

CHAPTER 4

SPECIFICATION OF MSY, OY AND OVERFISHING, AND DOMESTIC HARVESTING AND PROCESSING CAPACITY

4.1 Introduction

Sections 301, listing National Standards, and 303 of the Magnuson-Stevens Fishery Conservation and Management Act specify required provisions of fishery management plans. First and foremost, an FMP must describe how management measures will prevent overfishing and achieve optimum yield for managed stocks (§301(a)(1) and §303(a)(1)(A)). It must also describe how much of the optimum yield can be harvested by domestic vessels and how much can be processed domestically (§303(a)(4)). Since it is usually impossible to measure stock size directly, managers must identify various indirect measures, or indicators, that they can use to determine stock status, the impact of fishing, and the degree to which the stock is being fished at optimum yield. They must then develop a set of control rules that specify how management action should respond to any given indicator value. Most importantly, if the indicators suggest that a stock is being overfished, managers need to take action to reduce fishing pressure and begin rebuilding stocks. This chapter discusses how measures of stock condition—maximum sustainable yield (MSY), optimum yield (OY), and overfishing—have been developed, and the indicators that will be used to determine these levels. It also specifies how much of the optimum yield domestic fishermen are capable of harvesting and how much can be processed domestically.

As detailed in Chapter 2 of this FMP, the coral reef ecosystem consists of thousands of species; regulation of the enormous number of species with individual harvest control rules would prove unwieldy, and it is unnecessary. One strategy taken in this FMP, described in Section 1.6.2, is to divide the coral reef ecosystem management unit into two groups, Currently Harvested Coral Reef Taxa (CHCRT) and Potentially Harvested Coral-Reef Taxa (PHCRT). This division of the management unit focuses attention on and helps to prevent overfishing of currently harvested taxa. For those taxa for which scientists have limited data, it will make it easier to get the scientific data needed to estimate biological reference points. For CHCRT, available catch and effort data will be used to estimate reference points. If insufficient data exist for a given species, data from similar areas or species will be used instead to estimate reference points. If there is absolutely no information that can be brought to bear, then reference points may be estimated by proxy using data collected from the developing fishery. As fisheries for PHCRT develop, those taxa will be moved to the CHCRT category.

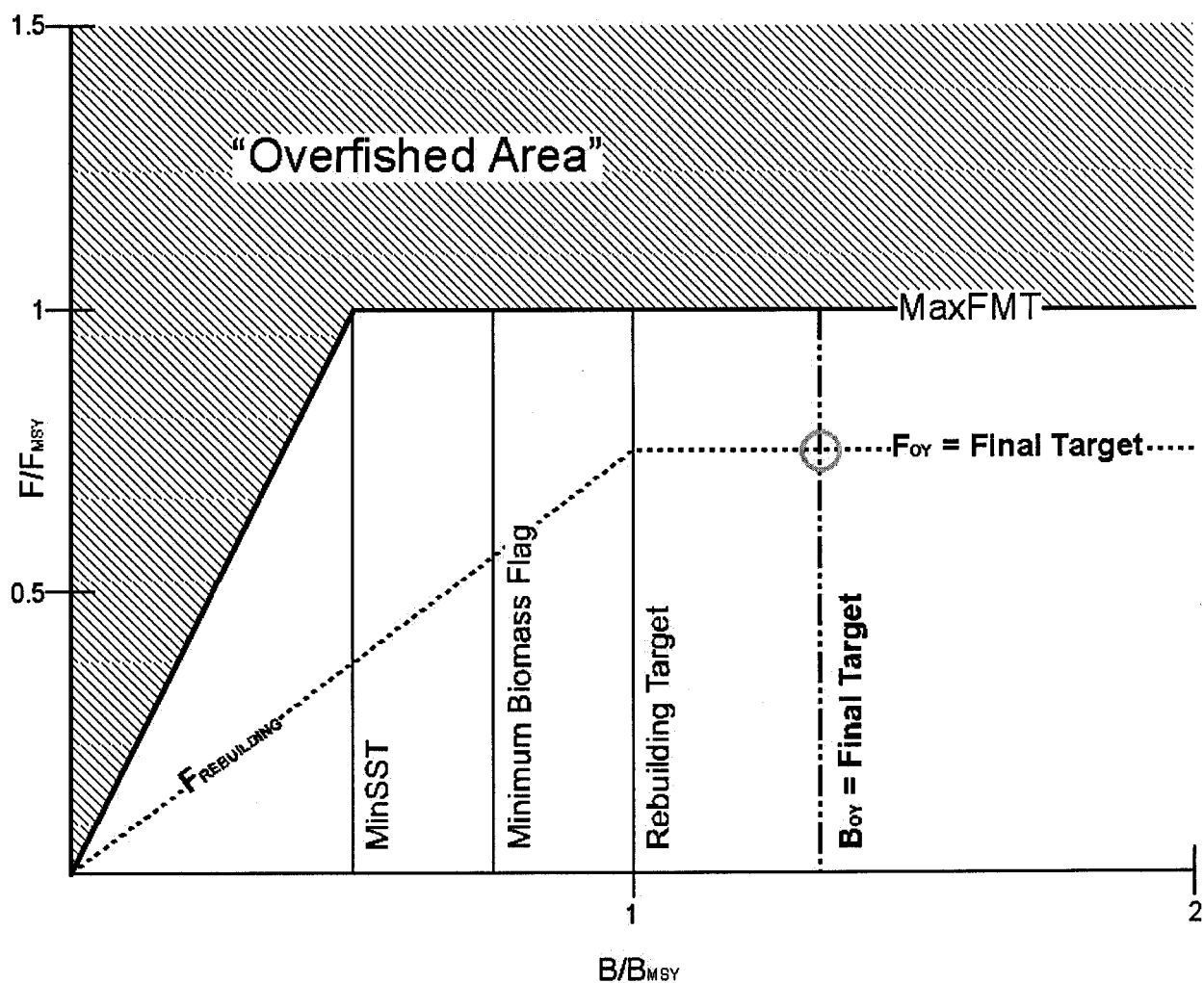


Figure 4.1: Representation of MSY, OY, and overfishing.

4.2 MSY, OY, and Overfishing

The goal of the MSFCMA is to ensure long-term fishery sustainability by halting or preventing overfishing, and by rebuilding any overfished stocks. By definition, overfishing occurs when fishing mortality (F) is higher than the level at which fishing produces maximum sustainable yield (MSY). MSY is the maximum long-term average yield that can be produced by a stock on a continuing basis. A stock is overfished when stock biomass (B) has fallen to a level substantially below what is necessary to produce MSY. So there are two aspects that managers must monitor to determine the status of a fishery: the level of F in relation to F at MSY (F_{MSY}), and the level of B in relation to B at MSY (B_{MSY}).

The technical guidance document for National Standard 1 (Restrepo *et al.* 1998) requires that “control rules” be developed that identify “good” versus “bad” stock conditions. It also requires that control rules describe management action that will influence a control variable (e.g., F) as a

function of some stock size variable (e.g., B), to achieve “good” stock conditions. Each control rule must identify reference points called “status determination criteria”: one for F that identifies when overfishing is occurring, and one for B that indicates when the stock is overfished. The status determination criterion for F is the maximum fishing mortality threshold (MaxFMT). Minimum stock size threshold (MinSST) is the status determination criterion for B . When F/F_{MSY} exceeds the MaxFMT, overfishing is occurring, and when B/B_{MSY} falls below MinSST the stock is overfished. When either of these two conditions occur, NMFS must notify Congress that the stock is overfished, and fishery managers must take action to halt overfishing, and rebuild the stock. A reasonable MSY control rule template for application to western Pacific coral reef ecosystems may be derived from the default MSY control rule suggested by Restrepo *et al.* (1998).

Managers must exert some control over F/F_{MSY} , the y-axis labeled in Figure 4.1, which is a function of B/B_{MSY} on the x-axis. The default MaxFMT recommended by the technical guideline document cited above is an upper limit set at F_{MSY} , shown as a horizontal line at $1 = \text{MaxFMT} = F/F_{MSY}$. In applying the MSY control rule, fishing effort—expressed as the ratio F/F_{MSY} —must not be allowed to exceed the MaxFMT, although a stock with a biomass well above B_{MSY} can support larger F values for a limited time, while B declines towards B_{MSY} . Other types of control rules would allow higher F levels under specified conditions, but such rules require reliable measures of B and a very good understanding of stock dynamics.

The MinSST is shown in Figure 4.1 by a vertical line at a biomass level substantially below B_{MSY} . This allows for some natural fluctuation of biomass around B_{MSY} under an MSY harvest policy. When B falls below MinSST, however, the stock is considered to be overfished and then F must be reduced below the MaxFMT by an amount that depends on the severity of the stock depletion, the stock’s capacity to rebuild, and the desired recovery time for the stock. A minimum biomass flag (see Figure 4.1) should also be defined so that if B drops below it, managers are prompted to implement remedial action before biomass reaches the MinSST.

When stock biomass falls below the MinSST, fishery councils are required to develop stock rebuilding plans. Different control rules may be used in rebuilding plans. A precautionary approach dictates that managers follow an “optimal yield” (OY) control rule, as illustrated by the line labeled $F_{REBUILDING}$ in Figure 4.1. OY is MSY as reduced by relevant socioeconomic factors, ecological considerations, and fishery biological constraints to provide the greatest long-term benefits to the nation. Under the suggested OY control rule (adapted from the Restrepo *et al.* 1998 default guidelines), when B is below B_{MSY} , F is controlled as a linear function of B , until a rebuilding target of B_{MSY} is reached at F_{OY} . A final OY target (B_{OY}) somewhat greater than B_{MSY} is achieved by keeping fishing effort at F_{OY} (see Figure 4.1). Simulation results show that when fisheries are managed at F_{OY} , equilibrium biomass will be maintained at about $1.30 B_{MSY}$ and resulting equilibrium yield (OY) will be at about 95% of MSY (Mace 1994).

4.3 Application of the MSY Control Rule to the Coral Reef Ecosystem

4.3.1 Overfishing Criteria in Coral Reef Ecosystems

It is difficult to determine overfishing criteria for coral reef fisheries because the coral reef ecosystem contains many species and this produces a complex web of ecological interrelationships. Russ (1991) defines four non-mutually-exclusive overfishing categories:

- growth overfishing, which occurs when fishing intensity prevents fish from reaching older age classes;
- recruitment overfishing, which occurs when the spawning stock of a population is reduced below the level at which adequate reproduction can maintain the population;
- economic overfishing, which occurs when a fishery is no longer cost-effective; and,
- ecosystem overfishing, which occurs when fishing pressure causes changes to the species composition in a multi-species setting, often resulting in changes in ecosystem function (DeMartini *et al.* 1996).

The Council manages most other EEZ fisheries through its four implemented FMPs. These FMPs have used either the recruitment overfishing model to identify overfishing criteria—such as spawning potential ratio, or SPR—or the growth overfishing model, using MSY methods. However, the ecosystem overfishing concept, detected by shifts in species composition or trophic web dynamics, may be most appropriate for the CRE-FMP. This approach can guard against single-stock recruitment overfishing, where applicable. Because the coral reef ecosystem is a multi-species community with a long coevolutionary history, removing certain species—if it reduces species diversity—could lead to the unwanted predominance of often less valuable generalist species. Changes in species dominance patterns in coral reefs experiencing fishing pressure have been reported for a number of tropical stocks from various areas around the world. It is also well known that the sensitivity of multi-species systems to environmental fluctuations increases as the level of exploitation increases.

4.3.2 Estimating Reference Points With Limited Data

Available biological and fishery data are poor for all species and island areas covered by the CRE-FMP. Data collection systems are managed by the local island governments, and they vary widely in format and coverage. Data are generally restricted to commercial landings records for a handful of species. Total effort cannot be adequately partitioned between the various management unit species (MUS) for any fishery or area. Biomass, maximum sustainable yield, and fishing mortality estimates are not available for any single MUS. Even though it seems likely that fisheries targeting coral reef ecosystem resources will continue to expand, possibly into the EEZ, there is scant information on the life histories, ecosystem dynamics, fishery impact, community structure changes, yield potential, and management reference points for many coral reef ecosystem species.

Once these data are available, fishery managers will then be able to establish limits and reference points based on the multi-species coral reef ecosystem as a whole. In accordance with the National Standard guidelines cited above, whenever possible, the MSY control rule should be applied to the individual species in a multi-species stock. When this is not possible, MSY may be specified for one or more species; these values can then be used as indicators for the multi-species stock's MSY. Clearly, any given species that is part of a multi-species complex will respond differently to an OY-determined level of fishing effort (F_{OY}). Thus, for a species complex that is fished at F_{OY} , managers still must track individual species' mortality rates in order to prevent species-specific population declines that would lead to strict protection, as required by the Endangered Species Act. For the fisheries encompassed by the CRE-FMP, the multi-species complex as a whole will be used to establish limits and reference points for each area. Where possible, available data for a particular species will be used to evaluate the status of individual MUS stocks in order to prevent recruitment overfishing. When better data and the appropriate multi-species stock assessment methodologies become available, all stocks will be evaluated independently, without proxy. Spatial bounds will initially follow the five island groups that are part of the management area,¹ but will be refined as stock bounds and ecosystem structure become better understood.

Coral reef fishery scientists have used several approaches to model multi-species fisheries with varying levels of success. These have been discussed in Section 2.4. Briefly, the simplest approach has been to consider a community to be the sum of its species. But the coral reef ecosystem is too complex to use these methods. Instead, the system can be divided into separate trophic levels to model energy flow and estimate potential yields. The ECOPATH model, discussed in Section 2.4, is based on this approach (Polovina 1984). When coupled with another computer model, ECOSIM, which uses output from ECOPATH, abundance of both target and non-target species can be estimated when different levels of fishing pressure are applied to the system (Kitchell *et al.* 1999). It may be possible to use these models in the future, but right now there is not enough data on coral reef species and fisheries to use them.

4.3.3 Establishing Reference Point Values

Standardized values of catch per unit effort (CPUE) and effort (E) will be used to establish limit and reference point values, which will act as proxies for relative biomass and fishing mortality, respectively. Limits and reference points will be calculated in terms of $CPUE_{MSY}$ and E_{MSY} included in Table 4.1.

¹American Samoa, CNMI, Guam, Hawaii, and the PRIAs. See Section 1.6.1 for a description of the management area.

Table 4.1. CPUE-based overfishing limits and reference points for coral reef species.

Value	Proxy	Explanation
MaxFMT (F_{MSY})	E_{MSY}	0.91 CPUE_{MSY}
F_{OY}	$0.75 E_{MSY}$	suggested default scaling for target
B_{MSY}	CPUE_{MSY}	operational counterpart
B_{OY}	1.3 CPUE_{MSY}	simulation results from Mace (1994)
MinSST	0.7 CPUE_{MSY}	suggested default $(1-M)B_{MSY}$ with $M=0.3^*$
B_{FLAG}	0.91 CPUE_{MSY}	suggested default $(1-M)B_{OY}$ with $M=0.3^*$

*interim value of $M=0.3$ is applied.

When reliable estimates of E_{MSY} and CPUE_{MSY} are not available, they will be estimated from the available time series of catch and effort values, standardized for all identifiable biases using the best available analytical tools. CPUE_{MSY} will be calculated as one-half a multi-year moving average reference CPUE (CPUE_{REF}). This value has not been finalized yet; however, preliminary values from the types of data presently available for Hawaii are shown in Figures 4.2a-c. These are time series of data from the State of Hawaii commercial catch reports, screened to include only CHCRT from all gear types for the entire area of the MHI. CPUE is estimated as the aggregate weight reported for that year, divided by the number of records for that year. A twenty-year time window is used for the multi-year average. Figure 4.2a presents all CHCRT in aggregate. Figure 4.2b is for *menpachi* (*Myripristis* spp.) while 4.2c is for *weke* (*Mulloidichthys* spp.). These two latter examples were chosen because they are well-represented in the catch report database. CPUE_{REF} and E_{MSY} could be estimated directly from this, as shown in the figures. Alternatively, following Restrepo *et al.* (1998), they could be estimated as $E_{MSY} = E_{AVE}$, where E_{AVE} represents the long-term average effort prior to declines in CPUE. When multiple estimates are available, the more precautionary value will be used. All values will be calculated using the best available data. When new data become available, reference point values will be recalculated.

Figure 4.2a: Time series of aggregate HCRT CPUE from HDAR data.

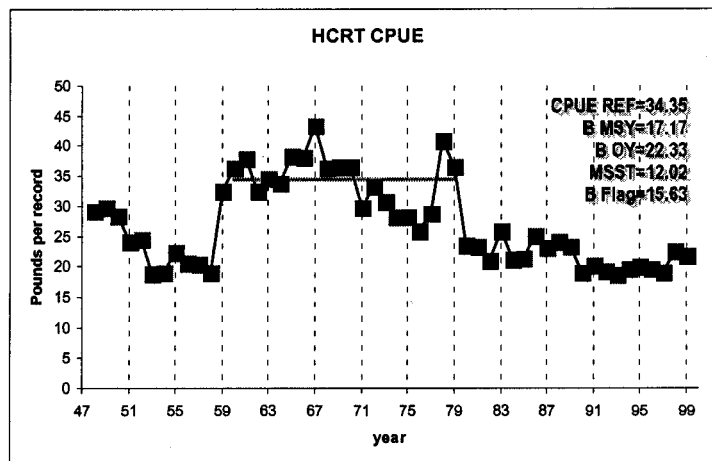


Figure 4.2b: Time series of menpachi (*Myripristis* spp.) CPUE from HDAR data.

