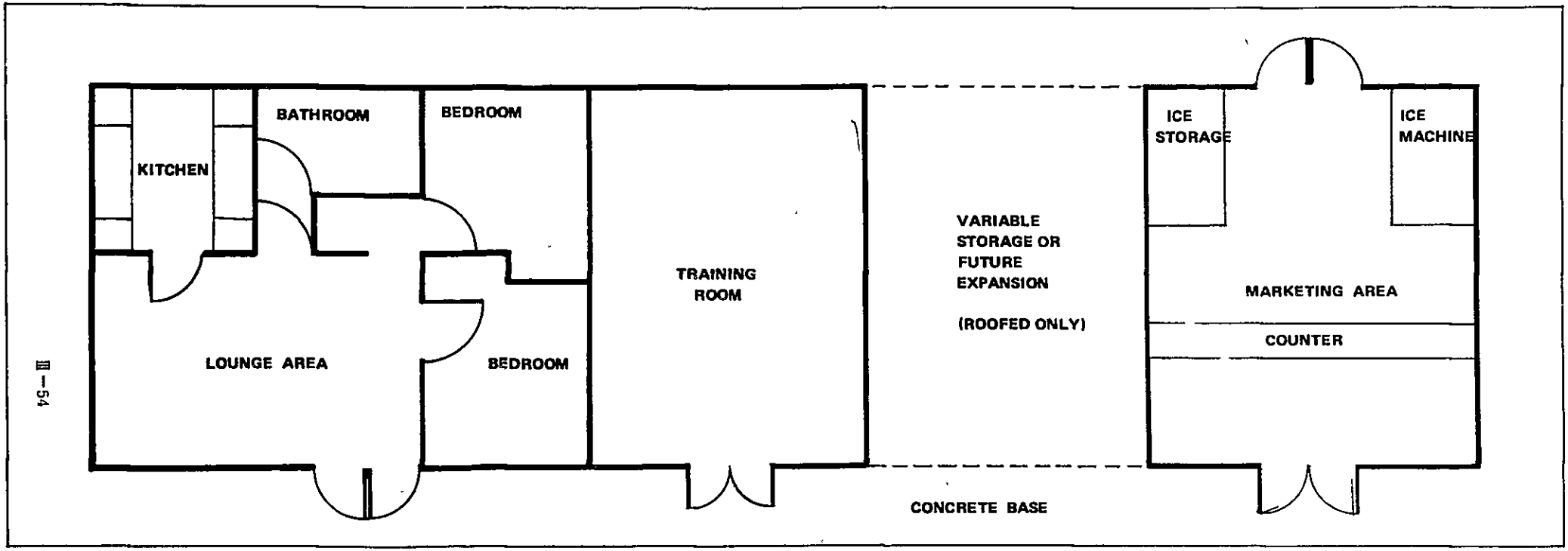
ORGANISATION CHART

for implementation of rural fisheries development project



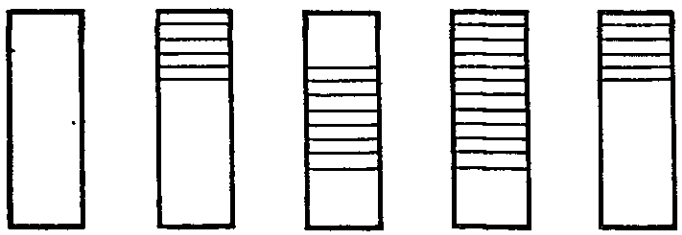

FISHERIES DIVISION
DEVELOPMENT
SECTION
PROVINCIAL
ASSEMBLY
AND
ADMINISTRATION
PROVINCIAL
FISHERIES
DIVISION
CENTRES
TRANSPORTATION
SUB
CENTRES
ICE
FACILITY
SUB
CENTRES
ICE
FACILITY
FISHERMEN
Direct operation by
Fisheries Officer and
support staff.
Operation through fisheries officer
either by assistant fisheries officer
or fishing group leaders.

