Vanuatu National Coconut Crab Fishery Management Plan

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by

Vanuatu Fisheries Department

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Vanuatu Fisheries Department
PMB 9045
Port Vila
Vanuatu

Tel: +678 533 3340

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APPROVAL

OF THE
VANUATU NATIONAL COCONUT CRAB FISHERY MANAGEMENT PLAN

The Vanuatu National Coconut Cab Fishery Management Plan is made in accordance with Section 3 of the *Fisheries Act Cap 315, No. 55 of 2005*.

1. VANUATU NATIONAL COCONUT CRAB FISHERY MANAGEMENT PLAN

By virtue of powers conferred upon the Minister for Fisheries, under Section 3(5) of the Fisheries Act Cap 315, No. 55 of 2005, I hereby approve the Vanuatu National Coconut Crab Fishery Management Plan, as the Plan to manage and develop the designated fishery as published in the national gazette.

2. COMMENCEMENT DATE

The Management Plan commences on the date on which it is approved by the Minister.

Made at Port Vila this 13 day of December 2012.

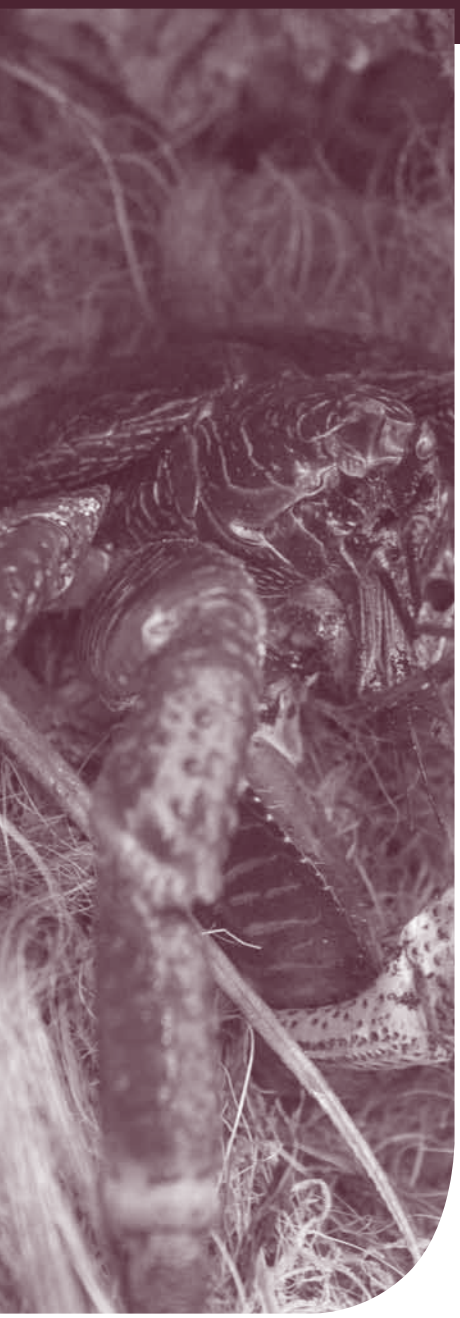
Honourable Kalfau Moli (MP)
Minister Responsible for Fisheries

CONTENTS

1. INTRODUCTION

Coconut crabs were once plentiful throughout much of the tropical Indo-Pacific region, but over-harvesting has resulted in only a few countries now having exploitable stocks. Vanuatu is one of the few countries where consistent harvesting is still possible and this forms a vital resource for many small communities in Vanuatu. The collection and sale of these crabs is sometimes the only form of cash crop available in some of these remote regions making the conservation of this important resource that appears on the 20 vatu coin of paramount importance. Given their vulnerability to fishing, a comprehensive system of management is needed to ensure the sustainability of this resource within Vanuatu.

This Management Plan is the outcome of the research and related work that has been completed over the past 20 years within Vanuatu on the biology and management of this resource. It was also a result of high level consultation that has been undertaken with relevant local communities who will be affected by the Plan and hopefully benefit from its implementation.



