

COMPONENT 3A - PROJECT 3A4
Technical and financial support to regional
networks and database

September 2010

CRISP



Coral Reef InitiativeS for the Pacific
Initiatives Corail pour le Pacifique

STUDY REPORT

Findings for Fiji Extinction Resistance Project

CONSERVATION
INTERNATIONAL



SPREP
PROE

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CRISP



Coral Reef Initiatives for the Pacific
Initiatives Corail pour le Pacifique



The CRISP programme is implemented as part of the policy developed by the Secretariat of the Pacific Regional Environment Programme for a contribution to conservation and sustainable development of coral reefs in the Pacific.



The CRISP Coordinating Unit (CCU) was integrated into the Secretariat of the Pacific Community in April 2008 to insure maximum coordination and synergy in work relating to coral reef management in the region.

The Initiative for the Protection and Management of Coral Reefs in the Pacific (CRISP), sponsored by France and prepared by the French Development Agency (AFD) as part of an inter-ministerial project from 2002 onwards, aims to develop a vision for the future of these unique ecosystems and the communities that depend on them and to introduce strategies and projects to conserve their biodiversity, while developing the economic and environmental services that they provide both locally and globally. Also, it is designed as a factor for integration between developed countries (Australia, New Zealand, Japan and USA), French overseas territories and Pacific Island developing countries.

The CRISP Programme comprises three major components, which are:

Component 1A: Integrated Coastal Management and Watershed Management

- 1A1: Marine biodiversity conservation planning
- 1A2: Marine Protected Areas
- 1A3: Institutional strengthening and networking
- 1A4: Integrated coastal reef zone and watershed management

Component 2: Development of Coral Ecosystems

- 2A: Knowledge, monitoring and management of coral reef ecosystems
- 2B: Reef rehabilitation
- 2C: Bioprospection and marine active substances
- 2D: Development of regional data base (ReefBase Pacific)

Component 3: Programme Coordination and Development

- 3A: Institutional strengthening, technical support and extension
- 3B: Coordination, promotion and development of CRISP Programme

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COMPONENT 3A

Institutional strengthening, technical support and extension

■ **PROJECT 3A-1:**

Institutional support and strengthening of links with member countries

■ **PROJECT 3A-2:**

Support to governance through workshops and studies sites

■ **PROJECT 3A-3:**

Improvement of socio-economics of coral reefs

■ **PROJECT 3A-4:**

Technical and financial support to regional networks and database (GCRMN, SEM-Pasifika, ReefBase Pacific)

■ **PROJECT 3A-5:**

Dissemination of knowledge and lessons learned sensitization of stakeholders

Funding agencies:



1. Background

The Extinction Resistance Project (ERP) seeks to determine if the current network of Marine Management Areas (MMAs) project in Fiji are effective in conserving key IUCN threatened species and their associated critical habitats. To determine this, an assessment was undertaken to identify species of global biodiversity conservation significance (e.g., those threatened with extinction, and those occurring at only one or a few sites) in Fiji and where they occur in relation to respective MMAs; and the status and trends of these.

This report summarizes work conducted utilizing datasets currently available for Fiji to date.

2. Threatened Species

There are about 100 marine species listed as vulnerable, endangered or critically endangered on the IUCN Redlist that are known to inhabit the marine waters of Fiji. The majority of these species are corals, in the order *Scleractinia* (n = 86). The remaining 14 species include three long lived reef fish, three giant clams and the big eye tuna. Several sharks and cetaceans also occur in Fiji, as well as one other coral, Helioporacea (Table 1).

Table 1: Number of threatened species per Order

Order	Number of Species
SCLERACTINIA	86
CETARTIODACTYLA	4
HELIOPORACEA	1
LAMNIFORMES	1
PERCIFORMES	4
SYNGNATHIFORMES	1
TESTUDINES	3
Total	100

3. Protected areas in Fiji

The conservation efforts occurring in the near-shore area are joined together by the Fiji Locally Marine Managed Area network (FLMMA) network of Locally Managed Marine Areas (LMMAs).

While, the Qoliqoli areas in Fiji are well documented there is no comprehensive dataset of other conservation sites. A number of resorts have local agreements with villages that create de facto Marine Protected Areas (MPAs), however these are not currently delineated or centralized in a database.

Based on current data, the near shore area as defined by *qoliqoli* boundaries is estimated to be approximately 30,000 km², (figure 2). The portion of the *qoliqoli* areas that are part of the LMMA network is 8,784 km², while the area within these LMMAs that are No-take Zones (NTZs) is about 328 km². LMMAs are primarily managed for livelihood objectives though conservation and biodiversity protection are elements of the LMMA vision. However, monitoring the specific effects of LMMAs have had on threatened species was not built into the sampling methodology.