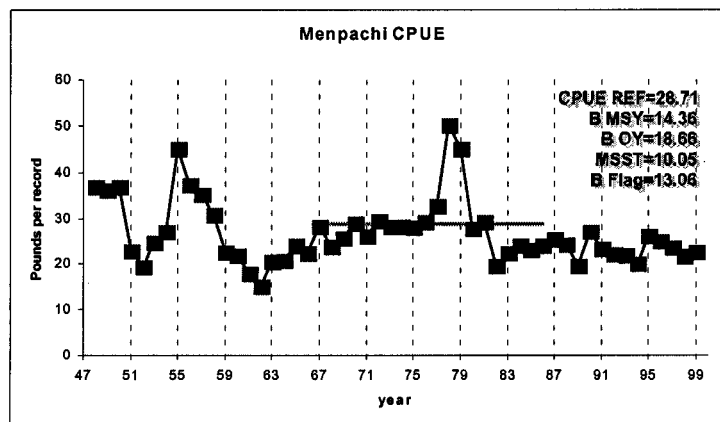
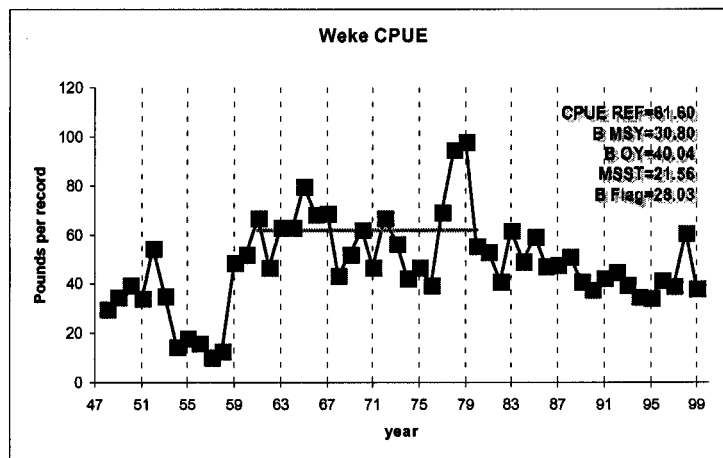


Figure 4.2c: Time series of weke (*Mulloidichthys* spp.) CPUE from HDAR data.



4.3.4 Preventing Recruitment Overfishing

The limits and reference points illustrated in Figure 4.2 can be applied to both multi-species stocks and to individual component species stocks, realizing however, that much of the data in the State of Hawaii commercial catch reports are often at the genus or family level. As stated earlier, while managing the multi-species stock to provide maximum benefit, fishery managers must also ensure that the resulting fishing mortality rate does not reduce any individual species stock to a level requiring protection under the Endangered Species Act. Preventing recruitment overfishing on any component stock will satisfy this need in a precautionary manner. Best available data will be used for each fishery to estimate these values. These reference points will be related primarily to recruitment overfishing and will be expressed in units such as spawning potential ratio or spawning stock biomass. However, no examples can be provided at present. Species for which managers have collected extensive survey data and know their life history parameters, such as growth rate and size at reproduction, will be the best candidates for determining these values.

4.3.5 Preventing Ecosystem Overfishing

Using the best available data, managers will monitor changes in species abundance and/or composition. They will pay special attention to those species they consider important because of their trophic level or other ecological importance to the larger community. For Hawaii, a preliminary approach aggregates HDAR data into two five-year bins for comparison, an early bin comprising 1948-1952 and a recent bin comprising 1995-1999. Table 4.2, which may be found at the end of this chapter, ranks CHCRT based on their proportion of total landings in the 1948-1952 data bin. Although it is difficult to draw conclusions from this exercise, it does show, in a preliminary way, how in an exploited ecosystem species composition has changed over time.

4.4 Specification of Harvesting and Processing Capacity

Section 303(a)(4) of the MSFCMA requires that all FMPs “assess and specify– (A) the capacity and the extent to which fishing vessels of the United States, on an annual basis, will harvest the optimum yield..., (B) the portion of such optimum yield which, on an annual basis, will not be harvested by fishing vessels of the United States and can be made available for foreign fishing, and (C) the capacity and extent to which United States fish processors, on an annual basis, will process that portion of such optimum yield that will be harvested by fishing vessels of the United States.”

Information used to compile this FMP, together with information in the other Western Pacific Council’s FMPs and related documents, was examined to assess and specify the U.S. fishing and processing capacity in this region. FMPs from other regions and related documents, including *Our Living Oceans* (NMFS 1999) (available online at <http://spo.nwr.noaa.gov/olo99.htm>) provided additional information on U.S. harvesting and processing capacity. This information clearly indicates that fishing vessels of the U.S. currently have the capacity to harvest the optimum yield on an annual basis. As such, no part of the optimum yield will be made available for foreign fishing. Similarly, the capacity of U.S. fish processors is of sufficient size to process the entire optimum yield.

Table 4.2: Change in landings for selected Hawaii CHCRT, 1948-1952 compared to 1995-1999. Species are ranked based on 1948-1952 landings.

Hawaiian, English & Latin names	1948-1952 aggregate			1995-1999 aggregate		
	Pounds	%	Rank	Pounds	%	Rank
<i>Menpachi</i> , soldierfish (<i>Myripristis</i> spp.)	415,252	18.54	1	218,781	15.04	1
<i>Amaama</i> , striped mullet (<i>Mugil cephalus</i>)	321,480	14.35	2	27,285	1.88	12
<i>Weke</i> , yellow goatfish (<i>Mulloidichthys</i> spp.)	305,108	13.62	3	148,149	10.18	4
<i>Moano</i> , banded goatfish (<i>Parupeneus</i> spp.)	172,493	7.70	4	20,656	1.42	19
<i>Wekeula</i> , Pflugers goatfish (<i>Mulloidichthys</i> spp.)	101,189	4.52	5	104,909	7.21	5
<i>Moi</i> , threadfin (<i>Polydactylus sexfilis</i>)	96,385	4.30	6	5,126	0.35	28
<i>Manini</i> , convict tang (<i>Acanthurus triostegus</i>)	88,335	3.94	7	70,448	4.84	7
<i>Kumu</i> , whitesaddle goatfish (<i>Parupeneus porphyreus</i>)	86,445	3.86	8	23,620	1.62	13
<i>Kawelea</i> , Hellers barracuda (<i>Sphyaena helleri</i>)	84,075	3.75	9	15,589	1.07	21
<i>Kaku</i> , great barracuda (<i>Sphyaena barracuda</i>)	82,062	3.66	10	14,847	1.02	22
<i>Tako</i> , octopus (<i>Octopus</i> spp.)	80,950	3.61	11	98,016	6.74	6
<i>Uhu</i> , parrotfish (<i>Scaridae</i>)	49,795	2.22	12	159,252	10.95	3
<i>Pualu</i> , yellowfin surgeonfish (<i>Acanthurus xanthopterus</i> , <i>A. blochii</i>)	46,338	2.07	13	28,020	1.93	11
<i>Palani</i> , eyestriped surgeonfish (<i>Acanthurus dussumieri</i>)	43,054	1.92	14	165,164	11.35	2
<i>Aweoweo</i> , bigeye (<i>Priacanthidae</i>)	32,058	1.43	15	22,133	1.52	14

Table 4.2 (cont.)

Hawaiian, English & Latin names	1948-1952 aggregate			1995-1999 aggregate		
	Pounds	%	Rank	Pounds	%	Rank
Aholehole, flagtail (<i>Kuhlia sandvicensis</i>)	31,637	1.41	16	21,627	1.49	18
Kala, unicornfish (<i>Naso</i> spp.)	27,727	1.24	17	66,686	4.58	8
Nenuē, rudderfish (<i>Kyphosus</i> spp.)	27,156	1.21	18	56,628	3.89	9
Puhiuha, conger eel (<i>Conger cinereus</i>)	20,616	0.92	19	1,378	0.09	33
Aawa, hogfish (<i>Bodianus bilunulatus</i>)	20,173	0.90	20	13,576	0.93	25
Nabeta, razorfish (<i>Xyrichtys</i> spp., <i>Cymolutes lecluse</i>)	17,559	0.78	21	22,014	1.51	15
Mu, porgy (<i>Monotaxis grandoculis</i>)	15,937	0.71	22	11,479	0.79	26
Uouoa, false mullet (<i>Neomyxus leuciscus</i>)	15,873	0.71	23	2,658	0.18	30
Humuhumu, triggerfish (Balistidae)	14,460	0.65	24	873	0.06	36
Kamanu, rainbow runner (<i>Elagatis bipinnulatus</i>)	10,540	0.47	25	21,867	1.50	17
Maiko, bluelined surgeonfish (<i>Acanthurus nigroris</i>)	10,067	0.45	26	17,953	1.23	20
Alaihe, squirrelfish (<i>Neoniphon</i> spp., <i>Sargocentron</i> spp.)	9,718	0.43	27	1,376	0.09	34
Panuhunuhu, parrotfish (<i>Calotomus</i> spp.)	8,117	0.36	28	5,316	0.37	27
Kupoupou, cigar wrasse (<i>Cheilio inermis</i>)	2,035	0.09	29	227	0.02	39
Kihikhi, Moorish idol (<i>Zanclus cornutus</i>)	1,768	0.08	30	0	0.00	43

Table 4.2 (cont.)

Hawaiian, English & Latin names	1948-1952 aggregate			1995-1999 aggregate		
	Pounds	%	Rank	Pounds	%	Rank
<i>Naenae</i> , orangespot surgeonfish (<i>Acanthurus olivaceus</i>)	945	0.04	31	28,590	1.97	10
<i>Amaama</i> , summer mullet (<i>Moolgarda engeli</i>)	376	0.02	32	421	0.03	38
<i>Pakuikui</i> , Achilles tang (<i>Acanthurus achilles</i>)	253	0.01	33	2,233	0.15	32
<i>Kole</i> , goldring surgeonfish (<i>Ctenochaetus strigosus</i>)	65	0.00	34	13,882	0.95	23
<i>Maikoiko</i> , whitebar surgeonfish (<i>Acanthurus leucopareus</i>)	44	0.00	35	0	0.00	44
<i>Uukanipou</i> , squirrelfish (<i>Sargocentron spiniferum</i>)	32	0.00	36	873	0.06	37
<i>Pala</i> , Yellow tang (<i>Zebrasoma flavescens</i>)	23	0.00	37	47	0.00	41
<i>Lauwiliwili</i> , longnose butterflyfish (<i>Forcipiger</i> spp.)	11	0.00	38	1	0.00	42
<i>Wekepueo</i> , bandtail goatfish (<i>Upeneus arge</i>)	8	0.00	39	60	0.00	40
<i>Opelu kala</i> , unicornfish (<i>Naso hexacanthus</i>)	0	0.00	40	22,001	1.51	16
<i>Munu</i> , striped goatfish (<i>Parupeneus bifasciatus</i>)	0	0.00	41	1072	0.07	35
<i>Moanokea</i> , blue goatfish (<i>Parupeneus cyclostomus</i>)	0	0.00	42	13,821	0.95	24
<i>Roi</i> , seabass (<i>Cephalopholis argus</i>)	0	0.00	43	2,304	0.16	31
<i>Poopaa</i> , hawkfish (<i>Cirrhitidae</i>)	0	0.00	44	3,744	0.26	29

CHAPTER 5

MANAGEMENT REGIME

5.1 Introduction

The preceding chapters have mainly described the setting for management: what areas and taxa will come under the FMP, the nature of the coral reef ecosystem, the way that resources within that ecosystem are used by people in various communities in the region, and the criteria that will be used to assess the status of managed species. This chapter outlines the actions that the Council is implementing to manage fisheries on coral reefs under Council jurisdiction. The overall goal of this management program is to establish a management regime for the entire Western Pacific Region that will maintain sustainable coral reef fisheries while preventing any adverse impacts to stocks, habitat, protected species, or the ecosystem. Developing management objectives that support this goal was an important starting point in determining the kinds of measures that should be implemented. The reader is encouraged to review Section 1.4, which lists and describes these objectives. Just as this whole plan has been shaped by the ecosystem approach advocated by the Ecosystem Principles Advisory Panel (EPAP 1999), the management regime outlined here has been developed with these principles in mind. Section 1.5, describes how this FMP conforms to the eight actions that the Ecosystem Principles Advisory Panel argues should be included in any “fishery ecosystem plan.”

Presently, there is little or no fishing or harvesting of coral reef ecosystem species in federal waters of the Western Pacific Region. This is due partly to access restrictions imposed in some coral reef habitat areas by various federal agencies. Within these areas, certain activities may also be restricted through regulations that in effect serve as a *de facto* management program. The management program described here will not supercede any of the valid restrictions imposed by these federal authorities. However, these areas encompass only a small portion of the total coral reef habitat in the region. Thus, most of the coral reef ecosystem in the region is currently not managed. This FMP management regime will strengthen and extend protection and management of the ecosystem to all areas within the region’s EEZ.

The coral reef management area includes all EEZ waters (from the surface to the ocean floor) that are outside of state or territorial waters (0-3 nmi) and within 200 nmi from shore. (See Section 1.6.1 for a detailed description of the management area.) The management area includes some areas where the Council shares jurisdiction with other federal agencies, such as National Wildlife Refuges. State waters have also been considered, although the management measures described here will only apply to waters within federal jurisdiction. CRE-FMP management measures are meant to simplify regulations for coral reef areas by developing consistency between the management regimes of these various state and federal entities.

The remainder of this chapter describes the management measures, which fall in four categories. Section 5.2 describes marine protected areas, which would restrict fishing in certain areas. Section 5.3 outlines permitting regimes. This FMP would implement a special permit and reporting regime for certain activities. A less restrictive general permit may be implemented at a later date. Section 5.4 describes gear restrictions that would be imposed on coral reef fisheries. Section 5.5 enumerates several other components of the management regime that are not regulatory measures. These include measures to adapt the management regime to changing conditions, the enforcement program that will support the regime, and non-regulatory measures to facilitate coordination between the various groups and agencies involved in managing EEZ marine resources.

5.2 Marine Protected Areas

Marine protected areas (MPAs) are an attractive option for ecosystem-based fisheries management. The selection of an MPA does not require detailed knowledge of the management unit species in order to holistically conserve multi-species resources and the functional attributes of marine ecosystems. They can also provide “insurance” against periods of poor recruitment of individual stocks.

MPAs can also vary in scope and extent. They can be areas designated for limited use, seasonal use, or areas that are completely restricted from consumptive use (no-take). Although completely restricted areas are thought to provide the highest degree of protection to marine ecosystems, less restrictive areas also provide some protection with fewer economic and social impacts.

The optimum size of an MPA depends on many factors, including the resources managed, management goals, enforcement capabilities, and social and economic constraints. However, researchers do not yet fully understand the relation between the area covered by an MPA and resulting benefits in the form of ecologically complete coral reef ecosystem protection. To be useful to fisheries and to promote the conservation of coral reef resources on a broader scale, MPAs should serve as sources of reproductive output to replenish larger surrounding or down-current areas. The present approach of establishing small and isolated MPAs is inadequate for this purpose.

Few, if any, studies have sought to verify whether MPAs established in the U.S. Pacific Islands do actually benefit nearby fisheries. It is clear that fish populations that build up in small areas temporarily closed to fishing are quickly reduced when fishing is resumed, as evidenced by studies in Hawaii and the Philippines. Existing MPAs in the U.S. Pacific Islands have been criticized for being either too small and fragmented or for not encompassing sufficient depth range and high quality habitat to provide broad coral reef ecosystem protection or recruitment benefits to fisheries.

It has been suggested that linking the populations in different MPAs over a broad area is necessary to assure long-term sustainability of coral reef fisheries. Some argue for complete

protection from fishing, whereas others believe MPAs are more valuable when they can serve as natural laboratories for fishing experiments and to test adaptive management strategies.

In determining the locations in the CRE-FMP, the Council considered the following criteria:

- Natural resource values- biogeographical representation, biodiversity, ecosystem integrity, ecological significance, species maintenance, habitat structure/features, and other special elements;
- Human use and historical values- renewable resources of importance for sustainable uses, recreational resources, research and monitoring, educational and interpretive opportunity, historical and cultural resources, and aesthetic resources;
- Impacts of human activities- observed environmental impacts and projected impacts; and,
- Management concerns- coordination with other programs, size and boundary considerations, accessibility, surveillance and enforcement, economic considerations, network-wide activities, and urgency of threats.

Two types of MPAs will be used to manage coral reef ecosystem fisheries. The first type is the no-take MPA, where all extractive activities, with a few carefully monitored exceptions, will be prohibited. Certain carefully managed fisheries will be allowed in the second type, the low-use MPA. However, as new information is acquired through resource monitoring, the initial MPA designations could be adjusted and additional MPAs added in the future through the adaptive management process.

5.2.1 No-take Marine Protected Areas

Under this plan, no-take MPAs will encompass federal waters shallower than 10 fathoms in the NWHI and waters shallower than 50 fathoms around Jarvis, Howland, Baker, Kingman, Laysan, French Frigate Shoals, the northern half of Midway Atoll, and Rose Atoll in American Samoa. (The Council recognizes the co-management agreement between the Territory of American Samoa and Department of the Interior for the Rose Atoll National Wildlife Refuge (0-3 nm), together with Department of Commerce's jurisdiction to the shoreline.) Figures 5.1 - 5.13 show the locations of the MPAs implemented by this FMP. Detailed maps of each MPA may be found at the end of this chapter. The Crustacean FMP provides additional protection by prohibiting fishing for lobster within 20 miles around Laysan island. Moreover, other restrictions may also apply inside areas managed and regulated by other federal authorities. The locations of no-take MPAs are described in the draft regulations of this FMP (see Section 8.1).