2. JURISDICTION

Coconut crabs are explicitly included in the definition of "fish" under *the Fisheries Act Cap 315 No. 55 of 2005* and therefore the harvesting and collection of coconut crabs can be defined as "fishing" and this collective activity can be described as a "fishery".

This Management Plan is consistent with the objective of the Fisheries Act which is "To provide for the control, development and management of fisheries and matters incidental thereto."

Furthermore it conforms to the requirement of Part 2 section 3 of the Fisheries act that each plan shall:

(a) identify the fishery and assess the present state of its exploitation;

(b) specify objectives to be achieved in the management of the fishery;

(c) specify the management and development strategies to be adopted for the fishery to which it relates;

(d) provide for a scheme of licensing, if necessary, or other appropriate management measure;

(e) specify, if applicable, the licensing regime to be applied, including the limitations, if any, to be applied to local fishing operations and the amount of fishing, if any, to be allocated to foreign fishing vessels;

(f) specify the information and other data required to be provided by persons licensed to fish for that fishery; and

(g) take into account any relevant traditional fishing methods and practices.

3. NAME

This Management Plan is the "Vanuatu National Coconut Crab Fishery Management Plan".

4. COMMENCEMENT

This Management Plan commences on approval by the Minister responsible for Fisheries.

5. DEFINITIONS

In this Management Plan:

Act means *the Fisheries Act Cap 315 No. 55 of 2005*

Coconut crab and crabs refers to the species *Birgus latro*

Fishery means the vanuatu coconut crab fishery

Quota means the number of coconut crabs that can be taken in a fishing season within the fishing area for which the quota is prescribed.

Unless otherwise stated, the following terms used in this management plan are as defined under Part 1 subsection 1 of *the Act*.

- fish,
- fishing,
- fishing licence,
- related activities

6. SCOPE

This plan is largely focused on the "commercial" fishery that captures coconut crabs for sale at markets or to restaurants and hotels. Nonetheless, many aspects of this plan also affect the capture of crabs for local/home consumption.

7. OVERVIEW OF THE FISHERY

7.1 General

The coconut crab fishery is largely based on the market for coconut crabs as a menu item for the restaurants of Port Vila, Efate, Luganville and Santo. The crabs are marketed as an exotic dish for tourists, sometimes as much for the stories that may be told about the crab's unique behaviour as for its culinary appeal.

The crabs are caught using very simple but effective techniques. In most locations, a trail is cut through the bush and a number of coconut baits are put out. In some areas, coconut may be burned, or spit out in a fine spray to increase its effectiveness in attracting crabs. These baits are revisited sometime after dark and the crabs attracted to the baits are caught. In addition, crabs can be caught during the moulting season when crabs bury themselves in the ground. In extreme cases, crabs may be smoked out of their hiding places using small fires at the entrance. In places where the crabs are abundant, it is easy to gather large numbers in a short period of time.

Crabs that are legal size are retained and trussed up using lengths of vines to immobilise them, particularly their claws. The fate of undersized crabs found varies amongst fishers, it is known that some take these home, others eat them at camp fires, and only some release them for the future.

The crabs are usually shipped to the markets, restaurants, or to wholesalers in Port Vila and Luganville alive (still trussed in vines). Being a land crab they can withstand being tied up for relatively extended periods, but if held too long (> 1 week) or held in conditions that are too hot they can still suffer high rates of mortality.

Given that the places where the crabs are caught are often some distance from transport, particularly airports, and the frequency of planes and the availability of space on the planes can be very limited at times, the mortality of captured crabs can sometimes be unacceptably high.

7.2 Locations of the fishery

The fishery occurs throughout the entire Vanuatu archipelago but there are currently 4 main provinces where this activity has been most prevalent:

7.2.1 Sanma

In recent years, fishing activity on the island of Santo has been occurring along the north east region of the island specifically at villages including Kole, Hog Harbour, Port Olry and down into Big Bay. There has also been significant collection in south Santo. Other islands where crabs have been collected for sale include Aore and Mavea.