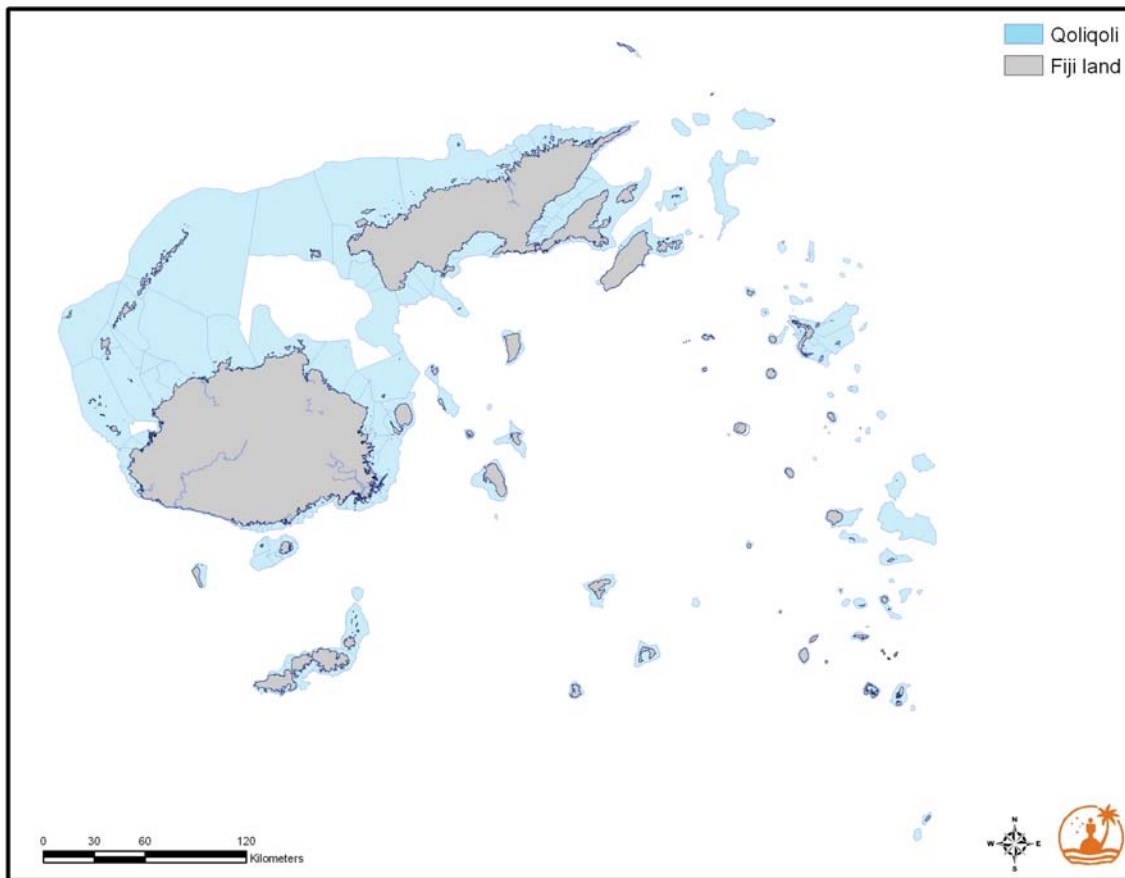


Figure 2: Qoliqoli areas

4. Data

There are a number of research projects and monitoring efforts taking place around Fiji, many of which have a limited geographic extent however when taken as a cluster these efforts provide the best overview of conservation in Fiji. Of these management and monitoring efforts, six have datasets that potentially inform the extinction resistance of critical species (Table 2).

Table 2: Data sources and extent

Dataset	Extent
LMMA data	Nation wide
WCS	Kabulau Macuata
CPUE	Nation wide
EIAs	Several sites available
GSR	Great sea reef
WWF	Several sites
GCRMN	38 sites

The majority of these studies report data on indicator species, coral health and abundance, biomass, and in some cases, specific species of interest. Nine of the 13 vertebrate species listed as threatened on the IUCN Red List are identified in at least one of the sites which the six datasets report on, (Figure 1). The endemic rabbit fish (*Siganus uspi*) included in Table 2 has not been evaluated by the Red List, but was identified in Fiji’s National Biodiversity Strategic Action Plan (NBSAP) as declining. Giant clams are often reported at the family level making it difficult to assess if they are vulnerable *Tridacna derasa* or *T. gigas*, or the lower risk *T. maxima* or *T. squamosa*, subsequently for the purpose of this assessment, they have been included under the umbrella term ‘giant clams’.

The combination of the six datasets provides a national representation of threatened species presence nationally. Unfortunately, however, it is not possible to determine trends in population or range decline or increase due to conservation efforts for several key reasons. The primary issue is that data points in nearly all cases are from a single survey and provide data on presence or absence thus precluding trend analysis. In the case where numbers of a particular species was reported comparable data from outside the LMMA with similar habitat characteristics is unavailable. For example, the PROCFish survey found *Bolbometopon muricatum* present at 3 of 5 survey sites and 1 to 32 individuals at each these sites, however the higher numbers may not reflect management effectiveness but instead lower fishing pressure, better habitat suitability or intra-survey variability. .

Table 2: List of non-coral IUCN threatened specie’s presence in datasets

Common names	Red List status	FLMMA	WCS	CPUE	EIA	GSR	WWF	GCRMN	PROCFishh-C	Total
Coral Grouper	VU				✓				✓	2
Brindle Bass	VU			✓		✓				
Common Seahorse	VU									
Giant Wrasse	EN	✓	✓	✓	✓	✓		✓	✓	7
Green Turtle	EN						✓			1
Hawksbill Turtle	CR						✓			1
Leatherback	CR									
Whitetip Shark	VU									
Polkadot Cod	VU			✓						1
Lemon Shark	VU									
Shortfin Mako	VU									
Sperm Whale	VU									
Bumphead parrotfish	VU	✓			✓	✓		✓	✓	5
Endemic rabbit fish	N/A		✓		✓					2
Giant clam	N/A	✓	✓	✓		✓				4
Total		3	3	4	4	4	2	2	3	

The acronyms stand for: FLMMA -Fiji Locally Marine Managed Area network, WCS- Wildlife Conservation Society, CPUE – Catch Per Unit Effort, EIA – Environmental Impact Assessment, GSR- Great Sea Reef report, WWF- World Wildlife Fund, GCRMN – Global Coral Reef Monitoring Network, PROCFish- C Pacific Regional Oceanic and Coastal Fisheries project. Sharks and the leatherback turtle are reported to occur in Fiji’s waters however there is a scarcity of sighting data from both the leatherback and shark population at specific sites with the LMMA network