Amendments to Already-implemented FMPs

The CRE-FMP designates no-take marine protected areas within the management area. Commercial, recreational, subsistence, or cultural take of any marine species within these areas is prohibited. No described or undescribed gear is exempt from this designation. Fisheries

managed under the Council's four already-implemented FMPs¹ are mostly exempt from the regulations outlined in this CRE-FMP, and will observe the management regime of their respective FMPs. No-take marine protected areas are the main exception: they will apply to all Council-managed fisheries. Chapter 5 of the EIS accompanying this plan analyzes the impacts of these area closures on these four already-implemented FMPs. To ensure designated no-take MPAs effectively apply to all of the fisheries managed under Council FMPs, each of the four already-implemented FMPs must be amended to ensure the no-take status of these areas. The following four subsections serve as amendments to those FMPs.

Amendment 7 to the Bottomfish and Seamount Groundfish FMP

It is prohibited to harvest the bottomfish management unit species listed in Table 5.1, and all future additions to the bottomfish MUS list, in no-take marine protected areas designated in the Coral Reef Ecosystem FMP, and in any marine protected areas that may be designated by amendment to the Coral Reef Ecosystem FMP. The locations of the no-take MPAs are:

- (1) federal waters shallower than 10 fathoms in the Northwestern Hawaiian Islands; and,
- (2) federal waters shallower than 50 fathoms around Jarvis Island (0°23' S, 160°01' W), Howland Island (0°48' N, 176° 38' W), Baker Island (0° 13' N, 176°38' W), Kingman Reef (6°23' N, 162°24' W), Laysan Island (25° 45' N, 171°45' W), French Frigate Shoals (23° 45' N, 166°15' W), the Northern half of Midway Atoll (28° 14' N, 177° 22' W), and Rose Atoll (14° 33' S, 168° 09' W).

Table 5.1: Bottomfish management unit species list.

Scientific Name	English Common Name	Scientific Name	English Common Name
<i>Aphareus rutilans</i>	red snapper/silvermouth	<i>Pristipomoides auricilla</i>	yellowtail snapper
<i>Aprion virescens</i>	gray snapper/jobfish	<i>P. filamentosus</i>	pink snapper
<i>Caranx ignobilis</i>	giant trevally/jack	<i>P. flavipinnis</i>	yelloweye snapper
<i>C. lugubris</i>	black trevally/jack	<i>P. seiboldi</i>	pink snapper
<i>Epinephelus fasciatus</i>	blacktip grouper	<i>P. zonatus</i>	snapper
<i>E. quernus</i>	sea bass	<i>Pseudocaranx dentex</i>	thicklip trevally
<i>Etelis carbunculus</i>	red snapper	<i>Seriola dumerili</i>	amberjack
<i>E. coruscans</i>	red snapper	<i>Variola louti</i>	lunartail grouper
<i>Lethrinus amboinensis</i>	ambon emperor	<i>Beryx splendens</i>	alfonsin
<i>L. rubrioperculatus</i>	redgill emperor	<i>Hyperoglyphe japonica</i>	ratfish/butterfish
<i>Lutjanus kasmira</i>	blueline snapper	<i>Pseudopentaceros richardsoni</i>	armorhead

¹The Bottomfish and Seamount Groundfish, Crustaceans, Pelagics, and Precious Corals FMPs. Additionally, the Council is currently developing an amendment to include the CNMI and the PRIA under Council-developed FMPs and to designate 49 additional bottomfish MUS. These FMPs and their fisheries are summarized in Chapter 3 of the EIS that accompanies this CRE-FMP.

Amendment 11 to the Crustaceans FMP

It is prohibited to harvest the crustacean management unit species listed in Table 5.2, and all future additions to the crustacean MUS list, in no-take marine protected areas designated in the Coral Reef Ecosystem FMP, and in any marine protected areas that may be designated by amendment to the Coral Reef Ecosystem FMP. The locations of the no-take MPAs are:

- (1) federal waters shallower than 10 fathoms in the Northwestern Hawaiian Islands; and,
- (2) federal waters shallower than 50 fathoms around Jarvis Island (0°23' S, 160°01' W), Howland Island (0°48' N, 176° 38' W), Baker Island (0° 13' N, 176°38' W), Kingman Reef (6°23' N, 162°24' W), Laysan Island (25° 45' N, 171°45' W), French Frigate Shoals (23° 45' N, 166°15' W), the Northern half of Midway Atoll (28° 14' N, 177° 22' W), and Rose Atoll (14° 33' S, 168° 09' W).

Table 5.2: Crustacean management unit species list.

Scientific Name	English Common Name
<i>Panulirus marginatus</i>	Spiny lobster
<i>Panulirus penicillatus</i>	Spiny lobster
<i>Family Scyllaridae</i>	Slipper lobster
<i>Ranina ranina</i>	Kona crab

Amendment 10 to the Pelagic FMP

It is prohibited to harvest the pelagic management unit species listed in Table 5.3, and all future additions to the pelagic MUS list, in no-take marine protected areas designated in the Coral Reef Ecosystem FMP, and in any marine protected areas that may be designated by amendment to the Coral Reef Ecosystem FMP. The locations of the no-take MPAs are:

- (1) federal waters shallower than 10 fathoms in the Northwestern Hawaiian Islands; and,
- (2) federal waters shallower than 50 fathoms around Jarvis Island (0°23' S, 160°01' W), Howland Island (0°48' N, 176° 38' W), Baker Island (0° 13' N, 176°38' W), Kingman Reef (6°23' N, 162°24' W), Laysan Island (25° 45' N, 171°45' W), French Frigate Shoals (23° 45' N, 166°15' W), the Northern half of Midway Atoll (28° 14' N, 177° 22' W), and Rose Atoll (14° 33' S, 168° 09' W).

The Council also recommends that the Pelagic FMP be amended to specifically identify only the nine pelagic shark species that are to remain as Pelagic MUS. In doing so, all other oceanic sharks belonging to the families Alopiidae, Carcharhinidae, Sphyrnidae, and Lamnidae will be removed from the Pelagic MUS list at that time. The Council further recommends that all coastal shark species belonging to these families are to be managed under the CRE-FMP. Therefore, the Pelagic FMP is amended to:

- (1) Remove all species of shark belonging to the families Alopiidae, Carcharhinidae, Sphyrnidae, and Lamnidae from the Pelagic MUS list except for the nine shark species listed in Table 5.3.
- (2) Remove dogtooth tuna (*Gymnosarda unicolor*) from the Pelagic MUS list. (*Gymnosarda unicolor* is to be managed under the CRE-FMP.)

Table 5.3: Pacific Pelagic management unit species list, as amended.

Scientific Name	English Common Name	Scientific Name	English Common Name
<i>Coryphaena</i> spp.	Mahimahi (dolphinfishes)	<i>Isurus oxyrinchus</i>	Shortfin mako shark
<i>Acanthocybium solandri</i>	Wahoo	<i>Isurus paucus</i>	Longfin mako shark
<i>Makaira mazara</i> : <i>M. indica</i>	Indo-Pacific blue marlin Black marlin	<i>Lamna ditropis</i>	salmon shark
<i>Tetrapturus audax</i>	Striped marlin	<i>Thunnus alalunga</i>	Albacore
<i>T. angustirostris</i>	Shortbill spearfish	<i>T. obesus</i>	Bigeye tuna
<i>Xiphias gladius</i>	Swordfish	<i>T. albacares</i>	Yellowfin tuna
<i>Istiophorus platypterus</i>	Sailfish	<i>T. thynnus</i>	Northern bluefin tuna
<i>Alapias pelagicus</i>	Pelagic thresher shark	<i>Katsuwonus pelamis</i>	Skipjack tuna
<i>Alopias superciliosus</i>	Bigeye thresher shark	<i>Euthynnus affinis</i>	Kawakawa
<i>Alopias vulpinus</i>	Common thresher shark	<i>Lampris</i> spp	Moonfish
<i>Carcharhinus falciformis</i>	Silky shark	Gempylidae	Oilfish family
<i>Carcharhinus longimanus</i>	Oceanic whitetip shark	family Bramidae	Pomfret
<i>Prionace glauca</i>	Blue shark	<i>Auxis</i> spp, <i>Scomber</i> spp; <i>Allothunus</i> spp	Other tuna relatives

Amendment 5 to the Precious Corals FMP

It is prohibited to harvest the precious corals management unit species listed in Table 5.4, and all future additions to the precious corals MUS list, in no-take marine protected areas designated in the Coral Reef Ecosystem FMP, and in any marine protected areas that may be designated by amendment to the Coral Reef Ecosystem FMP. The locations of the no-take MPAs are:

- (1) federal waters shallower than 10 fathoms in the Northwestern Hawaiian Islands; and,
- (2) federal waters shallower than 50 fathoms around Jarvis Island (0°23' S, 160°01' W), Howland Island (0°48' N, 176° 38' W), Baker Island (0° 13' N, 176°38' W), Kingman Reef (6°23' N, 162°24' W), Laysan Island (25° 45' N, 171°45' W), French Frigate Shoals (23° 45' N, 166°15' W), the Northern half of Midway Atoll (28° 14' N, 177° 22' W), and Rose Atoll (14° 33' S, 168° 09' W).

Table 5.4: Precious Corals management unit species list.

Scientific Name	English Common Name	Scientific Name	English Common Name
<i>Corallium secundum</i>	Pink coral (also known as red coral)	<i>Lepidisis olapa</i>	Bamboo coral
<i>Corallium regale</i>	Pink coral (also known as red coral)	<i>Acanella</i> spp.	Bamboo coral
<i>Corallium laauense</i>	Pink coral (also known as red coral)	<i>Antipathes dichotoma</i>	Black coral
<i>Gerardia</i> spp.	Gold coral	<i>Antipathes grandis</i>	Black coral
<i>Narella</i> spp.	Gold coral	<i>Antipathes ulex</i>	Black coral
<i>Calyptraphora</i> spp.	Gold coral		

5.2.2 Low-use Marine Protected Areas

MPAs that allow for limited consumptive activities are becoming a popular tool for conservation of marine resources. Low-use MPAs—while effectively protecting coral reefs—have fewer social and economic impacts than no-take areas. Low-use MPAs may also serve as natural laboratories to conduct research and fishing experiments, and to test adaptive management measures. At the same time, through carefully managed exploitation they can provide for food, medicine, and other benefits.

This FMP establishes low-use MPAs in federal waters between 10 and 50 fathoms deep in the NWHI, and around Palmyra Atoll, Wake Island, Johnston Atoll, and the southern half of Midway Atoll in federal waters shallower than 50 fathoms. The draft regulations of this FMP (see Section 8.1) provide detailed descriptions of the location and extent of these low-use MPAs. Fishing for coral reef ecosystem MUS will be carefully regulated and monitored in the low-use MPAs established under this FMP through a special permit regime described in Section 5.3.

Any vessel operator² intending to fish in a low-use MPA must notify the NMFS Regional Administrator (RA) at least 72 hours before the vessel leaves port (not including weekends and federal holidays). The notice must be transmitted directly to the RA's office or via a telephone number designated by the RA. It must provide the official number of the vessel; the name of the vessel; the intended departure date, time, and location of the name of the operator of the vessel; and the name and telephone number of the agent designated by the permit holder that NMFS can contact on any weekday 8:00 a.m. to 5:00 p.m. (Hawaii Standard Time).

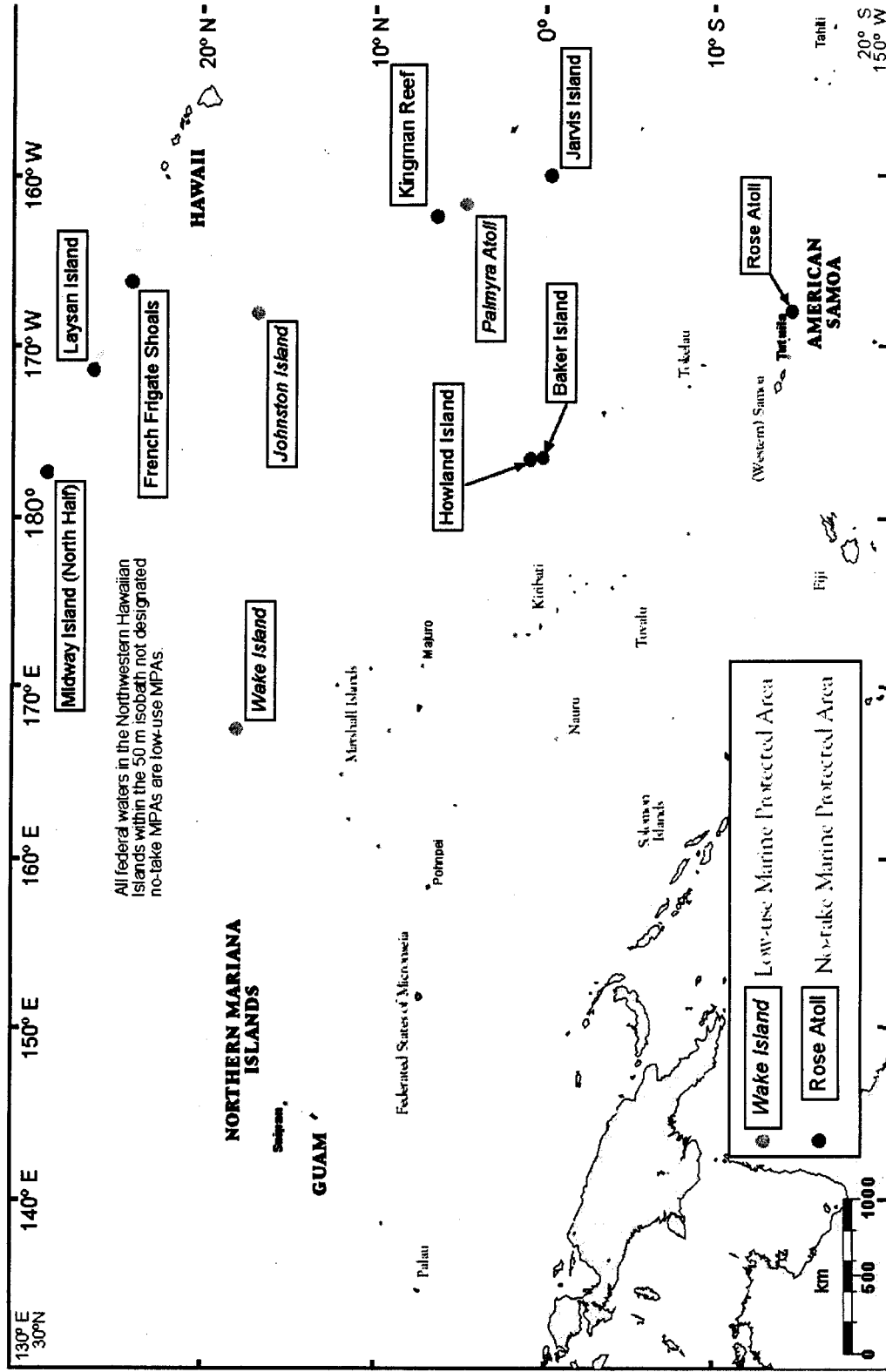
²The vessel operator will be presumed to be an agent designated by the permit holder unless the NMFS Regional Administrator is otherwise notified by the permit holder.

5.2.3 Operational Restrictions in MPAs

Most of the operational restrictions are inherent in MPA designation, as is the case with no-take MPAs, or stem from the permit regime described in the next section. (Other restrictions result from the gear restrictions outlined in Section 5.4.) However, there are two more general measures. First, all fishing vessels, including those regulated by existing FMPs, operating in or transiting an MPA must carry insurance to cover the cost of vessel removal and pollution liability in the event of a grounding. The insurance liability so required will be based on vessel category, permit type, and fishing area. Additionally, the Council will work with the relevant authorities to prohibit cruise ships from operating within established no-take and low-use MPAs. The Council will also work with the relevant authorities to authorize other vessels operating within MPAs to carry insurance similar to that which will be required for fishing vessels, as just described. Second, anchoring will not be permitted by vessels larger than 50 feet on Guam's Southern Banks. (It should be noted that the Southern Banks are not designated an MPA under this FMP, so none of the other MPA-related restrictions apply to that area.) In the event of an emergency caused by ocean conditions or vessel malfunction, vessels would be exempted from this prohibition. But they must be able to document the condition or malfunction after the fact.

The Council considered designating sub-zones within low-use MPAs that would be reserved for use by indigenous people on populated islands adjacent to the MPAs. However, the size, location, and specific rights of use have not been determined in any detail. Therefore, indigenous use sub-zones will not be implemented as part of this FMP, but could be a proposed measure for future framework action.

Figure 5.1: Location of MPAs proposed in this FMP.



5.3 Fishing Permits and Reporting Requirements

Permits are a fundamental management tool, and are used as a basis for participation in many U.S. domestic fisheries. Permits establish the legal rights, privileges, and obligations of fishermen. They are thus a vehicle for specifying the conditions under which fishing occurs. For example, performance standards can be set as qualifying criteria for obtaining and renewing permits. Permits can also specify that fishermen provide basic data for fishery monitoring and management. This monitoring can extend to permit holders' success in complying with permit requirements; by evaluating their records, managers can maintain a register of those permit holders in good standing. Permits will be issued only to U.S. citizens or nationals. Permits are not assigned to specific vessels, although the vessel being used during fishing operations will be identified on the permit application.

A permit process that allows managers to monitor participation, effort, and catch contributes to seven of the eight FMP objectives outlined in Section 1.4. Objective 4, which calls for measures to minimize adverse human impacts, is particularly addressed by permitting. More specifically, special permit conditions will allow managers to carefully monitor emerging coral reef fisheries and fisheries in low-use MPAs. Permits focus management attention on the specific reef resources and areas to be exploited and the harvest methods to be used. Periodic analysis of catch/effort data collected through permit reporting facilitates adaptive management. Finally, special permits can encourage applicants to more carefully consider their proposed activities and the potential impacts.

Table 5.5: Summary of CRE reporting requirements.