7.2.2 Torba

The islands in this province have long been a source of coconut crabs. The islands within the Torres group have the highest numbers of crabs such as Hiu, Tegua and Metoma but no fishing occurs on Metoma. The other island of Loh has also been fished.

The Banks group, specifically Moto Lava and Gaua are also sources of crabs from this province.

7.2.3 Penama

The island of Maewo is the only place in this province where significant export of crabs occurs. These collections are centred around the northern part of the island on the villages of Naone, Marino and Naumumu.

7.2.4 Tafea

This province has only recently been the source of commercial quantities of crabs. Collection occurs on the island of Erromango and is centred on the eastern side of the island close to the airport at Ipota. Futuna Island is also home to this important resource.

7.3 Participants

Individuals or small teams of young males collect coconut crabs. Most of the villages in the areas where crabs are harvested collect the crabs for sale. The basic equipment needed for this fishery is a bush knife and a torch. Thus it is relatively simple and inexpensive to begin operating within this fishery. In the more remote locations, however, such as the Torres Islands, the collectors require the assistance of small boats to get the crabs to the airfields.

There is currently no firm estimate of the number of participants involved in this fishery. Given the wide distribution of locations and the quantum of crabs collected it is likely that over 200 people are involved in the commercial coconut crab fishery throughout Vanuatu. However, there would be large variation in the level of involvement of each person. Some may only collect a few crabs (< 10 kg) opportunistically, whereas others may collect upwards of 500 kg.

7.4 Landings

The best estimates of total commercial catch come from the combination of restaurant surveys completed in Vila and the monitoring of markets and hotels completed in Santo.

In 2002 the survey indicated that approximately 18,000 crabs were sold in Vila and a further 2000 in Santo restaurants and markets for a grand total of 20,000. This is only slightly less than the 25,000 estimated back in 1991, which also included home consumption.

The 2003 survey indicated a substantial decline in the use of crabs in Vila restaurants to only 8,580, combined with the 2,000 crabs collected in Santo this represents a 50% decline on 2002.

7.5 Socio-economic benefits of the fishery

The market price paid for crabs varies amongst the buyers. Some pay only 600VT per kilo, others in excess of 1, 000VT/kg. The multiplier effects on the broader community are also large, with the price to restaurant customers varying between 3,000 and 4,000VT per serve.

The crabs form one of the few cash crops available to remote communities. The revenue generated from this fishery is often used to fund the education of the children from these communities.

In some areas the crabs are also used as an alternative source of protein, particularly when fish have been relatively scarce.

7.6 Consultation

The arrangements mapped out in this management plan have been presented at meetings with the fishers at each of the main locations. The recommendations upon which they were based have also been formally submitted to the relevant Provincial Government Councils and subsequently either endorsed or approved.

7.7 Previous management

Size limits and a ban on the capture of berried females were introduced in 1983 (Schedule A). The quotas and closed seasons for Torba and Sanma provinces were introduced in 1991 (Schedule B). A moratorium on the harvesting of coconut crabs in Sanma province was put in place in 2004 ending in 2011. Quota and closed season for Maewo and Erromango Islands were put in place in 2009 (Schedule B).

8. STOCK STATUS AND ECOLOGICAL INTERACTIONS

8.1 Biology

Coconut crab is a "close relative of the hermit crab group and has evolved to become the largest and least marine-dependent of the land crabs" (Brown et al. 1991)[1]. It is an omnivorous scavenger and its primary foods include coconut flesh, fruits of the screw-pine (*Pandanus*), *Canarium* spp., sago palm, *Terminalia*, *Barringtonia*, and *Artocarpus*.