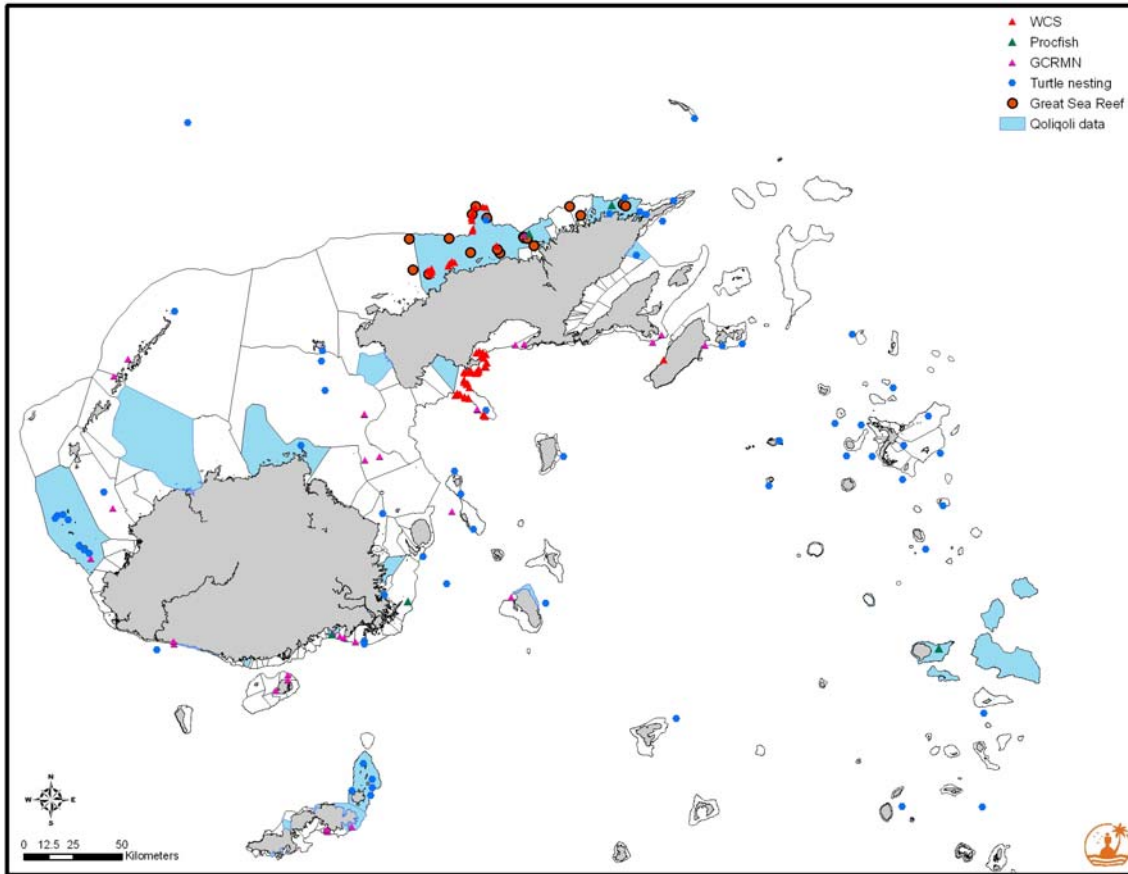


Figure 1: Six major Fiji Species Datasets for IUCN Red Listed Species Occurrence

4.1 FLMMA

The FLMMA network’s extensive monitoring and data collection policy was designed to monitor both biological and socio-economic indicators, which make up the LMMA learning framework. This learning framework was designed with seven goals in mind including stock assessment, community involvement, learning and advocacy.

Not all of the FLMMA sites however conduct monitoring. Out of the 216 FLMMA sites, only 86 have carried out some form of biological monitoring and 40 have monitored socioeconomic parameters (Figure 3) (Govan, *et al.* 2008). Some sites have conducted both socioeconomic and biological monitoring while others have only carried out one type and not the other.

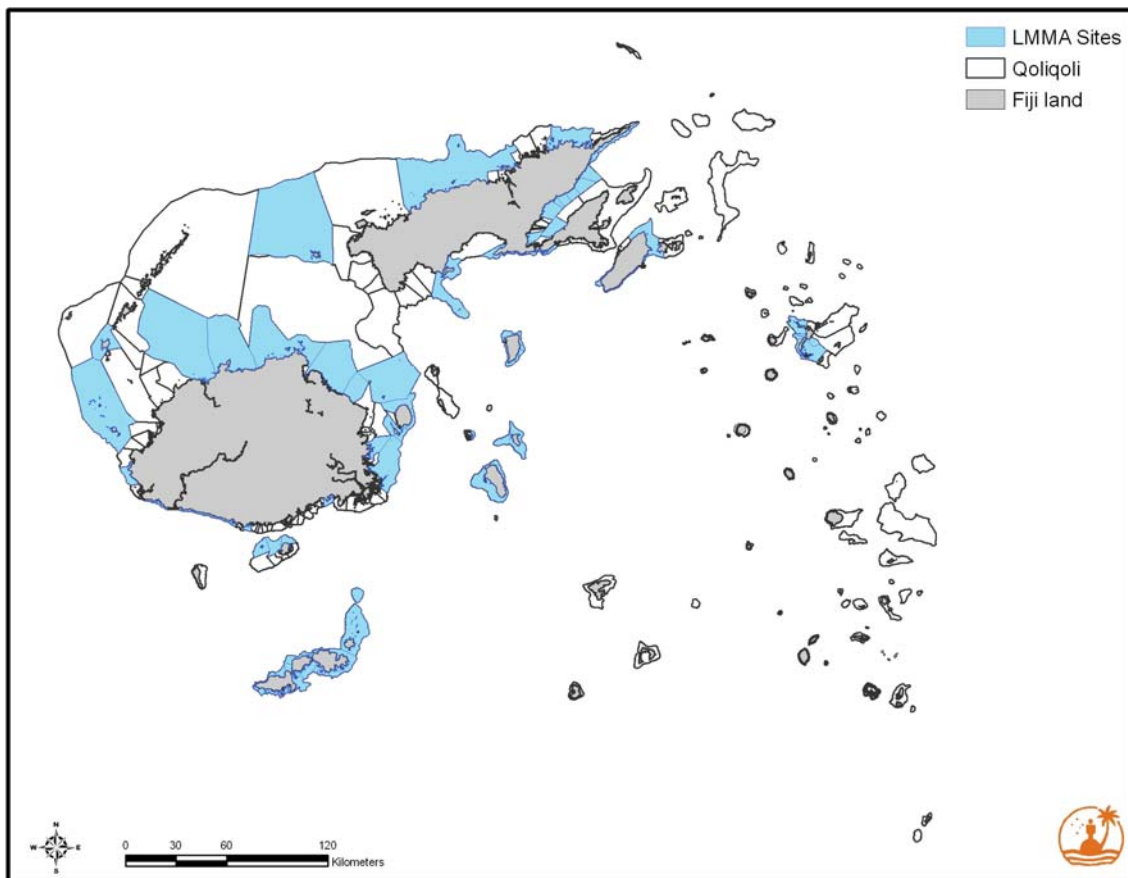


Figure 3: LMMA sites as of 2009

Of the above mentioned 86 sites that have carried out some form of biological monitoring, only 28 of these have biological data stored in digital format, and 24 of these have at least two replicates of this data.

The FLMMA access database was designed to foster meta-data analysis and thus is grouped so that raw data, currently stored in excel spreadsheets, must be accessed individually and cleaned before being analysis. Subsequently, there is great variation at the site level between the datasets available, which is to be expected with data sets on species with clustered distributions. However, identifying trends from a single replicate with high variability is challenging; and more replicates over time will be helpful to draw conclusions.

The taxonomic level at which data is gathered is often at the family level or uses common names in Fijian or English. To answer the question “are conservation goals for threatened species being met?”; data on specific species is necessary. For example, out of 9,800 records, 30 were identified to species for Humphead wrasse, with all 30 individual sighting occurring at one site over a period of two years. Of the 30 identifications, only 3 recorded the number of Humphead wrasse seen. Subsequently, the lack of specific data recoding makes determination of the effectiveness of a NTZ for this specific species simply unfeasible. The generalized class of ‘wrasse’ were recorded in 48 different records at seven locations around Fiji. These additional seven locations may

be home to an IUCN threatened species but based on the data available all that can be said is that a ‘wrasse’ species is present.