Fishery Type	Fishery Allowed In:	Permit Type Required	Reporting Requirement
All fisheries (except existing FMP fisheries)	All low-use MPAs	Special permit <i>Framework for general permit</i>	via special permit
Currently harvested CRE taxa (existing fisheries)	Outside no-take areas	<i>Framework for general or special permit</i>	via local monitoring/coordination
Potentially harvested CRE taxa (new fisheries)	Outside no-take areas	Special permit <i>Framework for general permit</i>	via special permit
Exemptions to ban on take of wild live rock and coral (bioprospecting, indigenous)	Outside no-take areas	Special permit	via special permit
Existing FMP fisheries (bottomfish, crustaceans, precious corals, pelagics)	Outside no-take areas	Follow permit requirements in respective FMP	Report incidental take of CRE taxa via respective FMP requirements

The permit regime adopted through this FMP will regulate the harvest of coral reef ecosystem management unit species (described in Section 1.6.1) under Council jurisdiction. As already noted, the management area covers EEZ coral reef resources in the Council region, including the remote U.S. island possessions directly under federal control, where permits would apply to

fishing from the shoreline to the outer edge of the EEZ. (In no-take MPAs, of course, marine resources harvesting is prohibited).

5.3.1 Permit and Reporting Regimes

Two types of permits will be used to manage coral reef fisheries. First, a special permit will be required to fish in low-use MPAs and to harvest Potentially Harvested Coral Reef Taxa (PHCRT). A second permit type, the general permit, may be implemented at a later date, using the framework process described in Section 5.5. General permits, if implemented, would be required to fish for Currently Harvested Coral Reef Taxa (CHCRT) in the EEZ outside of MPAs. In the meantime, existing permit regimes in the region will be used to manage CHCRT harvests outside MPAs. For the most part, these permit regimes, administered by local agencies in the various jurisdictions in the Council region, effectively manage current coral reef fisheries, to the degree that these fisheries are active. Hawaii and American Samoa have these locally-administered permitting systems. In Hawaii, any person who sells their catch is required to have a commercial fishing licence granted by the Department of Land and Natural Resources. In American Samoa, the Department of Marine and Wildlife Resources issues a variety of fishing permits and commercial licences via a regional general form. Fishing for CHCRT in CNMI and Guam does not require a permit. Nevertheless, information on numbers of vessels fishing, fishing effort, and catch data are collected through standardized sales receipts and creel censuses. If, in the future, these locally-administered permit regimes are deemed inadequate, a federal permit, such as the general permit mentioned above, could be implemented by the framework procedure.

Anyone wishing to fish in the EEZ must contact their local marine fisheries office to confirm if a permit is needed, based on the specific target resources sought and the area to be fished. Local marine fisheries offices will handle requests for participation in all existing fisheries in coordination with the NMFS Pacific Islands Area Office (PIAO), unless by means of a framework measure the Council has specified some other process. If appropriate, the PIAO will explain the proper procedure to the fisherman and make available permit and logbook forms as needed.

The Special Permit and Reporting Regime

Special permits will be required for:

- (1) fishing for coral reef taxa in a low-use MPA;
- (2) targeting all PHCRT anywhere fishing is allowed in the EEZ; and,
- (3) bioprospecting.

The Council thinks that, in general, harvesting significant quantities of wild live rock and live coral should be prohibited because of the harm it could do to the coral reef ecosystem. However, they recognized that limited harvests could be allowed by special permit in two circumstances:

(1) collection of seed stock by aquaculture operations; and, (2) collection by indigenous people for traditional and ceremonial uses.

Once enough data has been acquired from fisheries targeting PHCRT, the framework process could be used to classify the taxon as a CHCRT. A special permit would then no longer be required to harvest the taxon. In addition, in order to use fishing gear that is not one of the allowable gear types listed in Section 5.4, a person will have to apply for a special permit. The applicant must fully describe the gear and its mode of deployment on the permit application. These applications will be reviewed using the same process as would be used for any other special permit application.

Currently, residents on and visitors to Palmyra, Johnston and Wake Islands and Midway Atoll—which under this FMP will be surrounded by low-use MPAs—are allowed to fish recreationally, in some cases using catch-and-release. Although these fisheries are regulated by the USFWS, they are not regulated by any of the Council's already-implemented FMPs. Therefore, under this FMP people who want to take coral reef resources for recreation and personal on-island consumption will have to obtain a special permit for this purpose. They will have to provide an estimate of their total take (in pounds) and this must be approved by the local authority. Any local fishing regulations in effect should also be followed. If these procedures are followed, the NMFS PIAO may allow the on-site resource manager to issue these permits. Since the USFWS already regulates and monitors these activities, their programs will be taken into consideration as part of the permit application process.

Special Permit Application and Review Process

Anyone who wants to fish in the EEZ and meets any of the criteria listed above for the special permit requirement must contact the PIAO in order to obtain an application. They may contact the office directly, or they may be directed to the PIAO by the fishery management agency in their jurisdiction. A completed application must be submitted along with any specified fees at least 60 days prior to the desired date of permit action. The fee will be calculated based on administrative cost, in accordance with procedures in the NOAA Finance Handbook. (A sample application form with directions may be found in Section 8.2.) The applicant must provide the following information:

1. the species or taxa to be targeted by the fishery;
2. the estimated amount of catch (in pounds);
3. the general areas/banks that will be fished; and,
4. the gear that will be used and methods of collection.

Within 10 business days after they receive the application the PIAO will notify applicants if they need to submit additional information in order to process their application. Incomplete applications will not be processed until corrected in writing.

After receiving a completed application, the PIAO Administrator will consult with the Council and the director of the affected state fishery management agency. The Council will then inform PIAO of its decision to approve or deny the application. At the discretion of the Council, it may invite the applicant to appear in support of the application at the next Council meeting. In its review, the Council will consider anticipated cumulative effects of fishing and other activities in the proposed area, environmental factors which could compound effects of fishing pressure, and other relevant scientific information before making recommendations. After reviewing the Council's decision and supporting material, the PIAO Administrator will notify the applicant in writing whether the application has been approved or denied. If the application is denied, reasons for denial will be sent to the applicant in writing within 60 days. Permits can be denied for a number of reasons. Reasons include but are not limited to:

- The applicant has failed to disclose material information required, or has made false statements as to any material fact, in connection with his application;
- According to the best scientific information available, the harvest to be conducted under the permit would be significantly detrimental to the population of any species of fish or fish habitat;
- Activities to be conducted would be inconsistent with the intent of the special permit program or the management objectives of the FMP; and,
- The activity proposed under the special permit would create a significant enforcement problem.

Appeals for denied permits are outlined in Section 5.3.3.

Special Permit Logbooks

Catch reporting is an essential part of the permitting regime. Special permit holders will have to maintain a logbook to record and report their fishing activity. Logbook format and data reporting methods will be determined during the special permit approval process. However, any permit-specific requirements are in addition to the following basic requirements. The permittee must:

1. Report catch, effort and discards by species, location, time, and other factors as specified by the Council;
2. Report protected species observations;
3. Report any lost gear or damage to the coral reef (with no penalty to permittee);
4. Complete a daily logsheet within 24 hours after completion of the fishing day; and,
5. Submit reports within 30 days of returning to port.

For a more complete description, an example special permit daily catch report, and the directions to fill out the form see Section 8.2.

The operator of a vessel harvesting coral reef resources in a low-use marine protected area must contact the USCG, by radio or otherwise, at the 14th District, Honolulu, HI; Pacific Area, San

Francisco, CA; or 17th District, Juneau, AK, at least 24 hours before landing, and report the port and the approximate date and time at which the coral reef resources harvested on the trip will be landed.

As noted above, only recreational and on-island consumption fishing is allowed on Palmyra, Wake and Johnston Islands and Midway Atoll. The USFWS has programs in place to monitor these fisheries. If, after applying for a special permit through PIAO, the Council determines this reporting is adequate for the MSFCMA, and data are properly processed and provided to the appropriate Council advisory bodies, no further data collection will be required.

The General Permit and Reporting Regime

As mentioned above, general permits could be required to harvest CHCRT in any area of the EEZ not designated an MPA. If the Council determines that any extant locally administered permitting and reporting system is inadequate, because it is inconsistent with the objectives of this FMP, the general permit regime could be implemented by means of a framework measure (see Section 5.5.1). This framework procedure can be initiated in one of three ways:

1. If after reviewing the Coral Reef Ecosystem annual report the Council finds that data collection is inadequate, overfishing is occurring or there is the potential for overfishing, or other relevant scientific data show that there is a need for additional management measures;
2. If the Coral Reef Ecosystem Plan Team issues a report to the Council outlining concerns that need to be addressed at the next scheduled Council meeting; and,
3. If at any time regional management authorities bring concerns to the attention of the Council.

General permits can only be issued if the applicant meets certain minimum requirements, such as he or she is at least eighteen years old, a U.S. citizen or national, has no criminal record, and has completed the application form. Applications will be denied if the applicant does not meet any one of the minimum requirements or if in the past the applicant has been cited for not complying with regulations or reporting requirements. A general permit and reporting requirement would allow fishery managers to assess individual fishing effort and methods for a given target species, and associated bycatch. Implementing a general permit would result in more effective and adaptive management because consequent mandatory reporting would allow more specific data to be collected. The general permit application and review process would be administered by the PIAO in a manner similar to that described above for the special permit. Also like the special permit, a denied permit application may be appealed, as described in Section 5.3.3.

General Permit Logbooks

For existing coral reef fisheries that harvest CHCRT outside of MPAs—typically in EEZ waters around the main Hawaiian Islands, Guam, CNMI, and American Samoa—data reporting will be coordinated through the fishery management agencies in local jurisdictions. As with locally administered permitting, these reporting regimes—covering subsistence, recreational, and

commercial fishers—currently provide sufficient information for management. Mechanisms currently in effect include dockside creel surveys, logbooks, and/or sales reports in American Samoa, Guam, and the CNMI. Since these methods are adequate, no changes are recommended. Fishery management agencies in these jurisdictions, and in Hawaii, also collect data through commercial purchases from buyers and wholesalers. The CNMI government has requested all fish buyers to fill out data forms since 1983. While commercial fish catch reporting is also still voluntary in Guam, a relatively high percent coverage has been maintained since 1982 through cooperation of the major fish dealers there. In American Samoa, the Department of Marine and Wildlife Resources requires fish buyers to fill out a form that includes the date, species, weight of fish purchased, and additional economic information. Fishermen who land their catch in Hawaii are required to fill out a fish catch report; it includes area fished, type of gear, and weight and numbers of fish caught by species.

If the Council determines data collection to be inadequate for the given fishery, the general permit could be implemented through the framework process. In addition to the permit, this regime would also require a “general coral reef taxa daily catch report,” which will be provided by NMFS. NMFS can coordinate with local fisheries agencies to facilitate the collection, distribution, and processing of data via established WPacFIN protocols. Section 8.2 contains an example of this form and associated directions. Catch report or general permit logbook format and data reporting methods will be determined during the framework implementation process. However, any permit-specific requirements are in addition to the same five basic requirements listed below for the special permit logbook. The permittee must:

1. Report catch, effort and discards by species, location, time and other factors as specified by the Council;
2. Report protected species observations;
3. Report any lost gear or damage to the coral reef (with no penalty to permittee);
4. Complete daily logsheet within 24 hours after completion of the fishing day; and,
5. Submit reports within 30 days of returning to port.

It should be noted that the PIAO Administrator may, after consultation with the Council, initiate rule-making to modify these or any fishing record forms.

5.3.2 Federal Permit Exemptions

Two activities are exempted from the special permit and any future general permit requirement:

Scientific Research: Scientific research is permitted in all areas of the EEZ, including both no-take and low-use MPAs, if approved by the NMFS-Southwest Regional Administrator (RA), Science Center Director, or designee. The RA will, upon a formal request for a scientific permit for a given project in a designated area, contact the regional authority and consult with both the Council and the regional management agency at a subsequent Council meeting and prior to issuing a scientific permit. Foreign scientists who want to conduct research in the EEZ of the

Western Pacific Region must also contact the RA with a formal request. The RA will also contact the appropriate regional authority and then consult with the Council in the same manner as for domestic scientific permits.

Fishing permitted by other Council FMPs: Fishing for species managed under one of the Council's implemented FMPs already requires a permit, as specified by the relevant FMP. Therefore, participants in those fisheries will not be required to get a second CRE permit to fish in the CRE management area. They are already required to report any incidental catch of coral reef taxa under the relevant FMP permit and reporting regime. This information will be shared among managers through formal and informal coordination (see Section 5.5.3).

5.3.3 Appealing a Denied Permit

Within 30 days of receiving reasons for denial of a special or general permit from the PIAO Administrator, the applicant must submit in writing to the NMFS Southwest Regional Administrator an explanation of why he or she is appealing the decision, including supporting material for the appeal, and copies of the original application and reasons for denial. The applicant may also request an informal hearing.

Appeals to decisions will be heard by the RA, who will consult with the Council prior to making a determination. The RA has the discretion to grant the informal hearing. If no hearing is granted, the RA will notify the applicant and other interested parties in writing of the decision within 30 days.

If the RA determines that a hearing is necessary, a notice of the time, place, and subject will be published in the Federal Register. The hearing shall be held before a hearing officer within 30 days of the FR notice. The appellant and all interested parties are invited to give testimony. Within 30 days of the close of the hearing, the hearing officer will make a written recommendation to the RA on his decision. Within 30 days of receiving this recommendation, the RA will notify the appellant and other interested parties about the final action. Time limits may be extended for a period no longer than 30 days by either the RA or through a request from the appellant, based upon a written request stating good cause.

5.3.4 Data Processing and Annual Reports

For other FMP fisheries, data processing procedures have been established for Hawaii, Guam, CNMI, and American Samoa. The CRE-FMP will follow these established procedures. Creel survey, logbook, and/or commercial buyer's data will be collected and processed by the relevant local agencies in each jurisdiction. A cooperative program, funded in part by NMFS, augments existing fisheries monitoring efforts so that they more effectively support FMP objectives. As part of this cooperative agreement, NMFS staff make regular visits to the insular areas to coordinate data programs and to help produce the other FMPs' annual report modules. This cooperative program can support CRE data analysis in the same fashion, including NMFS staff visits. Island-specific annual report modules will be produced by CRE Plan Team members from

each respective island jurisdiction. Additional data come from federal logbooks, which are submitted directly to the NMFS-Honolulu Laboratory. Once all this information is given to the Council, it will be combined with other required material to produce the CRE-FMP Annual Report, which must be published by July 31 of each year. Annual reports are divided into six regions: MHI, NWHI, PRIAs, American Samoa, Guam, and CNMI. They include summaries of the status of the fisheries, the health of the ecosystem, status of current research, economics of the fisheries, and potential or emerging issues. They also include a section detailing fishing and non-fishing impacts to Essential Fish Habitat (EFH) and Habitat Areas of Particular Concern (HAPC) for both nearshore and EEZ waters throughout the Council region. Finally, these reports include actions taken in the past year by the Council; recommendations from the Plan Team, Advisory Panels, and the Scientific and Statistical Committee; reports from enforcement; and a report on the status of protected species.

5.3.5 Other Permit-related Matters

Fishing Regulations

Upon receipt of a special permit (or general permit if implemented), the user must affix the permit to the vessel for which the permit was issued in the manner outlined in regulations pursuant to this FMP. Regulations that will affect fishing operations include, among others, gear and area restrictions.

Transshipment Logbooks

Any vessel engaged in transshipment of coral reef ecosystem resources in the EEZ must have a permit issued for such activity as outlined in regulations pursuant to this FMP. These vessels must have an accurate and complete NMFS transshipment logbook. Section 8.2 contains an example form and directions. All required information must be recorded on the form within 24 hours after transshipment is completed. This information must be submitted to NMFS within seven days of landing transshipped coral reef ecosystem resources in port.

State Reporting

Vessels required to complete a federal logbook must still follow any state laws and regulations regarding reporting and submit those forms to the appropriate state agency. These records shall be made available for federal inspection and copying if an authorized officer so requests.

5.4 Fishing Gears and Methods

Pacific Islanders have fished on coral reefs for several thousand years. Sustainability resulted in part from the inefficiency and selectivity of the gear that they used. Many of these traditional methods are still used in contemporary fisheries, although the introduction of manufactured gear and population growth have increased the impacts. Today's fishermen employ a wide variety of gear and methods to harvest extremely diverse resources numbering hundreds of species. Most of these methods are very inefficient when compared to industrial fishing technology, such as

bottom trawls, all-terrain trawls, bottom dredges, or industrial netting—used in U.S. continental shelf fisheries but prohibited in many benthic fisheries around the Pacific. However, several potential threats to coral reef resources in the EEZ around U.S. Pacific Islands remain, due to the use of destructive fishing methods.

Unregulated live reef fish harvests for food and ornamental markets are already a problem in Southeast Asia, and could find their way to U.S. EEZ waters, especially in remote, difficult to monitor areas. Controls are needed to prevent the possession or use of destructive gear such as poisons, explosives, and intoxicating substances. Gillnets also need to be controlled because they can be very unselective, if left unattended. Along with other non-selective gears and methods, they result in substantial incidental catch or bycatch. Scuba-assisted spearfishing at night can be very efficient because highly-prized fish, which sleep among coral heads and in reef crevices, can be sought out and easily speared. Bioprospectors may also wish to harvest reef resources. Despite the potential benefits to society, any harvesting must be carried out in a controlled manner. The collection of these organisms, many of which are still unknown, will utilize novel techniques that are difficult to anticipate.

Because certain gear types can damage habitat and result in high levels of bycatch, FMPs are required to list allowable gear types. In addition to meeting this requirement, specifying allowable gear types addresses several FMP objectives including Objective 1- sustainable use of resources, Objective 4- minimizing adverse human impacts, and Objective 7- effective surveillance and enforcement.