8.1.1 Growth

Coconut crabs are slow-growing and for the Vanuatu stocks, they take at least ten years to reach legal marketable size (9.0 cm, CTL=43 mm)[2]. Fletcher et al. (1991) estimated longevity to be between 40 and 60 years and the asymptotic thoracic length of 80 mm and 50 mm for males and females respectively. Growth in coconut crabs, as in other crustaceans, has two components, the increment of growth at each moult and the time interval between each moult episode (Fletcher et al. 1991)[3]. Moulting is normally once a year with the exception of smaller-sized crabs that are believed to be able to moult more than once a year. For protection from predation and to minimize the risk of dehydration the crabs burrow or

[1] Brown, I.W., and Fielder, D.R. (ed). 1991. The Coconut Crab: aspects of the biology and ecology of Birgus latro in the Republic of Vanuatu. ACIAR Monograph No. 8, 136 p.

[2] CTL=Cephalothoracic length, TL=thoracic length.

hide in small crevices that provide the same conditions as burrows, prior to moulting. The ecdysis process takes from one to two hours to complete, while the time between moulting and emergence from the burrows is about one month for small crabs and up to three months for the larger individuals (Fletcher et al. 1991)[4].

8.1.2 Reproduction, spawning season, age at maturity

Mature crabs mate on land in summer while both sexes are in hard shell condition. However, fertilization may require seawater. Laying of eggs is assumed to take place soon after copulation as females do not possess seminal receptacles. The females carry fertilized eggs attached to their pleopods for approximately one month, while maturing, before migrating to the sea for their release. The release of eggs is accomplished using one of the four methods which are closely associated with the type of coastline present.

(i) In cliff coastlines with narrow or no inter-tidal shelf, the berried crab climbs over the cliff edge and reorients itself so that it faces up the cliff. It then "slowly reverses down the cliff until a wet section, or wave splash, is encountered" at which point it "stops and flexes its abdomen away from the cliff face, letting the egg-bearing pleopods dangle loosely, thus exposing its entire egg mass". The crab moves further down if there are not sufficient splashes at any particular height until it is washed over by a wave which results in rapid hatching of the mature eggs and washing away of the newly enclosed zoea larvae.

(ii) In coastlines with an inter-tidal shelf, the berried female walks rapidly across the shelf until it encounters a saltwater pool. It raises its abdomen to keep the egg mass clear of the water and only lowers it into the water with rapid backwards and forwards flexes of its abdomen in small rapid jerking movements, to facilitate eclosion of the eggs, when a wave sweeps over it.

(iii) The third method involves coastlines as in method (ii) above but the release is not through a pool splashed by waves but a saltwater "stream" draining the shelf.

(iv) The method used in coastlines having a sand or coral rubble beach is similar to that in method (ii) above. The crab moves down the beach into the water until it is swamped by a wave. "In each method, egg hatching/larval release is invoked by exposure of the eggs to moving water, usually via inundation by waves".

Mature eggs hatch immediately into the first zoea stage upon release into the ocean. The hatched eggs undergo four plantonic zoeal stages in approximately three weeks and the crabs (new recruits) emerge from the water as glaucothoe inhabititing shells. The glaucothoe inhabit the wrack area above the high sea mark and are hard to find and distinguish from other related coenobinids. "The glaucothoe subsequently metamorphose into juvenile crabs which maintain the shell carrying habit for one to two years" (Brown 1988)[5].

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[3] Fletcher, W.J., I.W. Brown, and D.R. Fielder. 1991. Moulting and Growth Characteristics. In: Brown, I.W. and D.R. Fielder (ed). 1991. The Coconut Crab: Aspects of Birgus latro biology and ecology in Vanuatu. ACIAR Monograph Number 8.

[4] See footnote 3.

[5] Brown, I.W. (ed) 1988. Growth and Recruitment in Coconut crab populations in Vanuatu. Final annual report to June 1988.