Adding to the data extraction issue is the fact that there are 28 village/community names recorded in the database for the families of interest and 18 *qoliqoli* areas in which the 28 place names occur, therefore some villages/communities share *qoliqoli* areas (figure 4).

Based on the FLMMA data, it appears that for sites with data on species of interest the NTZ or ‘*tambu*’ areas have, on average, slightly higher numbers for IUCN Red-listed species (Table 3). In general, for the majority of species or species groups surveyed there are more individuals in NTZs than in the associated control site. Based on this data and anecdotal evidence it seems that NTZs may have higher numbers specific species perhaps species of international concern. The caveat here though, is that the sample size is small and the temporal scale ranges from a single survey to a maximum of three surveys, so trends over time are not clear.

Table 3: Number of individuals in MMAs compared to control sites shown as a percentage

Site	Giant Clam	Grouper	Humphead wrasse	Parrotfish	Shark	Wrasse
Biausevu				25%		
Cevai	60%	54%		66%	100%	
Daku	58%	78%	33	59%	75%	33%
Druadrua		49%		65%		
Gevo				73%		
Komave				48%		
Kumi						
Lamiti						
Lamiti-Malawai	85%	63%		91%		
Lekanai	70%	67%		68%		
Malawai	0%	0%		33%		
Naboutini	100%			85%		100%
Nabubu		68%		59%		
Naivakarauniniu	75%	0%		0%		
Namada	53%	22%		81%	100%	100%
Namatakula				63%		
Namuana	50%	79%		46%		100%
Naovuka	0%					
Nasau	73%	82%		96%		
Nasegai	21%					
Navakavu		57%		90%		24%
Navola				21%		
Nukuvou		65%		80%		
Tagage	67%	0%		-76%		
Tavua						
Ucunivanua						
Vanuaso	36%	77%		63%		
Vatu-o-lalai	77%	91%		64%		N/A
Votua (Ba)						
Votua (Nadroga)	89%	13%		38%		100%
Total on average	57%	52%	33%	65%	84%	61%

4.1.1 Challenges in extrapolating FLMMA findings

Within the suite of FLMMA network objectives monitoring was designed to fulfill there is no specific objective to monitor IUCN threatened species. A secondary issues is that NTZs and control sites were selected based on different objectives at different sites, in some cases the NTZ sites were selected to protect an already healthy site, while other protected areas were selected to restore a degraded site. While the treatment in both cases was the same, it would be expected that different results in each type of protected area would result, especially in a short time span.

Furthermore, some control areas are adjacent to the protected area, in which case some spillover effects would eventually be expected to be observed, while other control areas are relatively far from the protected area and thus spillover effects would be less pronounced if they were observable at all.

A third complicating factor is whether the NTZ is permanent or temporal variable. Some protected areas are closed permanently while others are periodically opened during the course of their protection, this too would lead to differences in abundance of long lived rare species of concern. Large, mobile species by their nature respond better in larger MMAs or NTZs. In general, MMA sites range from less than a 0.1 km² to nearly 48 km² in size across the FLMMA network and within the 18 qoliqoli areas with data the tambu areas range from 14.6 km² to 0.015 km² in size. When looking at sharks and long lived reef fish the size of the tambu site would also be expected to contribute to the species response to projection.

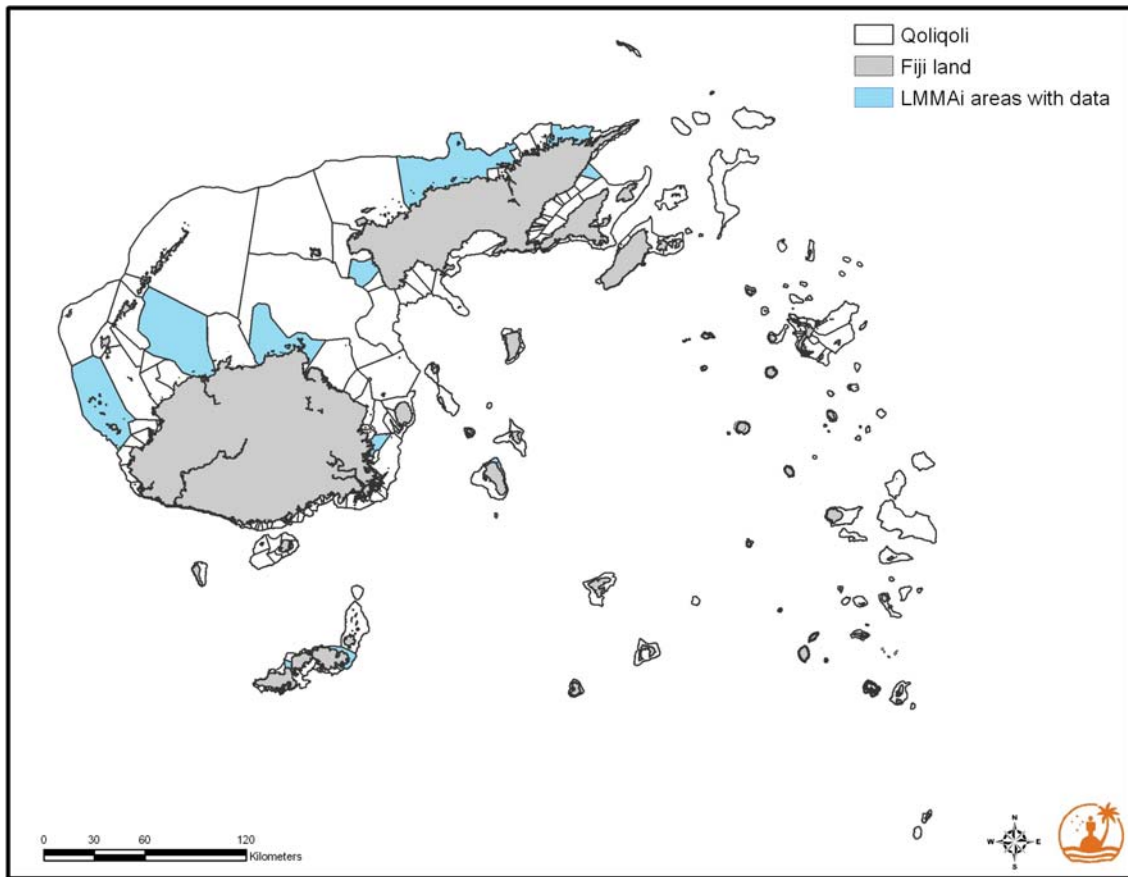


Figure 4: Qoliqoli sites with digital data

General trends within FLMMA sites may serve as a proxy for success in conserving IUCN threatened species. Of 45 species recorded, monitoring data is available for 39 species of these, which show a higher number inside the NTZ compared to the control areas outside the NTZ (Figure 5). These include all species for which monitoring was conducted and not just rare species

Based on data available from the FLMMA network and noting the data gaps, nearly 200 sites are with no available data, or have little to no data on species of concern. They also have differing sizes and conditions of NTZ.