Three criteria have been used to rate fishing gear that has been or may be used in the coral reef ecosystem environment. First, how selective is the gear, or how well does it catch the target species and not other organisms? Second, does the gear damage essential fish habitat? And third, to what degree does the gear or method of use allow species to find refuge from capture?

5.4.1 Restricted Gear

The use of poisons, explosives and intoxicating substances are specifically banned in all areas of the EEZ. Scuba-assisted spearfishing at night is prohibited in the PRIAs and NWHI, and in other areas, scuba-assisted spearfishing could be prohibited via future framework action so as to be consistent with local regulations.

5.4.2 Allowable Gear

Existing FMP fisheries shall follow the allowable gear and methods outlined in their respective plans. For coral reef fisheries, only the following 11 selective, non-destructive fishing gears are allowed: (1) hand harvest; (2) spear; (3) slurp gun; (4) hand net/dip; (5) hoop net (for kona crab) net; (6) throw net; (7) barrier net (for aquarium fish); (8) surround/purse nets for targeted schools (e.g., *akule*, baitfish, *weke*) with a minimum of bycatch; (9) hook-and-line (includes powered and unpowered handlines, rod-and-reel, and trolling); (10) traps (with conditions); and (11) remote-operating vehicles/submersibles.

Anyone who wants to fish with gear that is not on this list must describe the gear and its method of deployment in the special permit application. The PIAO Administrator will rule on the acceptability of a proposed gear type after consulting with the Council and the director of the affected state fishery management agency. While fishing for coral reef resources in the EEZ, it is prohibited to possess any gear not approved under 50 CFR 660.108 (a) or not approved by the PIAO Administrator as part of the permit approval process.

5.4.3 Unattended Gear and Gear Identification

Because any allowable gear type, if improperly used, has the potential to cause damage, specific conditions of operation are outlined in the gear catalogue (Appendix B). In summary, nets must be tended at all times (except hoop nets for Kona crabs) and traps must only be used in appropriate areas and only operated under appropriate conditions. These conditions are meant to minimize bycatch mortality, produce negligible habitat impact, and minimize the possibility of ghost fishing. In addition, all traps on board a vessel possessing a CRE-FMP permit or deployed by this vessel in the EEZ must be permanently and legibly marked to identify the owner. NMFS personnel, or an authorized officer, may seize and dispose of traps found that do not comply with CRE-FMP regulations and are unattended in EEZ waters. By the same token, they may dispose of unattended surround nets or bait seine nets. The U.S. Coast Guard has authority to board any vessel in the EEZ to check for violations, including gear compliance.

5.5 Other Components of the Management Regime

This section describes three parts of the management regime that are not immediately implemented as regulatory measures. Section 5.5.1 describes procedures to adapt the management regime to changing environmental and fishery conditions. These are the framework and amendment processes for implementing new management measures. Section 5.5.2 outlines how management measures will be enforced. Finally, Section 5.5.3 list non-regulatory measures that will improve inter-agency coordination, and highlights education programs to raise public awareness.

5.5.1 Adapting the Management Regime to Changes in the Environment and Fishery

Since the status of coral resources and their exploitation can change over time, any management regime must be able to adapt to those changing conditions. Flexibility is also needed to change management measures in response to new information on ecosystem function, including how it responds to alteration, and on productivity limits. Implementation is also a learning process and regulations sometimes need to be changed if, for example, they do not work as intended. Generally, the process of changing the management regime begins with recommendations made in the annual report and/or at Council or other advisory body meetings. There are two ways to implement new management measures, by the framework procedure, for established measures, and by FMP amendment, for new measures.

Framework Actions for Established Measures

Established management measures can be changed in an administratively simpler and more timely fashion through the framework process. Framework measures are measures that have been evaluated in this FMP or one of its amendments. These changes, or "adjustments," must be consistent with the original intent of the measure and within the scope of analysis in any previous documents supporting the existing measures. All adjustments must address the objectives of this FMP, which taken together promote sustainable resource management of coral reef ecosystems. Provided that a proposed adjustment meets these criteria, a draft document is prepared. It outlines the need for action, analyzes alternatives, provides supporting material, and describes how other federal laws may be applicable. A notice is then placed in the Federal Register and the document is made available for public comment. A public hearing may also be required. After receiving and addressing all public comments, the document is revised prior to the next Council meeting, when the Council votes on it. If the measure is approved, the RA is asked to begin rule-making.

This section identifies five such measures, which could be implemented at a later date using this procedure. These are: (1) mooring buoy installation and an anchoring prohibition, (2) a vessel monitoring system (VMS) requirement for vessels operating in specific coral reef areas, (3) implementation of the general permit and reporting regime, (4) moving MUS on the PHCRT list to the CHRCT list, and (5) designating indigenous sub-zones within low-use MPAs. Additional measures could be implemented through the framework process too, if their impacts are evaluated in a subsequent amendment to this FMP; otherwise a full FMP amendment is required.

These five measures are not slated for immediate implementation for several reasons. Details for actions 1, 2 and 5 still need to be worked out. For action 1, mooring buoy locations have not yet been determined, although all parties agree on their importance. For action 2, a closer look at the needs of vessels operating in MPAs and a better understanding of EFH and HAPC will be required. It has not yet been determined whether the federal government will pay for the installation and operation of VMS in this fishery. For action 5, the size and location of indigenous sub-zones have not been decided and legal issues were not fully explored. Although the management aspects of framework measures 3 and 4 have been explored in this FMP, their implementation depends on the availability of new information on the fishery and its environment.

- 1. Designate zones in the EEZ where mooring buoys will be installed in order to protect EFH from anchor damage. In areas with approved mooring buoys, prohibit anchoring of fishing vessels within a radius indicated on the buoy.**

Rationale: "No anchor zones" in specific habitat areas would protect coral reefs from devastating anchor damage. Mooring buoys have been used successfully in Hawaii and elsewhere in the Pacific as an alternative to anchoring, particularly in high use areas. The buoys would be used on a first-come-first-served basis and allowed time limits would be specified so that no one boat monopolizes a buoy. This process would ensure that the use of these buoys and the concomitant

access to the resources would be fair and equitable to all fishermen, consistent with National Standard 4. Only one boat would be allowed to moor at a time at each buoy. The prohibition of anchoring would limit the number of secured boats fishing an area to the number of mooring buoys at the site. While this may concentrate fishing effort around the buoys, it would also limit the number of vessels fishing at one time, increasing vessel safety and minimizing fishing pressure on coral reef resources.

Beneficial Impacts:

- Prevents anchor damage to reef habitats and allows anchoring for safety reasons in EFH and/or HAPC.
- Limits number of vessels fishing on the banks at one time, increasing vessel safety and minimizing fishing pressure on coral reef resources.
- Increases safety of fishermen by making anchoring (and its hazards) unnecessary and reducing risk of anchor dragging.
- Is consistent with requirements of the Sustainable Fisheries Act by minimizing degradation of coral reef habitats.

Adverse Impacts:

- Limits number of vessels able to fish in a designated mooring zone at one time.
- Mooring buoy maintenance may be difficult.
- May concentrate fishing effort in areas with buoys.
- Includes a cost for installation and maintenance of buoys.
- May encourage "rafting" of vessels at each mooring buoy (even though it would be prohibited under the measure), which is a safety concern.

2. **Require fishing vessels to carry remote electronic vessel monitoring systems (VMS) as part of an effective monitoring and enforcement system for state and federal agencies. This requirement could be applied to coral reef fisheries in specific geographical areas (e.g., the NWHI). This measure will only be enacted if the cost of such a system is fully subsidized with federal funding.**

Rationale: VMS is an effective system for managing vessels operating in areas with different use zones, such as the MPAs, and with different licenses/permits, and for encouraging and documenting compliance with permit conditions. The vessel's precise location would be transmitted via satellite to a Land Earth Station and from there to a computerized monitoring station where the information would be kept in a secure and confidential database. If the vessel enters a designated buffer zone or MPA, an automatic signal is sent to both the ship's captain and the appropriate management agency. Such a system may prove to be a cost-effective compliance tool for real time and accurate positioning of vessels and instant recognition of a breach of permitted activities, as well as a tool to locate vessels in distress. VMS also has been shown to be an effective tool for monitoring vessels' locations in relation to navigational hazards and,

when used in conjunction with automated buffer zones, may serve as an additional warning mechanism to prevent vessel groundings.

Beneficial Impacts:

- Protects coral reef resources by providing early warning of a vessel approaching too close to a reef slope, thereby protecting both the reef and the vessel from grounding damage.
- Protects coral reef resources by providing a tool that can dramatically improve compliance with FMPs.
- Is consistent with the requirements of the Sustainable Fisheries Act.
- Provides precise location information to assist in emergencies and rescues.
- Provides documentation on vessel movements, which can be used to clear up misunderstandings regarding liability or accusations of responsibility for environmental damage.
- Requires no input by captain or crew to run the automatic system.
- Can make enforcement easier and potentially much less costly.

Adverse Impacts:

- Cost of implementation may be burdensome to federal government.
 - Implementation will require fiscal and personnel resources.
 - Fishermen are concerned over the use of VMS information (security and confidentiality of data).
3. **Require general permits to fish for CHCRT MUS outside of MPAs in the EEZ, in the event that regional management is determined inadequate to protect the species and/or ecosystem.**

Rationale: This framework measure is described in Section 5.3.1 in the subsection outlining the general permit and reporting regime. Initially, general permits will not be required for existing CRE fisheries. This option to implement a general permit requirement would allow fishery managers to assess individual fishing effort and methods for a given target species and associated bycatch before any vessel begins fishing. This more detailed data collection and mandatory reporting would facilitate more effective and adaptive management. This framework measure can be enacted if the Council determines that a locally administered permit and reporting regime does not adequately address CRE-FMP objectives. A general permit, issued by NMFS-PIAO, would then be required to harvest CHCRT MUS in the EEZ outside of MPAs.

A number of methods could be used to instigate this framework procedure: (1) as a result of the Council reviewing the Coral Reef Ecosystem Annual Report for adequate data collection, overfishing or potential for overfishing, and other relevant scientific data which reflect the need for additional management measures, (2) the Coral Reef Plan Team issuing a report outlining concerns to the Council to be addressed at the following scheduled Council meeting, or (3)

regional management authorities bringing their concerns to the attention of the Council at any time.

American Samoa can be used as an example of how a general permit and reporting regime could be implemented and applied, using framework procedures. This example is particularly apposite because reef fisheries occur both in territorial and federal waters. The American Samoa Department of Aquatic and Wildlife Resources issues permits to fish for coral reef species and collects data through both creel surveys and commercial purchases. These reef fisheries are small-scale operations, with individuals catching a few to a couple hundred pounds of fish on a given day. If one or more large-scale operations began efficiently targeting these species in the EEZ, increasing the total catch substantially, regional management might not be sufficient to address this development. The Council could then initiate the framework process to require a general permit for reef fisheries in the EEZ of American Samoa.

While details about who would be affected and how the measure would affect fishing are unique and unforeseeable, general procedures can be outlined here. Federal regulation 50 CFR 660.13 details current permitting procedures, which would also apply to this CRE general permit. Permits would be valid only for the fishery management subarea specified on the permit and remain valid for the period specified unless transferred, revoked, suspended, or modified. A permittee first requests an official Southwest Region Federal Fisheries permit application form. After filling out all required information and attaching necessary documents (see example form in Section 8.2), the permittee returns the application along with any fees, as specified. The PIAO will review and process all completed applications within 15 business days. Permittees will be notified of incomplete or incorrect applications. If deficiencies are not corrected within 30 days following notification, the application will be considered abandoned. Within 15 business days after receiving a completed application, the administrator of the PIAO will issue a permit to the applicant under the CRE-FMP or send a written notification of denial, which will include the reasons for the denied application.

Beneficial Impacts:

- Requires specific data reporting of catch, effort, area, and method of fishing.
- Allows for a thorough understanding of the total fishing effort for given areas and given target species.
- Provides information on bycatch and protected species.
- Allows for standardization of reporting, assisting fishery managers assessment of impacts
- Makes fishermen more aware of concerns of impacts from fishing through completing both permit form and logbooks.
- Assists adaptive management with crucial data on fishery.

Adverse Impacts:

- Increases administrative burdens (time and costs) due to the permit process.
- Increases burdens to fishermen not used to completing this type of paperwork.

- Removes management from regional authority which had traditionally managed these fisheries.
4. **Allow particular MUS on the PHCRT list to be moved to the CHCRT list when sufficient information has been gathered for less restrictive management.**

Rationale: If a market develops for potentially-harvested species, fishermen will request to fish those species under a special permit. The special permit embodies the precautionary approach. Permit approval requires a thorough description and evaluation of all aspects of the fishing method for each applicant. Additionally, permittees will be subject to strict reporting requirements, including submittal of bycatch and discards information. The data gathered from the vessels will help managers determine MSY, OY, and potential for overfishing. When enough data has been gathered for a given species or species complex and its associated bycatch to understand cumulative impacts on the species and the ecosystem, the Council can determine whether to lessen the stringent requirements by moving such species to the currently harvested list. This reduces administrative and regulatory burdens at the appropriate time without causing risk to the resource.

Beneficial Impacts:

- Relieves unnecessary administrative burdens associated with fishing for species for which management is better understood.
- Reduces burden to the Council and the PIAO Administrator for permit approval.
- Eases burdens on fishermen who have complied with regulations, allowing for given species to be re-listed as CHCRT.
- Procedure to re-list MUS prompts fishery managers to better understand species and the ecosystem to facilitate effective management.

Adverse Impacts

- Has the potential to put species at risk, which could require more stringent management measures.
- Could facilitate additional fishing pressure for given species due to less stringent permit requirements for allowed harvesting.

5. **Designate a set percentage of the area within low-use MPAs for sole use by indigenous people, with the percentage based upon the percentage of indigenous population in the area around the low-use MPA.**

Rationale: Discussions during the planning process centered around access for Native Hawaiians to the NWHI for traditional and ceremonial purposes. Later on, other island cultures were included in these discussions, with details to be worked out in the future as new MPAs were designated in their EEZs. At this time, however, details are lacking even for the NWHI. Details include where the areas would be, the exact percentage of low-use MPA that would be set aside,

and also the legal issues surrounding the proposal. Nevertheless, the CRE Plan Team and other groups strongly believe in the premise. As discussed in Section 1.3.5, the indigenous people of the Samoan, Hawaiian and Mariana islands have close historical and cultural relationships with the marine environment and coral reef resources. Increasing restrictions on customary and traditional uses of marine resources are jeopardizing cultural continuity in many areas of the U.S. Pacific. The designation of no-take zones in the NWHI could result in some negative impact on the Hawaii fishing community by causing a loss of earning potential, investment value, and lifestyle for some bottomfish and lobster fisheries participants.

A 1993 survey of participants in the NWHI bottomfish fishery found that half of the respondents who fish in the Ho'omalulu Zone were motivated to fish by a long-term family tradition (Hamilton 1994). This sense of continuity is also reflected in the importance placed on the process of learning about fishing from "old timers" and transmitting that knowledge to the next generation. Hawaii's commercial fishing industry dates back nearly 200 years and closure of some fishing grounds in the NWHI would also likely have a negative impact on those who value the continued existence of Hawaii's maritime tradition and culture. In view of the historic and cultural importance of fishing over the last 2,000 years for Native Hawaiians, this deprivation of the right to make a living at *koa* (see Kahaulelio 1902, pp. 22, 24), which they have been accustomed to frequent in the NWHI, is an especially onerous penalty. Two events have exacerbated this situation. First, annexation of Hawaii by the U.S. opened access to fishery resources to any U.S. citizen (Kosaki 1954). Second, this action increased fishing pressure on resources customarily used by Native Hawaiians and weakened cultural norms that controlled the proper conduct of fishing.

Beneficial Impacts

- Helps preserve and reestablish island cultures and families whose history of traditional and ceremonial use of coral reef resources dates back thousands of years.
- Adds additional protection within low-use MPAs, by effectively limiting the amount of users in the area.
- Will make the permitting process for certain activities simpler because usage in these areas can be expected to be uniform across these select user groups.
- Potentially supports subsistence fishing.

Adverse Impacts

- Could be challenged legally on grounds of discrimination.
- Locations and size of the sub-zones could cause contention between user groups.
- Concerns have been expressed regarding what constitutes cultural take. For example, modern gear and techniques could alter the purpose of the sub-zone.

Procedure for New Measures (Amendments)

These procedures apply to regulatory measures that have not been included in previous regulations and/or whose impacts have not been analyzed previously in the FMP. These new measures include, but are not limited to, catch limits, resource size limits, closures, and effort limitations. New regulatory measures will follow the procedure outlined for amendments in NMFS' *Operational Guidelines, Fishery Management Plans* (May 1, 1997 revision).

A Federal Register notice will be published describing any proposed new management measure. The notice will solicit public comment. At the subsequent Council meeting, the Council will formally address the specific measure for which they will consider recommendations. A Federal Register notice will be prepared summarizing the Council's deliberations, rationale, and analysis for the preferred action, and include the time and place for any other Council meetings to consider the measure. At subsequent meetings, the Council will consider public comments and other information received and will draft a document with a recommendation to the Regional Administrator.

Within two weeks of the decision, the RA will propose regulations to carry out the action or offer a written explanation supporting the denial of the recommendation. The Council may appeal a denial by writing to the Assistant Administrator. The Assistant Administrator must respond to the Council within 30 days. If the RA agrees with the recommendation, the RA and the Assistant Administrator will make their decision in accordance with the MSFCMA and other applicable laws. Finally, NMFS may implement any recommendation made by the Council by rule-making, if approved by the Regional Administrator.

5.5.2 Enforcement

Enforcement burdens and costs have been analyzed in the draft Regulatory Impact Review (RIR) and Initial Regulatory Flexibility Act (IRFA) analysis found in Appendix B. Enforcement can occur either at sea with use of air and/or boat patrols or dockside through vessel and logbook inspection.