8.2 Environment

Coconut or robber crab is widely distributed from the Seychelles in the Western Indian Ocean to the Tuamotu Archipelago in the Eastern Pacific. Its occurrence is restricted to island habitats and is virtually unknown in East Africa, the Indian sub-continent, mainland Asia and Australia, probably due to the presence of large animal competitors and predators in these areas (Brown et al. 1991)[6]. However, several reports seem to indicate that the species' range appears to have somewhat diminished. Within certain localities, habitat destruction, uncontrolled exploitation and depredation by domestic and feral animals have contributed to the declines and local extinctions.

Within Vanuatu, coconut crabs are distributed over a wide area and are present on most islands of the archipelago. The areas with the main exploitable populations at present are in the north, mainly, Banks/Torres, Santo/Malo, and Maewo; and in the south, mainly Erromango and Futuna Islands.

8.3 Stock assessment

The status of the coconut crab stocks are assessed by field sampling which utilises the methods detailed in Fletcher & Moses (1994)[7]. In brief, during the day a series of coconut baits are placed along a trail cut through the forest. Each trail is revisited at night with each of the crabs attracted to the baits captured, measured and released. These data are used to assess changes in the relative abundance and size structure of crabs within each of the main areas where crabs are harvested.

This sampling has been completed at over 20 locations around Vanuatu since 1985. This provides a good basis to assess the current stock status of most regions.

8.4 Current stock status

Sanma: Overall, the number of crabs found in the 2002 surveys in the Sanma province was similar to or lower than during the last survey period in 1991/1993. However, even then, the numbers of crabs were already at low levels and this was prior to the introduction of the current management regime. Some of the Sanma sites had more crabs (Matantas, Thion), others had similar numbers (Hog Harbour), but some had substantially fewer crabs (Kole). Most of the sites had catch rates of less than 0.5 crabs per bait with few legal sized crabs (CPUE < 0.15).

Thus, most areas can be classed as growth overfished and the entire province is rated as overfished and therefore reductions in the numbers collected are needed.

A four-year moratorium has been put in place on crab collection in Sanma province. Initially, the moratorium was for a period of three years commencing in 2004. Currently, the moratorium has been extended for a four years ending in 2011.

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[6] See footnote 1.

[7] Fletcher, W.J. & M. Amos (1994) Stock Assessment of Coconut Crabs: A manual ACIAR Monograph Series No. 29 32p.

Torba: The status of coconut crab stocks varied amongst the islands in the Torba province. On the two main islands in the Torres group (Hui and Tegua), substantial quantities of crabs (mean CPUE > 2) were found; with many sites having higher catch rates than was found 10 years ago. Thus, this area is classed regionally as underfished and may be able to have higher catches.

Some of the other locations in this province were not as healthy with the survey results suggesting that there have been significant declines in crab abundance at Moto Lava in the Banks, whilst the sampling at Loh also showed signs that this region is also growth overfished and some reduction in capture of crabs at this location is required.

Tafea: The preliminary data for the Tafea province suggests that there are healthy stocks of coconut crabs on Erromango. The sites around the village of Ipota are, nonetheless, showing the first signs of local depletions. If this is to be avoided, collection needs to be limited at this location to levels that will not result in further declines in abundance as has occurred elsewhere. Thus, future levels of harvesting should not be allowed to increase beyond this level without close monitoring.

There was no assessment conducted on Futuna Island and thus the stock level is not known.

Penama: The initial survey in the Penama province (Maewo) suggests that the level of harvesting in this region may be too large because the catch rates in some regions are relatively low. Thus, the exploitation rate should be reduced to some degree in this region.

General: The spawning stock (defined as the numbers of females of spawning size) of coconut crabs in the Vanuatu archipelago has not declined substantially since the last surveys in 1991/1993 and in many cases there have been increases in relative abundance. Therefore, the overall status of the coconut crab resource in Vanuatu is reasonably healthy in terms of spawning potential, but in terms of the availability of legal sized individuals for capture and sale the level has at best remained the same. Indeed, with the opening of new areas it has probably declined. Therefore increased management restrictions are required to ensure that the status can be maintained, or preferably improved, the future.