Of the artisanal or commercially important species that have been monitored all were found in higher abundance in NTZs, including the critically endangered humphead wrasse. Giant clams, lobster and octopus were also found in higher numbers within NTZs (figure 6).

Looking at this data as a whole leads to the conclusion that for the species monitored, NTZs appear to house a higher number of individuals when compared to nearby control sites. This may be due to management, or other environmental factors. Given the variability of all parameters at each site, the FLMMA datasets are most useful for adaptive management at sites and case studies.

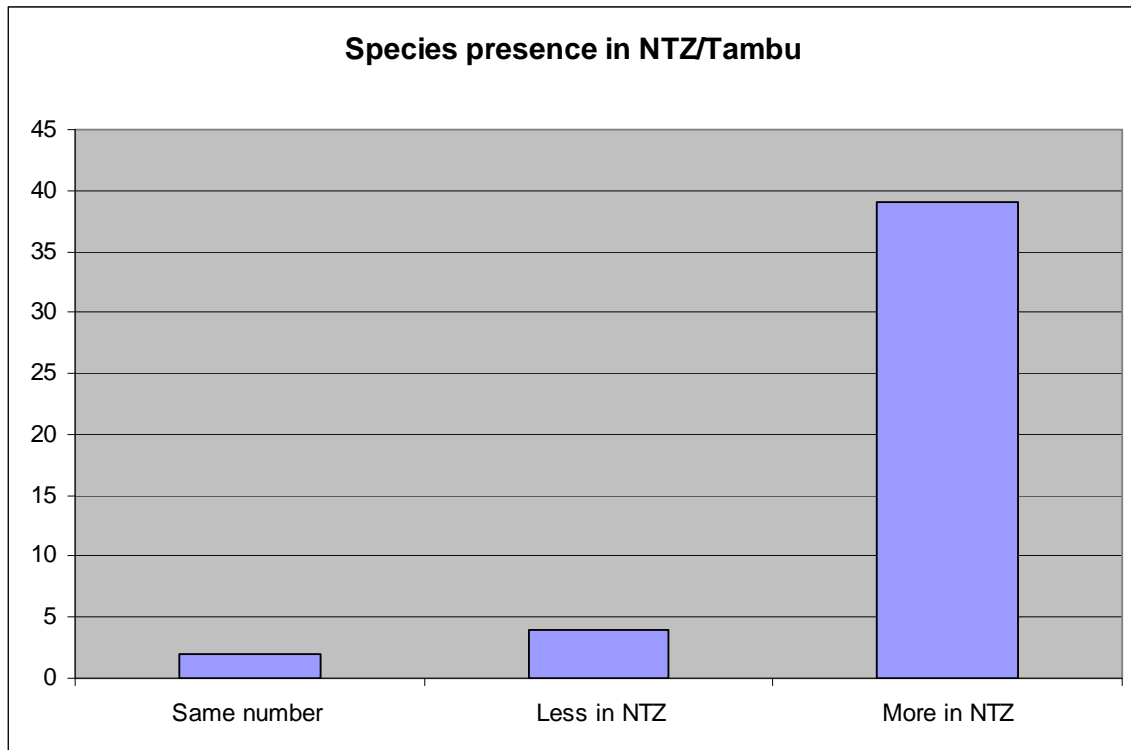


Figure 5: Numbers of species counts in NTZ vs. Control site

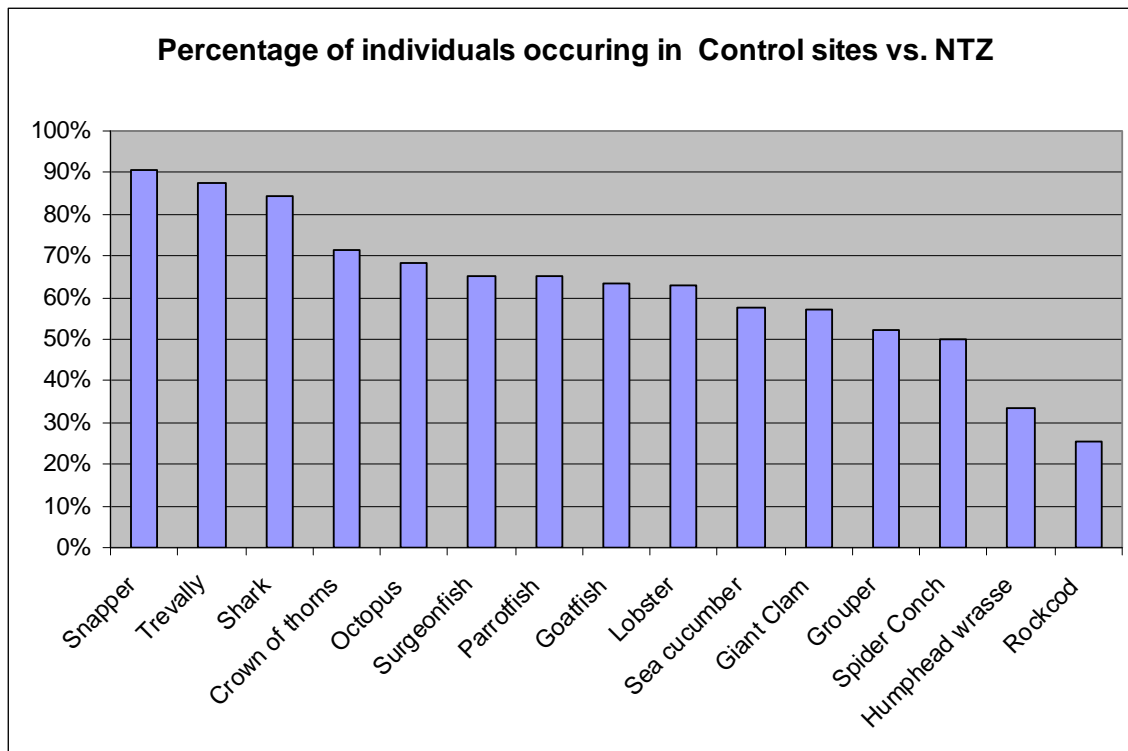


Figure 6: Percentage of commercially valuable species found in control sites vs NTZ

4.2 Other data sources

4.2.1 *Great Sea Reef Report:*

Of the 16 sites surveyed in the 2004 Great Sea Reef survey, 11 sites recorded positive finds for IUCN threatened species (Figure 7). Of the species identified, only three were either listed by the Red List as threatened. None of the species were found within a NTZ, though one site was within 300 ms of a NTZ. Bumphead wrasse were found in three locations, nurse sharks and giant groupers were each found in one location.