At-Sea Enforcement

The major additional enforcement burden required by this FMP is directly related to the designation of no-take and low-use MPAs. In the NWHI, these areas follow the 10 or 50 fathom depth contour in the EEZ. Due to the irregular shape of the bathymetric contours that define MPAs, it may be difficult for enforcement officials to determine whether a vessel is inside or outside an MPA. Large-scale maps of the MPA with boundary coordinates will help determine whether a vessel is in violation of MPA provisions. Improving the accuracy and detail of maps of coral reef ecosystems and associated habitat is a priority for both the Council and NOAA.

Prior to implementation of framework action 2, mandating VMS for every vessel operating in any MPA, the only method to enforce MPA regulations is through direct at-sea monitoring with either aerial or vessel patrols. The cost and time needed to patrol the coral reef ecosystem of the

NWHI, the PRIAs, and the other insular areas is analyzed in the associated RIR and EIS. Mandatory installation and use of VMS for every vessel operating in MPAs would greatly reduce the need for at-sea patrols, simplify the process of determining whether vessels are operating within or outside an MPA, and greatly reduce the cost while increasing overall coverage.

Enforcement agencies may, if deemed necessary, board any vessel and request to conduct an at-sea inspection of the catch, gear, and logbooks. Retained catch should be recorded in the logbook entries. Fishing data forms should be filled out within 24 hours of completing fishing. If on-board gear should be specifically identified (e.g., traps), compliance can be checked.

Unattended surround nets or bait seine nets or traps without owner identification, as described in the CRE-FMP regulations, and found deployed in the EEZ, will be considered unclaimed or abandoned property. Enforcement officers may dispose of these in any manner considered appropriate.

Dockside Inspection

While many of the activities stated above could occur at sea, it is much more effective to inspect gear compliance, validity of permits, and logbooks and reporting of catch when a boat returns from a fishing trip. Vessels that have fished in low-use MPAs are supposed to notify the Coast Guard at least 24 hours prior to returning to port. This makes dockside inspection much easier than at-sea inspection.

5.5.3 Non-regulatory Actions

Strengthen Inter-agency Cooperation

Coherent management of coral reefs and better enforcement of island government fishing regulations, which presupposes regulatory consistency in state and federal waters, can be achieved through cooperative agreements between federal and island government natural resource management and enforcement agencies. The enforcement agreements between NMFS Southwest Law Enforcement and enforcement agencies in American Samoa, Guam, and Hawaii are good examples of such cooperation. Such agreements may vary from area to area. They are manpower intensive and require a substantial commitment to training. With joint enforcement by island government and federal agencies, local regulations might be enforced as landing laws to control the harvest of coral reef resources in areas outside state waters. Coral reef areas where fishing is prohibited or restricted and which function as *de facto* MPAs could be expanded by island governments and federal agency designations.

Process to Facilitate Interagency Coordination to Assess Non-fishing Impacts and Threats to Coral Reef Habitat

This document identifies and describes MPAs, Essential Fish Habitat (EFH), and Habitat Areas of Particular Concern (HAPC). Many of these areas fall under state or territorial jurisdiction

(i.e., within 3 nm from shore), while others are under partial jurisdiction of the Department of Interior and the Department of Defense (e.g., National Wildlife Refuges or Defensive Seas around some parts of the NWHI and the PRIAs). Under the EFH provision of the MSFMC, federal agencies are required to consult with NMFS for any action that may affect EFH. The EFH provision also allows for NMFS and the Council to comment on any federal or state agency action that may impact EFH. Therefore, designation of these specific areas within the whole management area will help to provide additional focus for conservation and management efforts.

In the populated areas, much of the non-fishing impacts are land-derived and the potential impacts from these activities will not initially affect the EEZ waters under Council jurisdiction. But these spillover effects may eventually impact resources under the Council's jurisdiction. Therefore, efficient inter-agency coordination is vital to effective conservation and resource management.

In order to facilitate interagency coordination to assess the impacts of non-fishing activities on the marine environment, specific concerns that would initiate inter-agency coordination must be identified. These issues include, but are not limited to the following:

- Significant damage to habitat or high likelihood of significant damage;
- Size of a coastal construction project (dredging, likelihood of erosion);
- Large-scale agricultural activity (pesticides, herbicides, nutrient loading);
- Increased marine tourism (anchoring, shell collecting, cruise ships);
- Military activities (bombing and training operations, construction);
- Boat activity (oil / fuel spills, vessel grounding);
- Offshore mining (sand, coral, manganese);
- Power plant and water treatment plant discharge;
- Scientific projects;
- Marine debris (fishing gear); and,
- Introduction of exotic species (ballast/bilge waters, aquaculture).

The National Environmental Policy Act requires that an environmental impact statement be prepared for any major federal action that significantly affects the environment. Similarly, the EFH provisions require that any federal agency must consult with NMFS and the Council if the action they propose is conducted or may impact an area designated as EFH or HAPC. After this consultation, the permitting agency must make an initial assessment of how the proposed activity may affect EFH and must respond to any recommendations provided by NMFS or the Council. This consultation merges the requirements of other environmental laws (e.g., Clean Water Act, Endangered Species Act) so as not to cause undue burden on the permittee, the permitting agency, NMFS, or the Council. If an action or project is proposed by any state or territorial agency that may impact an area designated as EFH or HAPC, NMFS and the Council may provide recommendations to minimize or eliminate the impacts to those areas.

Formal Process for Coordination among Plan Teams to Identify and Address Impacts to Coral Reef Ecosystems

A formal process will be established (under the Council's Standard Operating Procedures and Practices) to ensure coordination of the CRE-FMP with the existing Bottomfish, Crustaceans, Pelagics and Precious Corals FMPs. The plan team coordination procedure is described here. The CRE Plan Team (CRE-PT) identifies an ecosystem issue pertinent to the activities of another Council FMP. Conversely, ecosystem issues may also be brought to the attention of the CRE-PT by other plan teams, the Scientific and Statistical Committee, the Council, fishermen, government agencies, NGOs, or the public. The CRE-PT then prepares a written description of the issue, together with various options or measures to minimize the identified fishery-related impacts to the coral reef ecosystem, and submits it to the respective FMP plan teams for review. The other FMP plan teams then prepare a summary of proposed alternatives to mitigate the impacts, including pros and cons, in consultation with the CRE-PT. The plan teams, at their next regularly scheduled meeting, then formalize their proposed mitigation measures in their meeting reports and recommend a preferred alternative to the Council. The Council reviews these alternatives at its next regularly scheduled meeting and directs an appropriate course of action. The Council's program planning "milestones" document, which is regularly updated, also describes cross-FMP activities and needs, including research.

Education

The Council has established an education and public outreach program for FMP-managed fisheries. The program will be expanded to include a strong educational outreach component to raise public awareness of coral reef ecosystems and to improve compliance with regulations controlling the harvest of coral reef resources.

Figure 5.2: NWHI Marine Protected Area (MPA) Map legend.

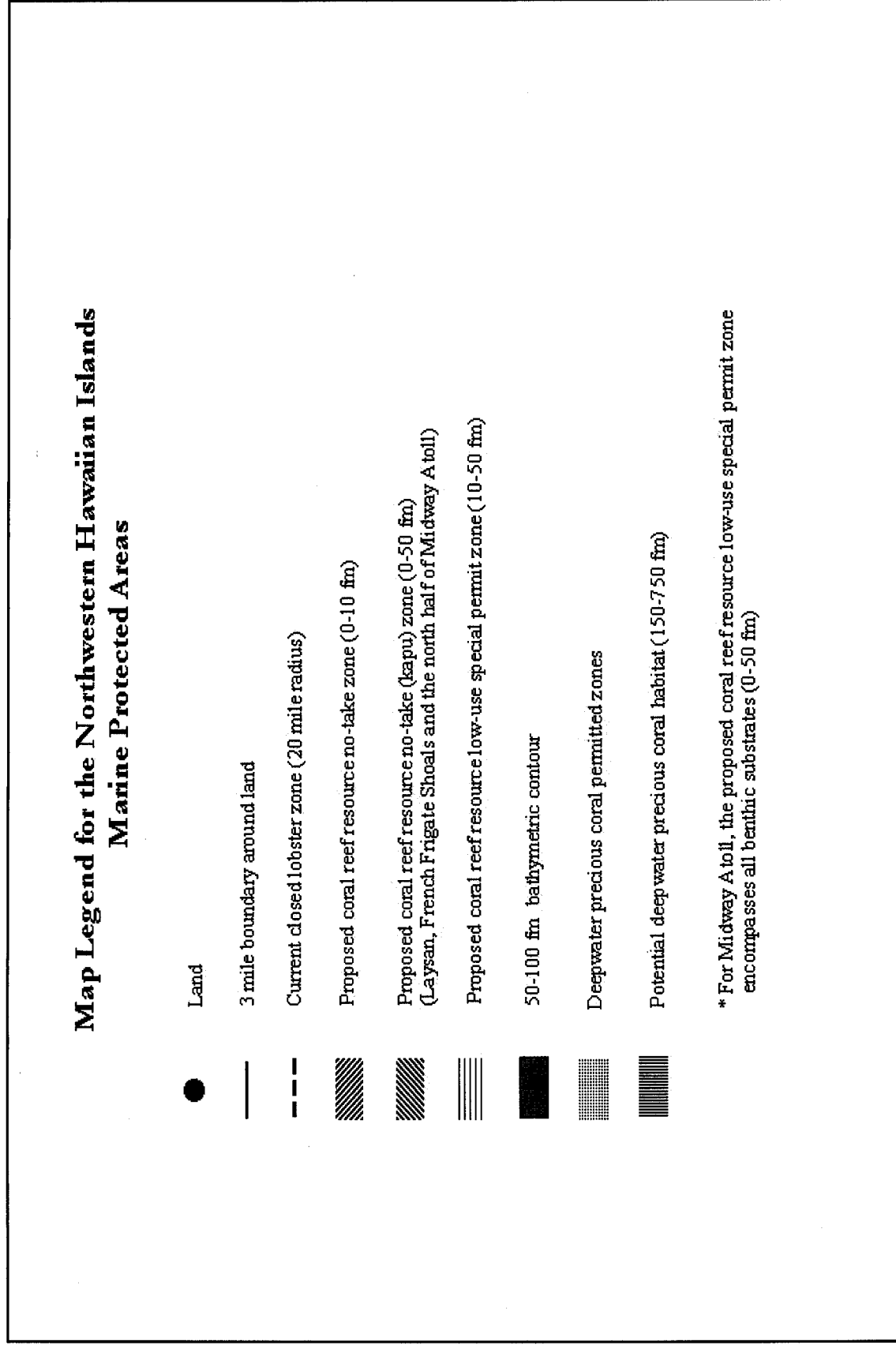


Figure 5.3 : Nihoa to Necker Island Marine Protected Area.

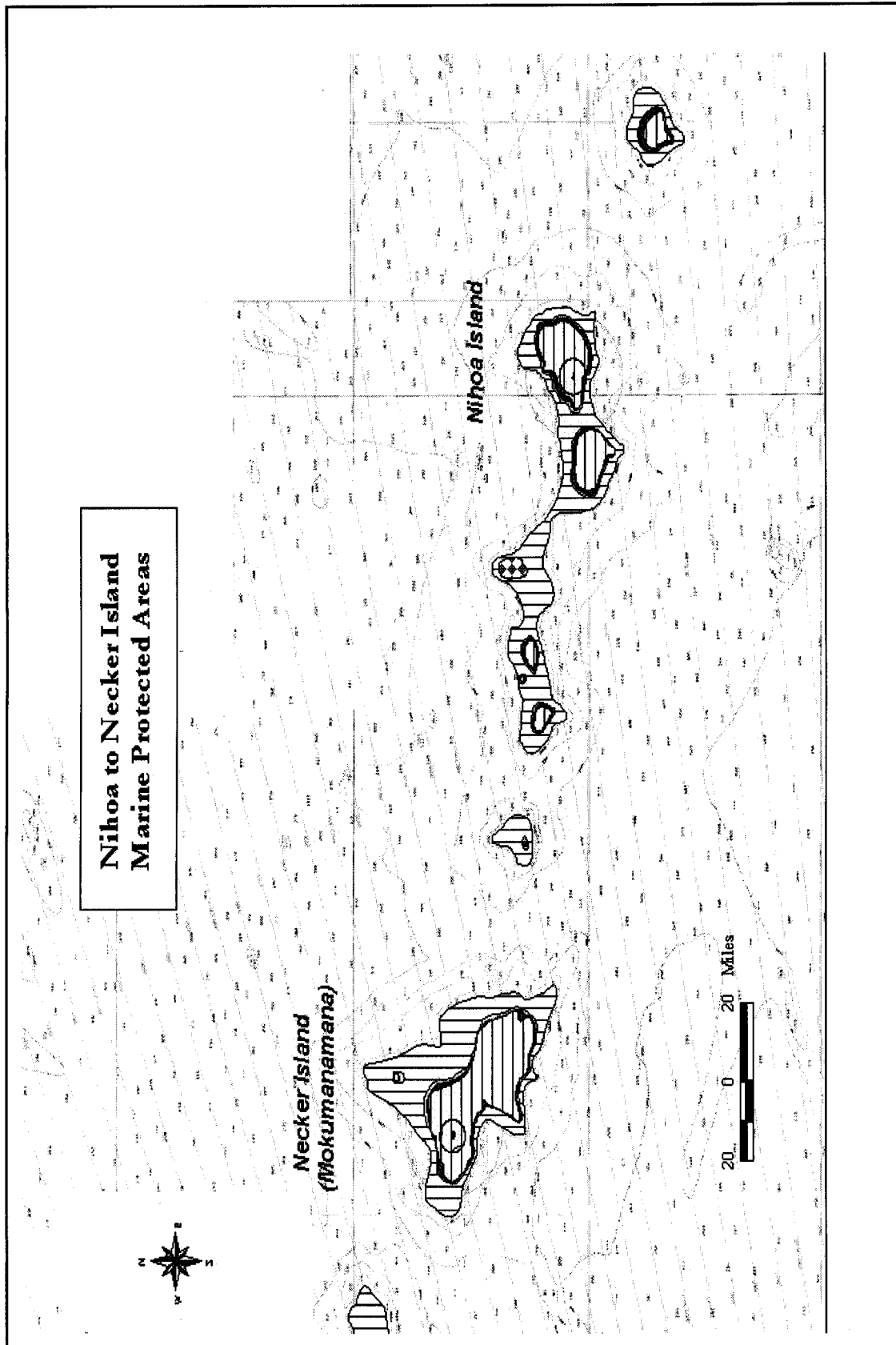


Figure 5.4: French Frigate Shoals to Raita Bank Marine Protected Area.

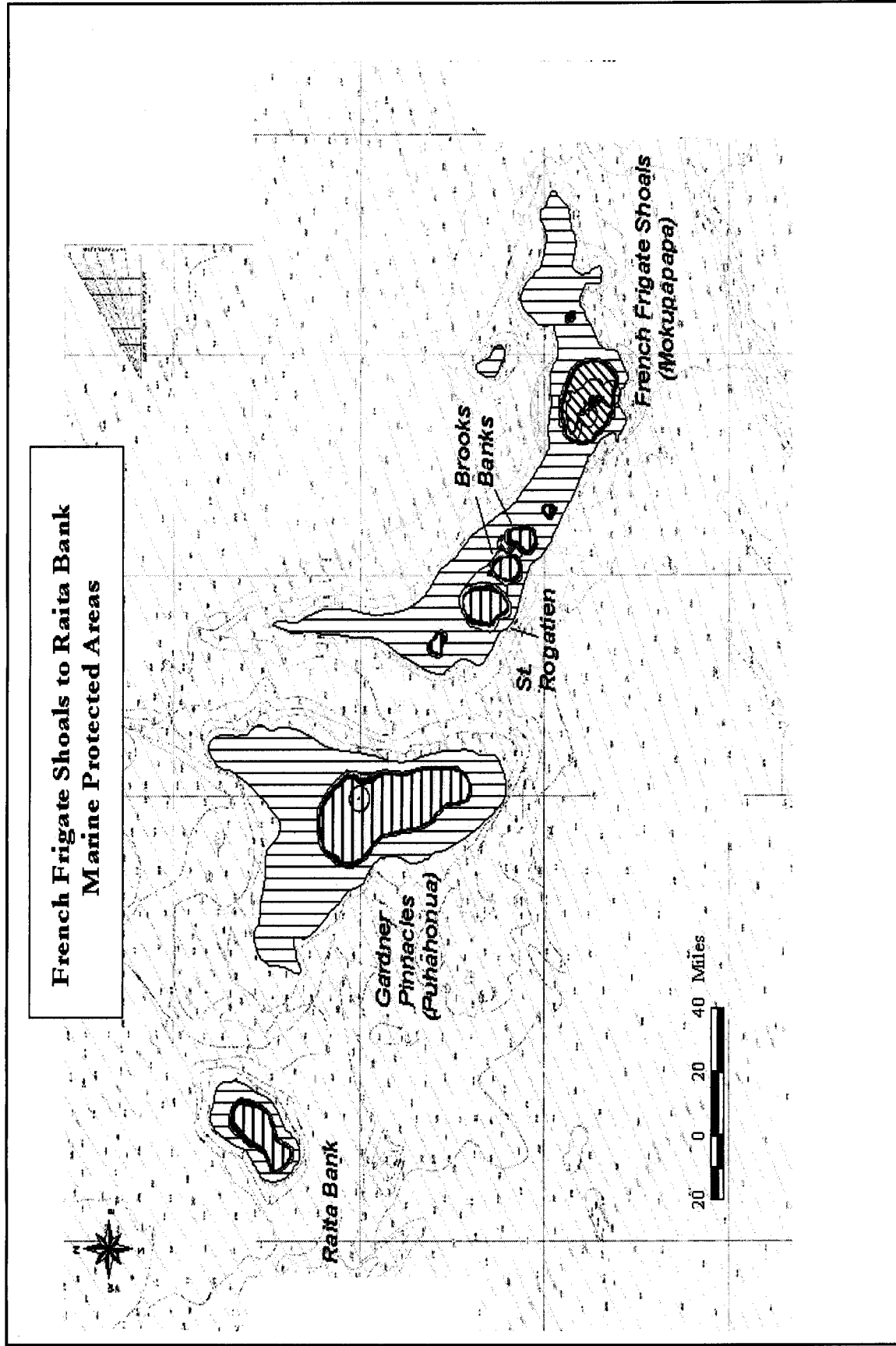


Figure 5.5: Maro Reef to Lisianski Island Marine Protected Area.