8.5 Current research

Current research is restricted to the completion of the periodic stock assessment surveys.

8.6 Further research requirements

Vanuatu Fisheries Department in collaboration with other national, regional and international agency should continue to carry out stock assessment survey and research on crab stocks in Vanuatu.

9. FISHERY MANAGEMENT OBJECTIVES

9.1 Socio-economic objectives

- To manage the fishery efficiently and cost-effectively for the Republic of Vanuatu.
- To maximise the opportunity for rural communities to generate long-term income streams through the sustainable exploitation of the resources of the fishery.
- To promote the development and use of good fishing practices for both commercial and domestic uses of the crabs.

9.2 Biological objectives

- To preserve the reproductive potential of the stock within each area.
- To minimise the risk of local depletion of stocks.

9.3 Fishery management strategies

9.3.1 Administration

Within 12 months of the commencement of the Plan,

- There will be a clearly outlined set of procedures for the implementation of the Plan.
- All new or amended regulations required for the Plan will have been drafted and gazetted.

9.3.2 Consultation and communication

Within the first 12 months of the Plan, an outline of these management arrangements will be provided in Bislama to all the main collecting areas.

There will be an annual visit by Fisheries Staff to each of the main collecting areas to discuss current status and issues.

Before there are changes to any elements covered by the Plan, there will be consultation with the local collectors, villages, Provincial Governments and other relevant parties.

9.3.3 Biological controls

To assist in the maintenance of adequate egg production by the coconut crab stock in Vanuatu the Plan will continue to utilise the minimum legal size declared in 1983, which is consistent with the information now available on growth rates and sizes at maturity. Similarly the ban on the capture or processing of egg bearing females and for crabs where the eggs have been removed also continues.

9.3.4 Closed season

To minimise the disruption to the mating and spawning behaviour of the coconut crabs, there will be closed seasons for each of the main provinces/islands. The timing of these closed seasons needs to utilise the information available on the differences in spawning times between geographic regions in conjunction with the timing of peak tourist numbers to Vanuatu.

9.3.5 Quota

To ensure that stocks are maintained at a healthy level, a quota system is applied for all four provinces (Sanma, Torba, Penama and Tafea).

9.4 Review

The quotas shall be formally reviewed at least every five years or sooner if:

- monitoring surveys indicate that one or more of the reference points/levels have been exceeded; and
- at the written request of the relevant Provincial Government Council.

9.5 Licensing

Within the first 24 months of the approval of the Plan, the following should be undertaken:

- determine if some or all of the provinces and islands with Total Allowable Catch (TAC) should require all fishers in the region to obtain a fishing licence for the capture and sale of coconut crabs. Where this is undertaken, it should be developed and administered through the relevant Provincial Government Council;
- establish the number of potential buyers in Luganville and Port Vila; and
- determine whether to issue licenses to middlemen in Luganville and Port Vila.

9.6 Relationship with Provincial Government Council regulations

The Plan allows for the possibility of Provincial Governments taking an active role in the management of crab resources within their jurisdiction.

In situations where a Provincial Government Council wishes to impose a ban on the capture of crabs for some period (in addition to the current Fisheries regulations) the Fisheries Department may, if deemed appropriate, mirror this ban using Fisheries regulations and associated penalties.

The criteria to determine if these complementary regulations will be imposed include:

- assessing how this ban will meet local sustainability or future development requirements;
- the relative level of impact on collectors;
- whether there has been adequate consultation with local villages and other interested

parties; and

- any other relevant issues.

A Provincial Government Council regulation cannot, however, override a closed season as specified in 9.3.4 or increase a provincial quota as specified in 9.3.5.