FISHERIES MARKETING/TRAINING/EXTENSION BASE



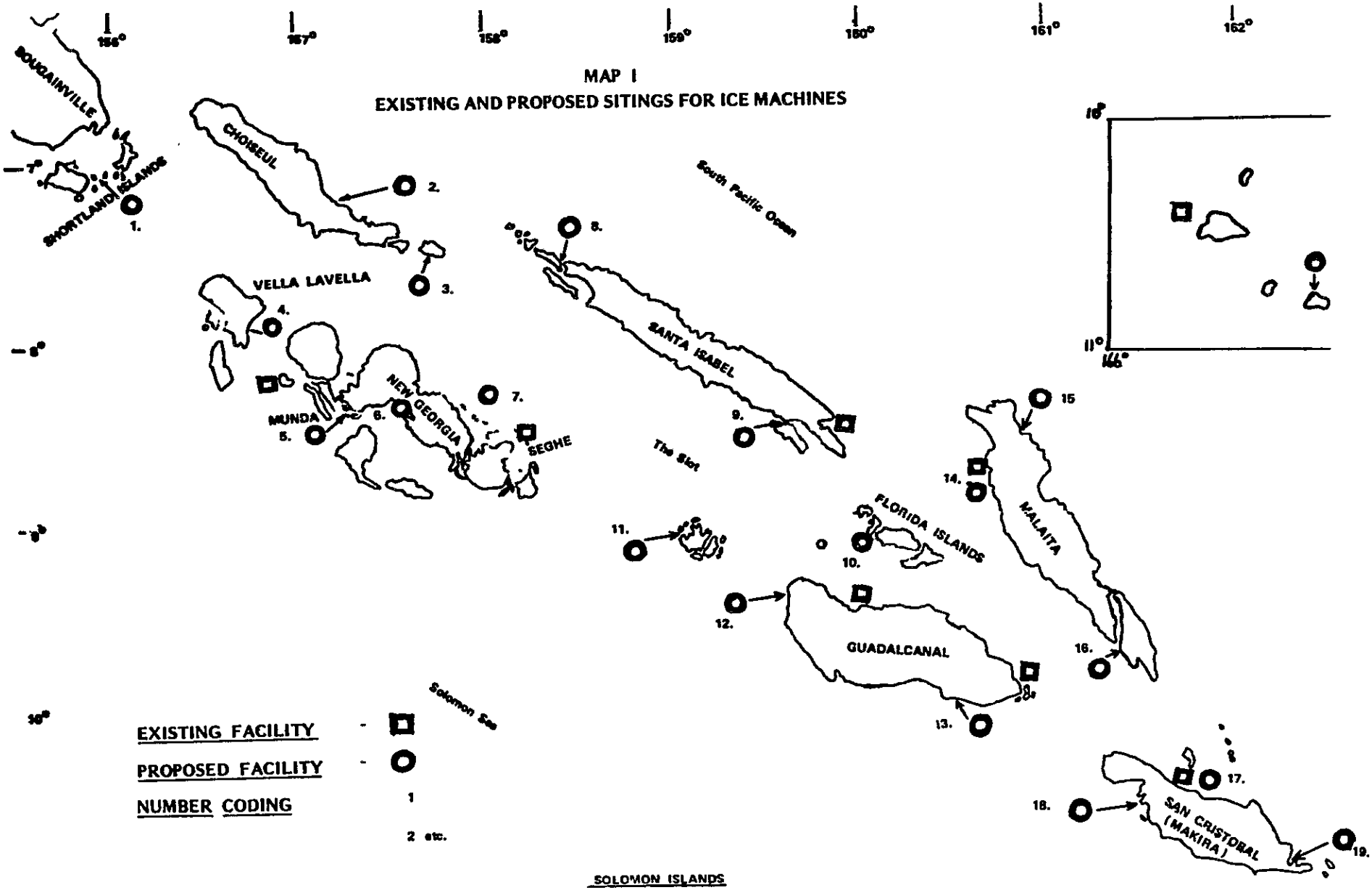
III — 54

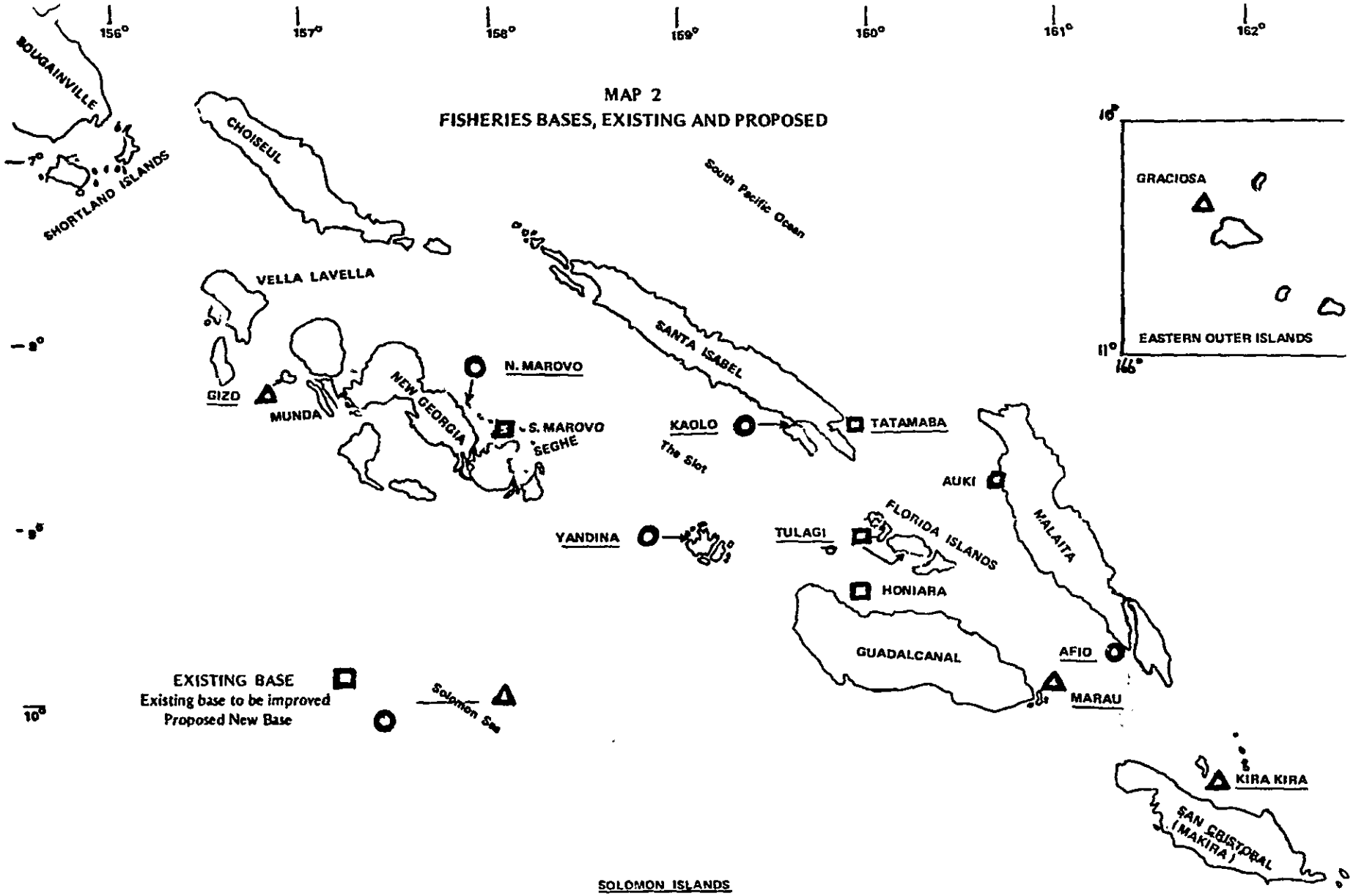
PRE FABRICATED SECTIONS



BLANK DOOR C. LOUVRE ¾ LOUVRE PARTITION

SCALE 1 cm = 1mtr


MAP I
EXISTING AND PROPOSED SITINGS FOR ICE MACHINES
156°
157°
158°
159°
160°
161°
162°
BOUGAINVILLE
SHORTLAND ISLANDS
1.
CHOISEUL
2.
3.
VELLA LAVELLA
4.
MUNDA
5.
6.
NEW GEORGIA
7.
SEGHE
8.
SANTA ISABEL
9.
South Pacific Ocean
The Slot
11.
10.
FLORIDA ISLANDS
12.
GUADALCANAL
13.
14.
MALAITA
15
16.
17.
18.
SAN CRISTOBAL (MAKIRA)
19.
Solomon Sea
EXISTING FACILITY
PROPOSED FACILITY
NUMBER CODING
1
2 etc.
SOLOMON ISLANDS


156°
157°
158°
159°
160°
161°
162°
MAP 2
FISHERIES BASES, EXISTING AND PROPOSED
BOUGAINVILLE
SHORTLAND ISLANDS
CHOISEUL
VELLA LAVELLA
GIZO
MUNDA
NEW GEORGIA
N. MAROVO
S. MAROVO
SEGHE
SANTA ISABEL
South Pacific Ocean
KAOLO
TATAMABA
The Slot
YANDINA
AUKI
TULAGI
FLORIDA ISLANDS
MALAITA
HONIARA
GUADALCANAL
AFIO
MARAU
KIRA KIRA
SAN CRISTOBAL (MAKIRA)
GRACIOSA
EASTERN OUTER ISLANDS
EXISTING BASE
Existing base to be improved
Proposed New Base
Solomon Sea
SOLOMON ISLANDS