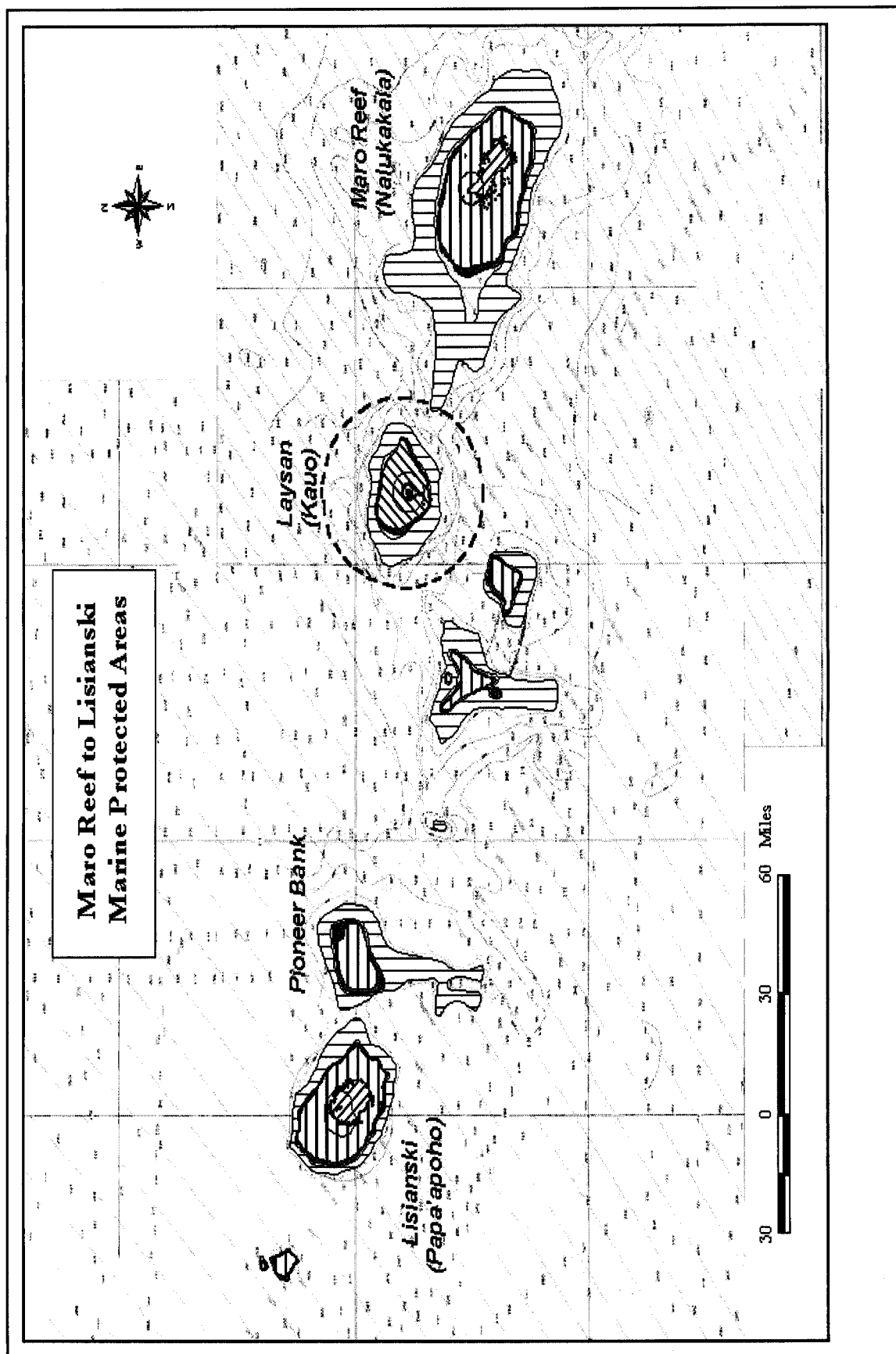


Figure 5.6: Pearl and Hermes Reef to Midway Atoll Marine Protected Area.

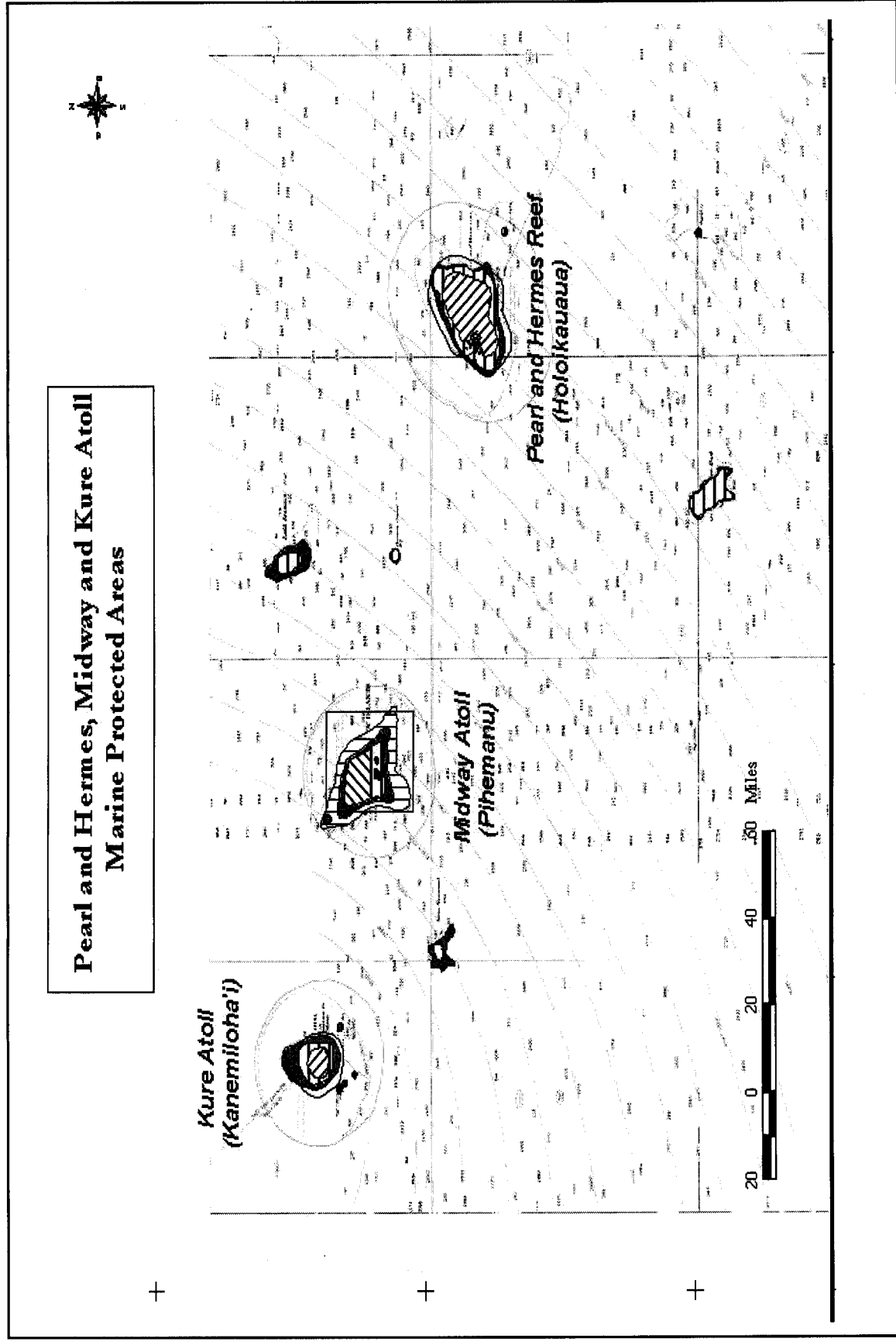


Figure 5.7: Rose Atoll Marine Protected Area.

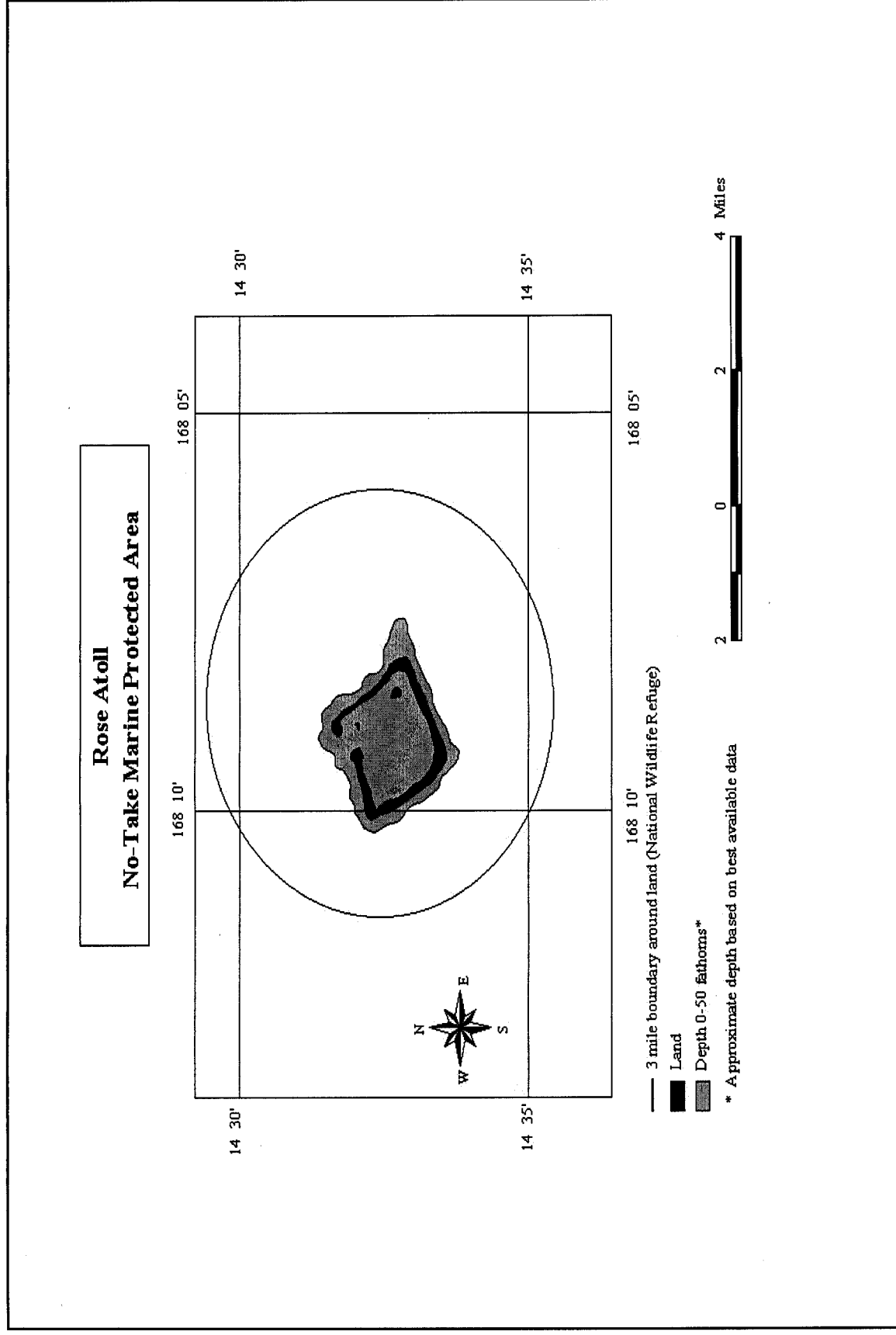


Figure 5.8: Howland Island Marine Protected Area.

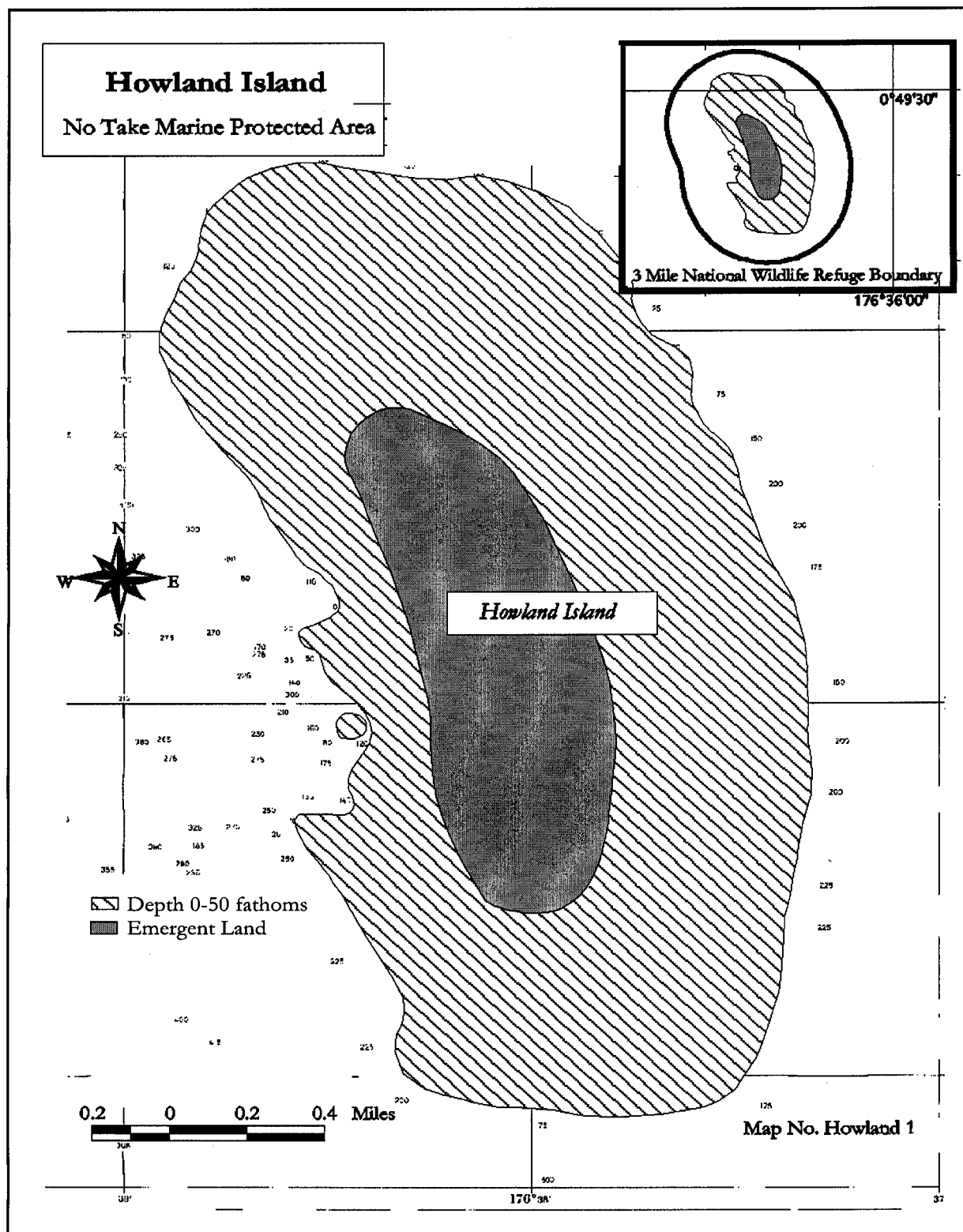


Figure 5.9: Baker Island Marine Protected Area.