9.7 Monitoring

9.7.1 Catch

Within 12 months of the commencement of the Plan, a coordinated system of data gathering and storage will have been generated to enable the catch of crabs within each area to be monitored such that an estimate of the season/annual total will be available. This should be generated using a synthesis of information gathered including:

- at the village level, information supplied by nominated village monitors;
- by examining the records of any relevant domestic airline cargo manifests at regular intervals;
- from biannual surveys of the numbers of crabs sold/bought at markets, restaurants and wholesalers in Vila and Santo; and
- where fishing licences are required, holders of these licenses will be required to submit catch and effort data.

9.7.2 Compliance

Regular checks of restaurants, hotels, markets outlets, airports, wharfs will be made to ensure the crab buyers comply with all relevant regulations.

9.7.3 Abundance and size structure

An annual survey of the sampling sites within each Province will be completed using the specified survey methods.

9.7.4 Socio-economic

Surveys of markets and restaurants will be made to estimate average prices paid to fishers and prices paid by diners.

9.8 Review

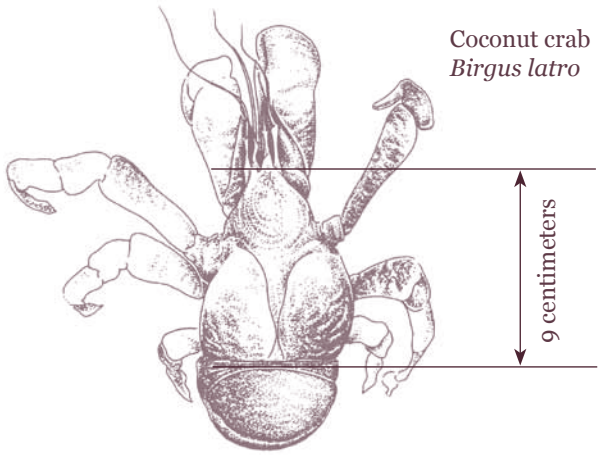
The effectiveness of the Plan will be reviewed annually and the entire management plan will be reviewed after five years.

9.9 Penalties

Penalties for breaching any of the regulations associated with this plan are outlined in Schedule A.

10. SCHEDULES

A: Size limits and ban on berried females



Coconut crab management regulations

Coconut crab is managed under the Fisheries Act no. 55 of 2005, Subsidiary Act - Fisheries Regulations, Part IV Section 15 and Section 22.

Size limits:

Coconut crab of a length of less than 9 cm (see diagram) must not be harvested, possessed, sold or purchased.

Other restrictions:

Female coconut crabs carrying eggs, or females from which eggs have been removed, must not be harvested, possessed, sold or purchased.

It is forbidden to remove the eggs from a female coconut crab.

Coconut crab must not be exported except with the written permission of the Minister.

Maximum penalty (**Subsidiary Act – Fisheries Regulations, Part IV Section 24**):

- For an individual: **200,000VT**
- For a company or an association of persons: **1,000,000VT**

B: Annual quota

Sanma Province

Sites	Quota
North Santo (Port Olry/ Cape Queros/Loran	700
Hog harbor	350
Kole	150
Shark Bay/Mavea	200
South Santo	300
Malo/Aore	300
Total	2,000