Again, it is not possible to infer that the NTZs or the FLMMA network are protecting IUCN threatened species.

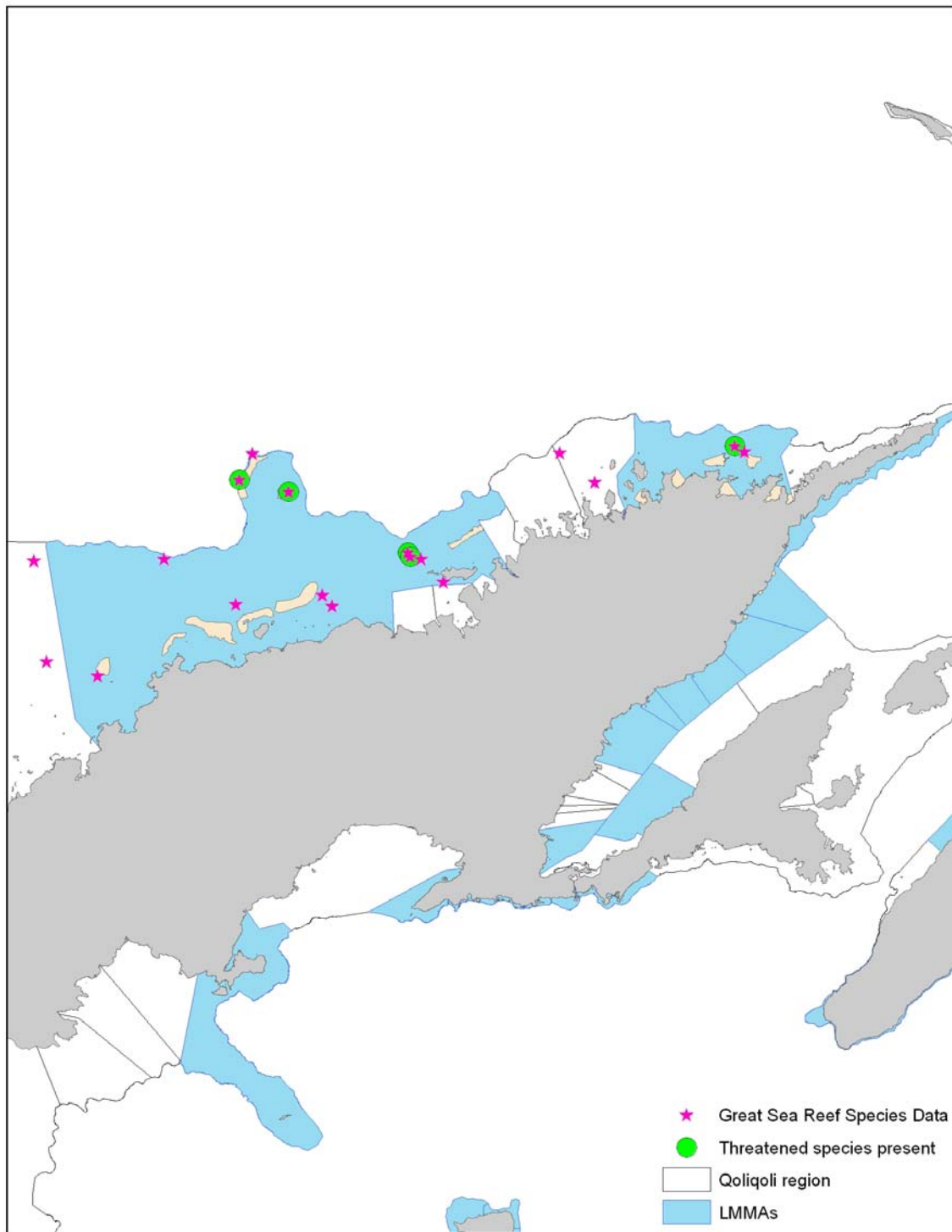


Figure 7: Great sea reef survey sites with threatened species present

A technical report on the finfish of *vanua navakavu* shows the presence of the giant grouper, humphead wrasse, the endangered ray and nearly all known sharks occurring in Fiji (Thaman, 2008). However the effectiveness of the LMMA and NTZs at conserving these species is unaddressed as this report focuses on species presence rather than status.

The Fiji Fisheries Department (FFD) reports a wealth of data on species but the data is not collated, or easily accessible. A query regarding humphead wrasse presence to FFD staff confirmed their presence in 10 *qoliqoli* areas, but not population trends (Figure 8) .