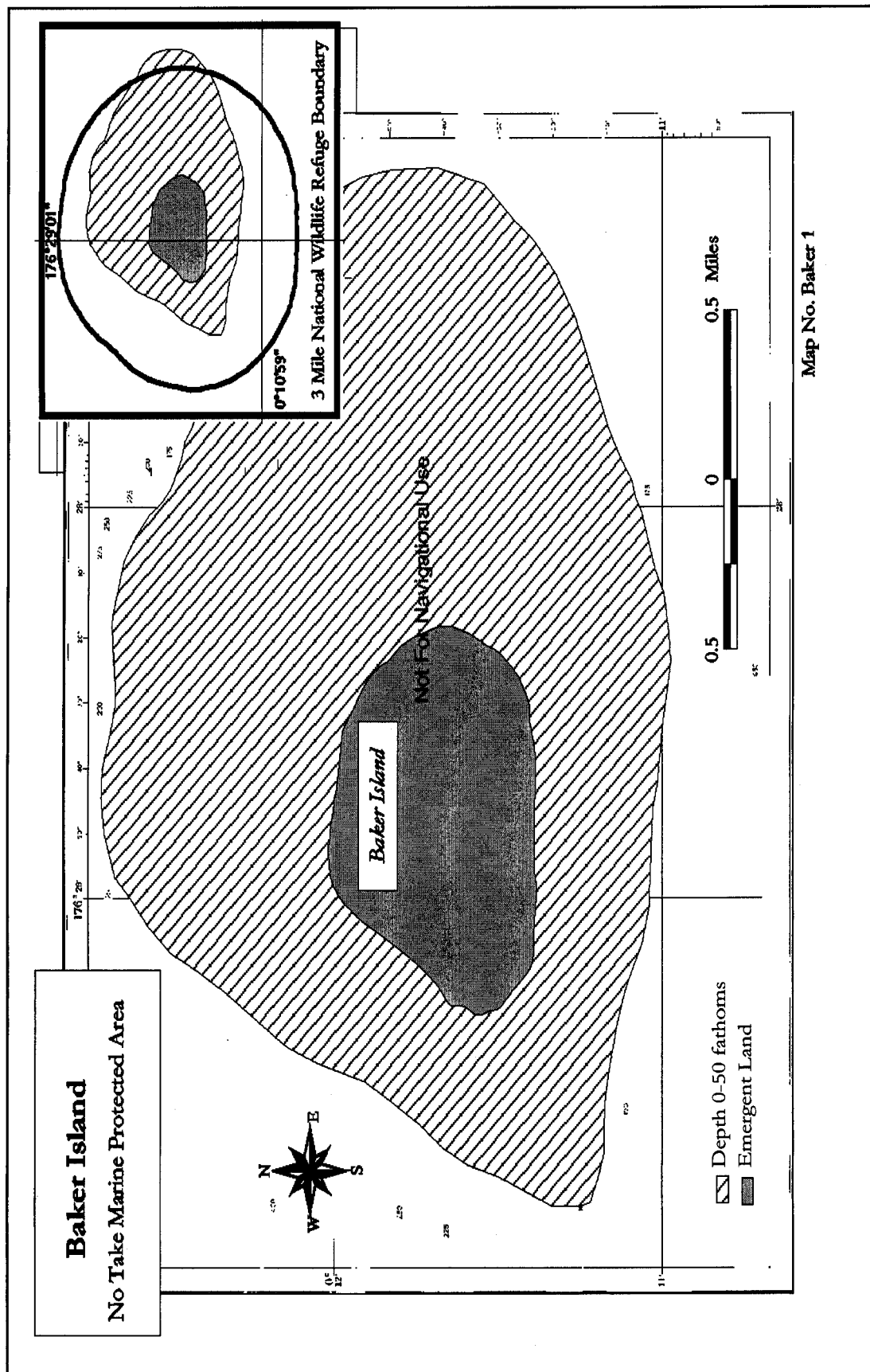


Figure 5.10: Jarvis Island Marine Protected Area.

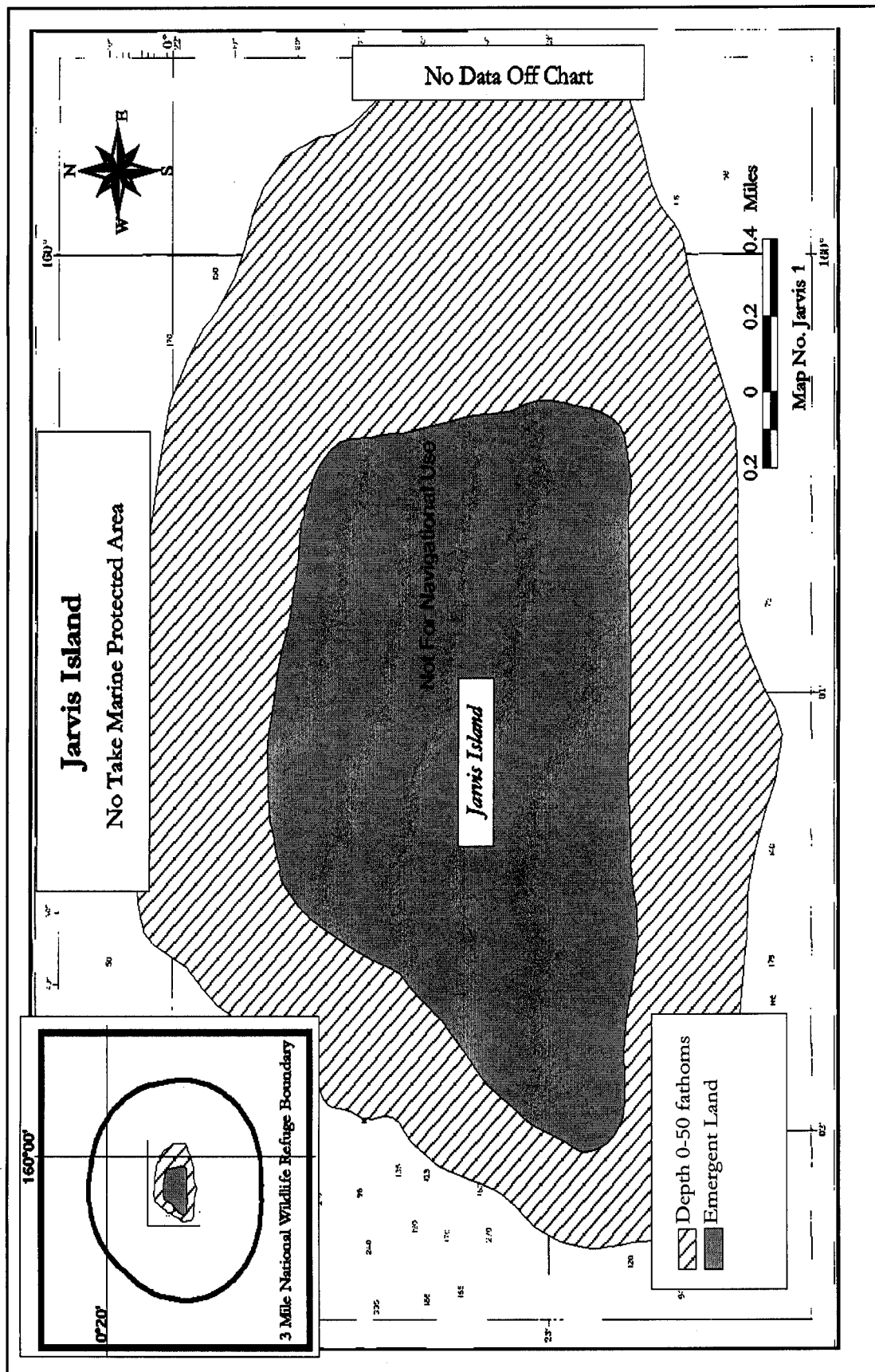


Figure 5.11: Kingman Reef Marine Protected Area.

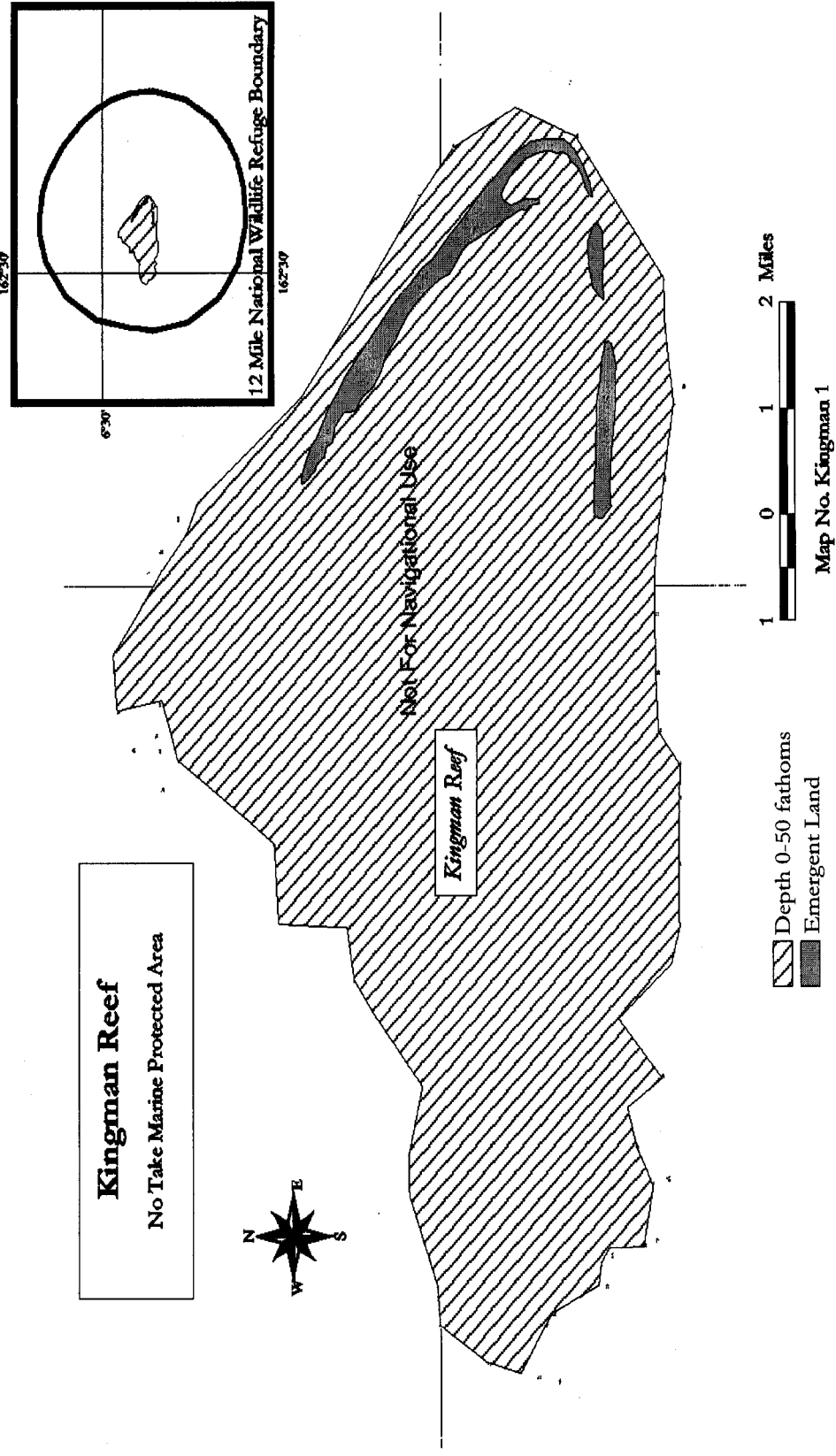


Figure 5.12: Palmyra Atoll Marine Protected Area.

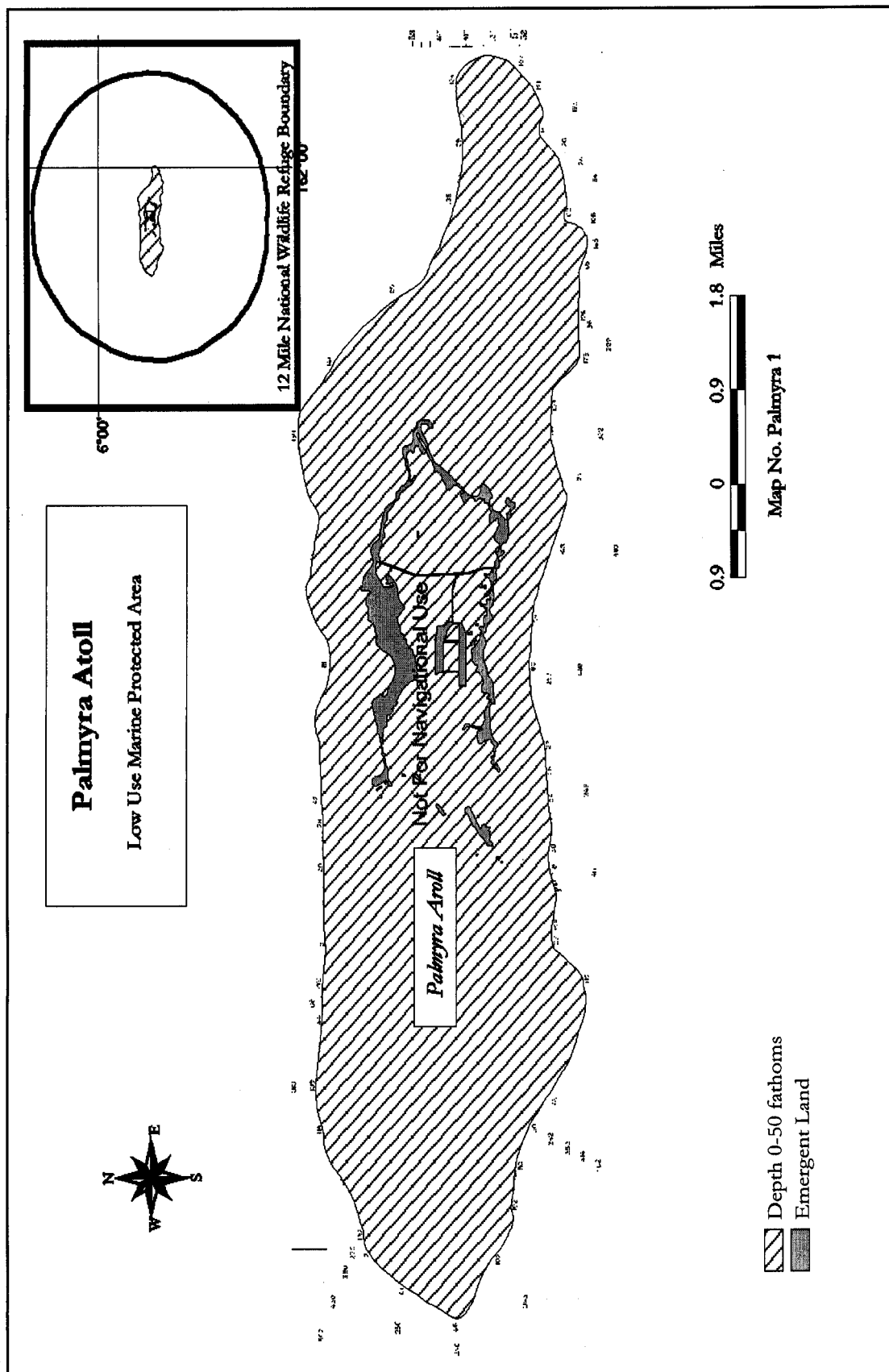


Figure 5.13: Wake Island Marine Protected Area.

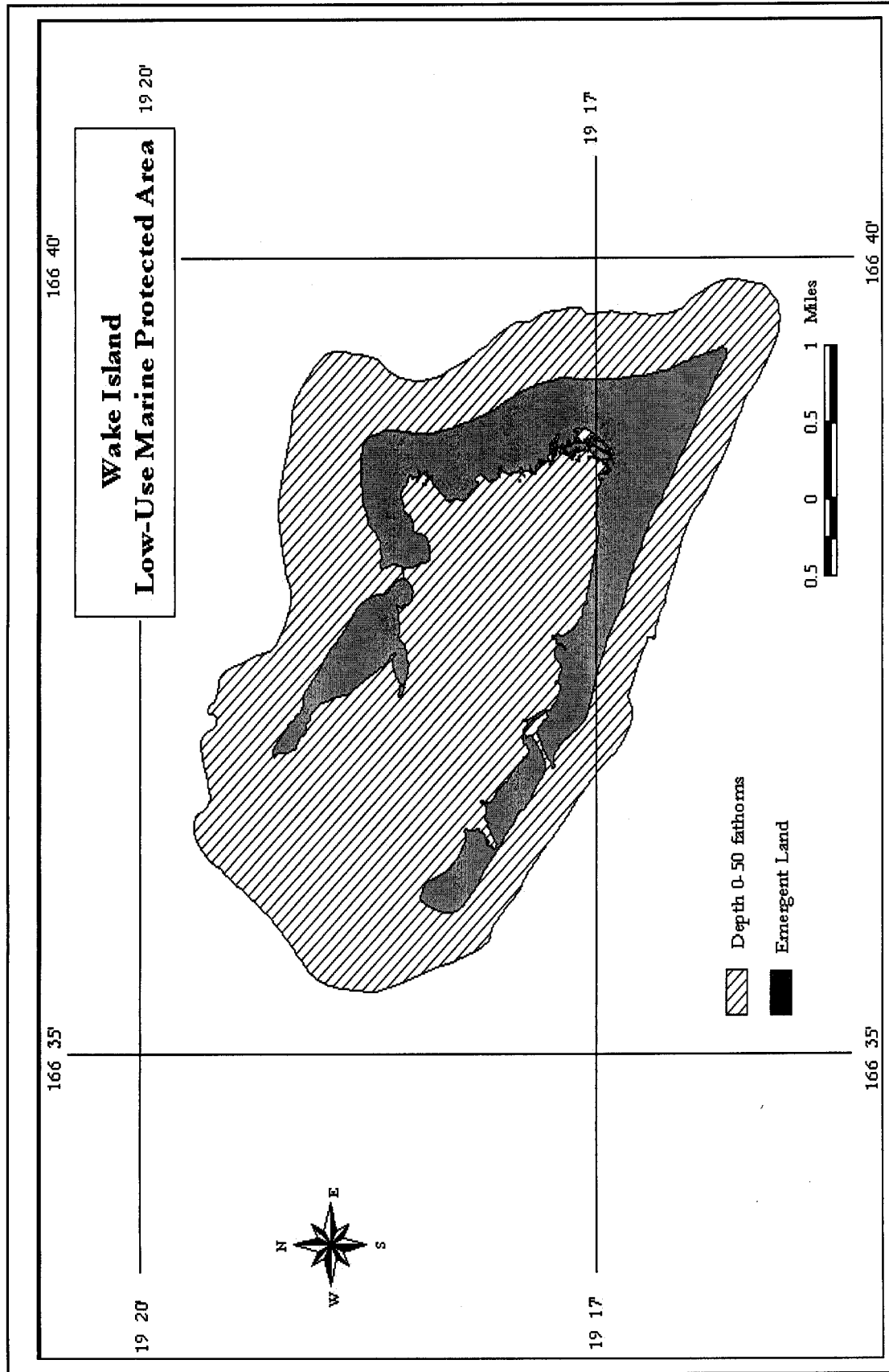


Figure 5.14 : Johnston Atoll Marine Protected Area.