Penama Province

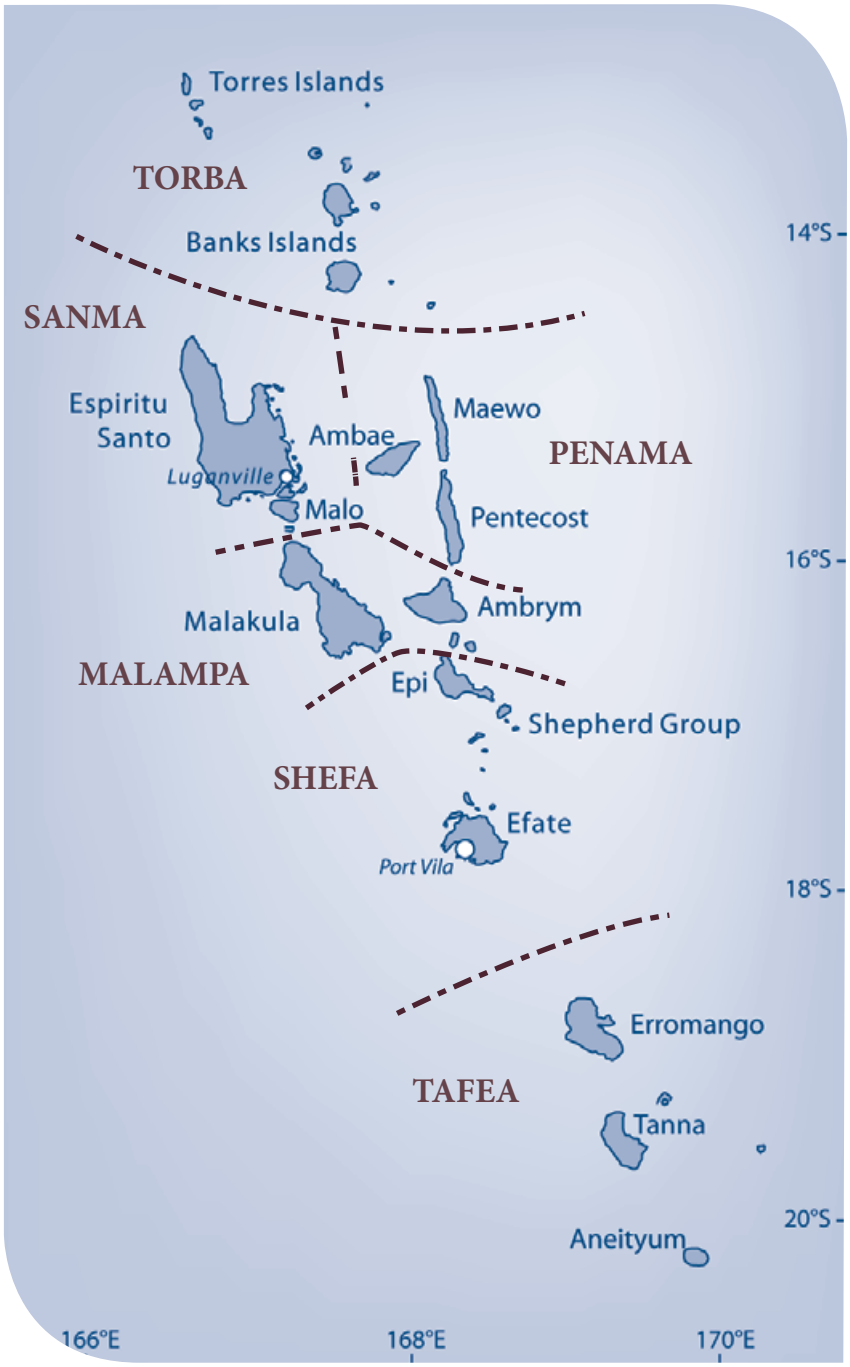
Sites	Quota
Maewo Island	
Naone village	500
Marino village	500
Naumumu village	500
Total	1,500

Tafea Province

Sites	Quota
Erromango Island	2,000
Total	2,000

Torba Province

Sites	Quota
Torres	
Hiu	1,500
Tegua	1,500
Loh	500
Toga/Metoma	200
Banks	
Mota Lava	400
Gaua	400
Others	500
Total	5,000


Torres Islands
TORBA
Banks Islands
SANMA
Espiritu Santo
Luganville
Ambae
Maewo
PENAMA
Malo
Pentecost
Malakula
Ambrym
MALAMPA
Epi
Shepherd Group
SHEFA
Efate
Port Vila
Erromango
TAFEA
Tanna
Aneityum
14°S
16°S
18°S
20°S
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168°E
170°E

Vanuatu Fisheries Department
PMB 9045
Port Vila
Vanuatu
Tel: + 678 533 3340