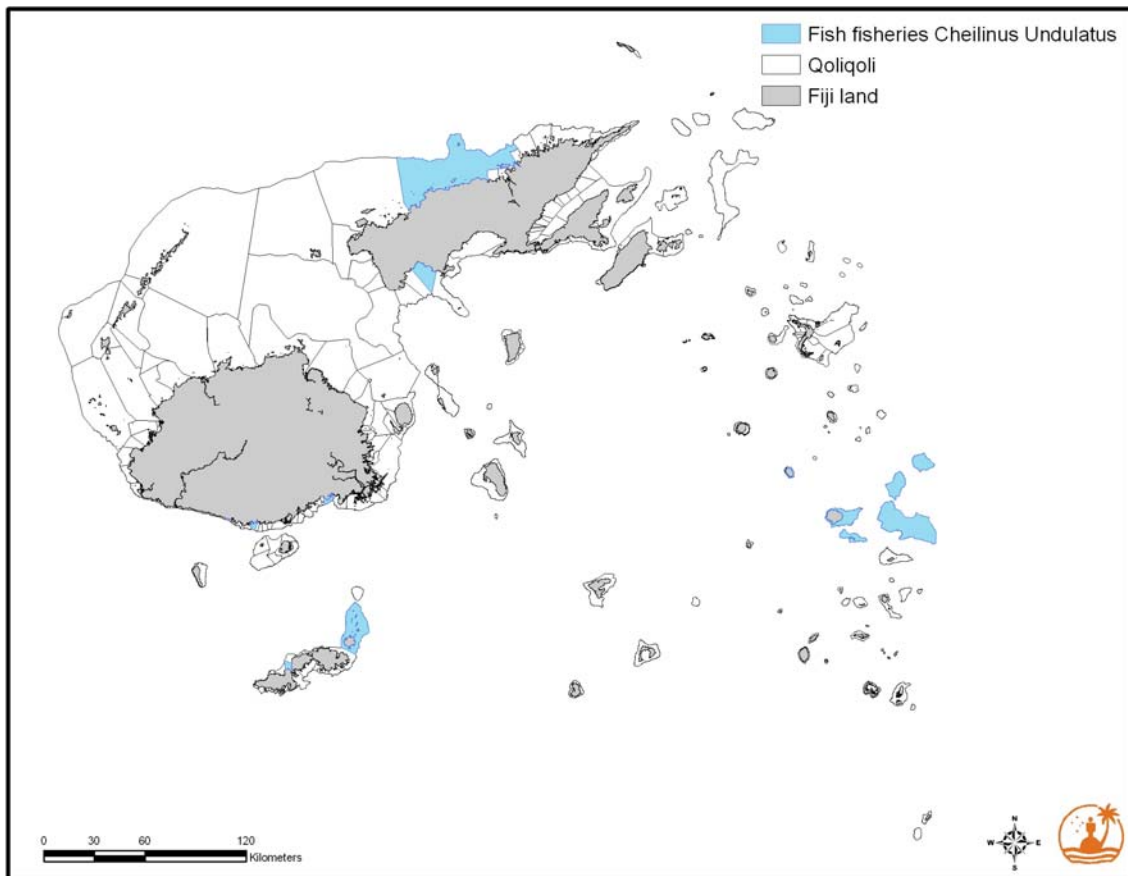


Figure 8: Fiji Fisheries department data on presence of *Cheilinus undulatus*

4.2.2 GCRMN

There are 34 GCRMN sites in Fiji and two IUCN Red-listed vertebrates have been surveyed over the course of 6 years across Fiji (Skyles, 2009). While coral data is extensive, coral taxonomic data to species level is not available at each site. At 13 of the 34 GCRMN sites, corals were identified to life form categories. This dataset is taxonomically limited but has a wide geographic coverage (Figure 9).

Anecdotal evidence from the GCRMN indicates that the bumphead parrot fish is in decline with “obvious reductions in schooling areas” and noting that “it is possible, that they will become extinct in Fiji” within the next decade. Turtles face harvesting pressure as well as development pressure and giant clams have been “much reduced” by subsistence fishing, (Skyles, 2009).

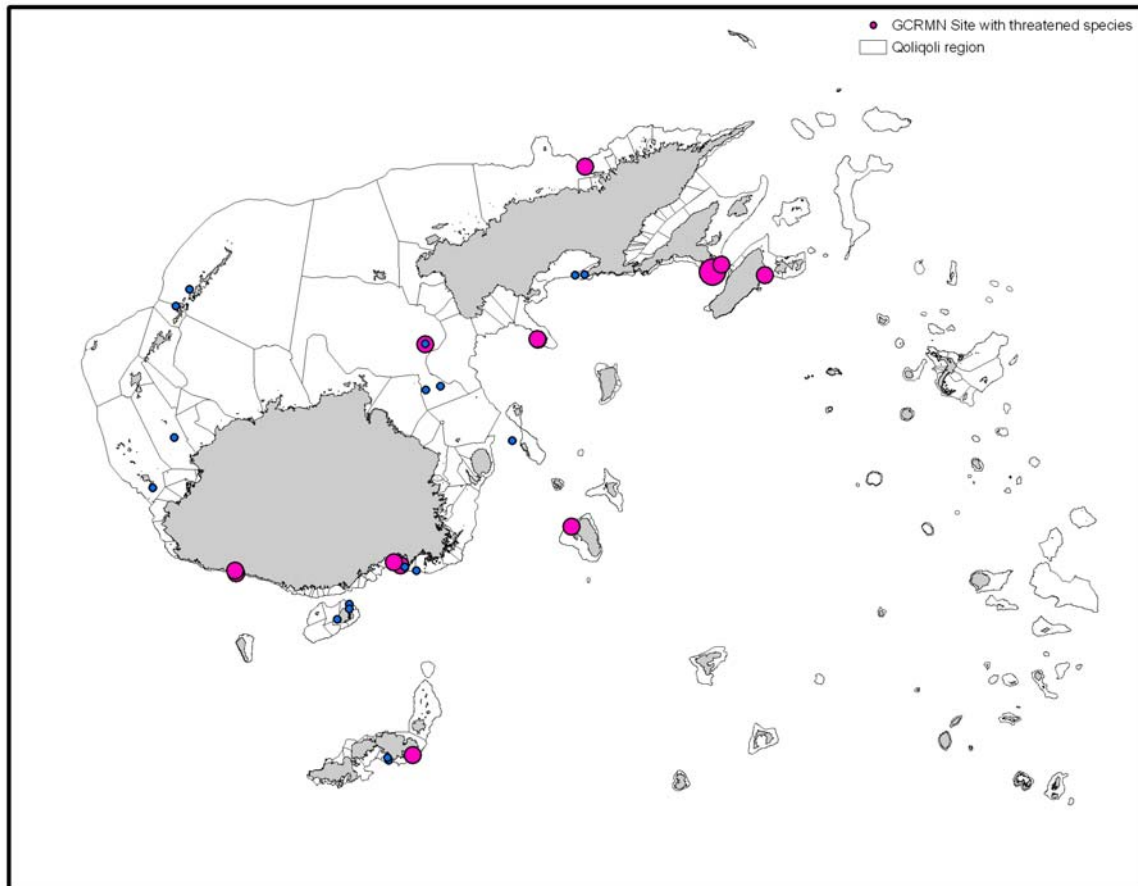


Figure 9: GCRMN sites with threatened vertebrates present

4.2.3 WCS

WCS has one of the most detailed datasets for the Kubulau and Macuata Districts in Vanuau Levu. WCS has records for four IUCN threatened species and one species of local concern with in these two areas (Figure 10). While the geographic coverage for Fiji is limited there is detailed data. A recent ecosystem management plan for the Kubulau District included several threatened fish species, all turtles and some invertebrates as protected species to provide full conservation status throughout the Kubulau qoliqoli area (WCS 2009).

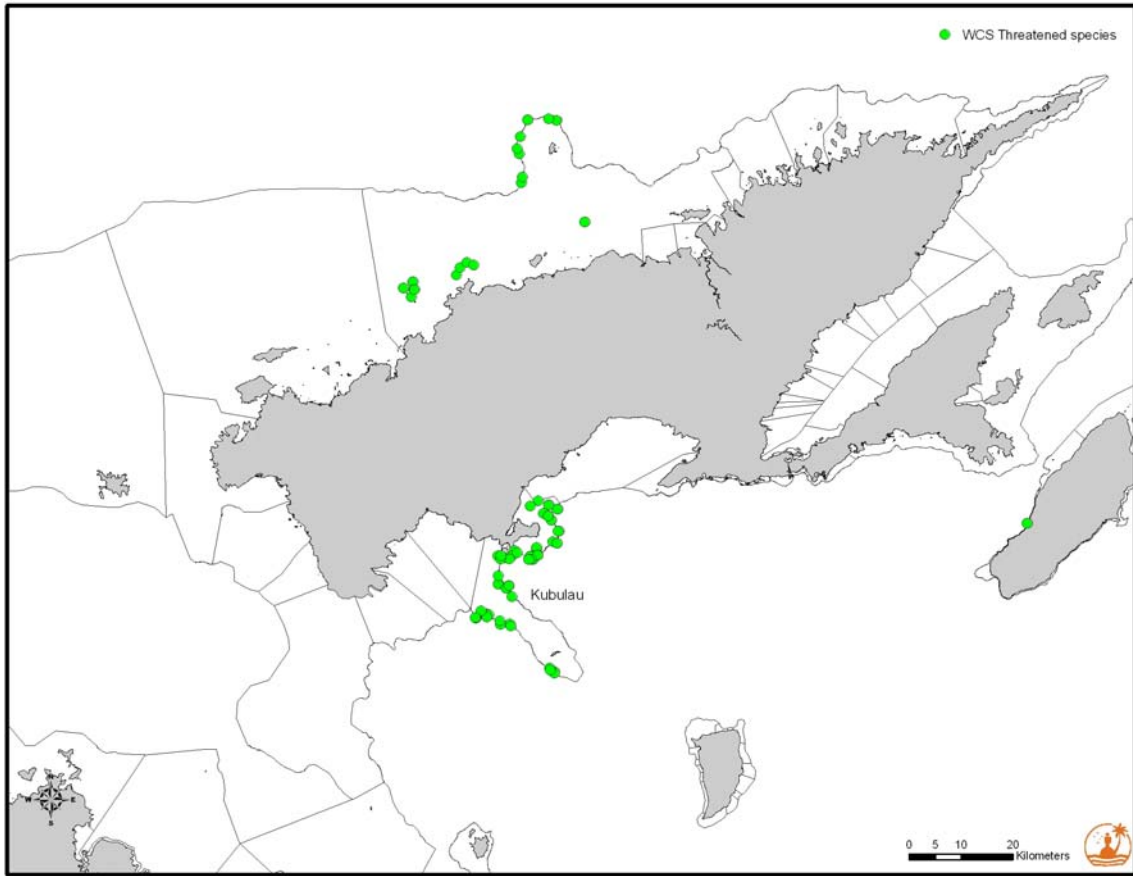


Figure 10: WCS threatened species

5. Sea Turtles

Due to the threats and a perceived declining trend in numbers there has been a moratorium on taking or killing turtles for the whole of Fiji for the past the decade. There is a wide geographic spread of turtle nesting there is also wide array of threats including development and loss of nesting beaches (Figure 11).

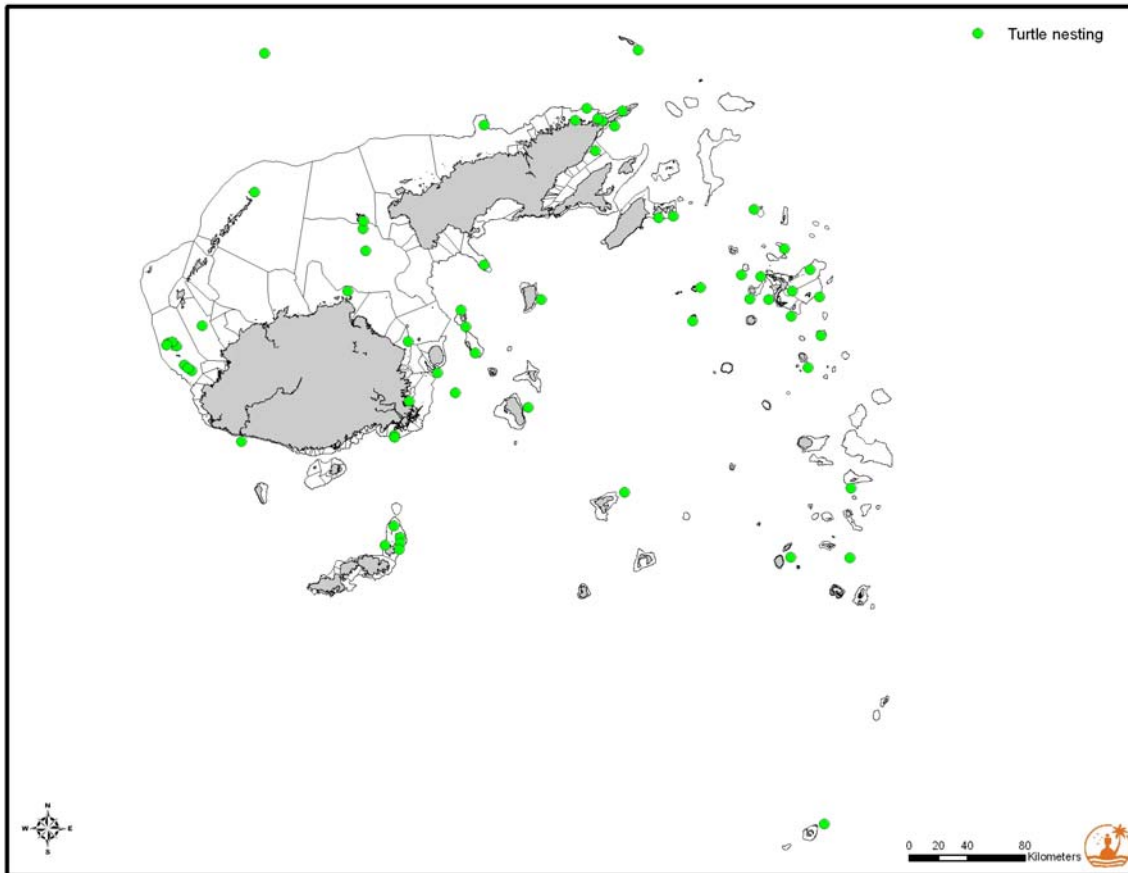


Figure 11: Turtle nest sites.

6. Other Threatened Species

Over 200 sites or areas were identified as having at least one IUCN Red-listed species present at some time during the year. While many of these occurrences were found inside managed *qoliqoli* areas (i.e. FLMMA sites), very few were identified inside NTZs (Figure 12).

Since the sampling methodology of these disparate datasets was not designed to address the impact of protection or management, the occurrence IUCN Red-listed species inside or outside a managed *qoliqoli* cannot be taken as a supporting or validating current management.

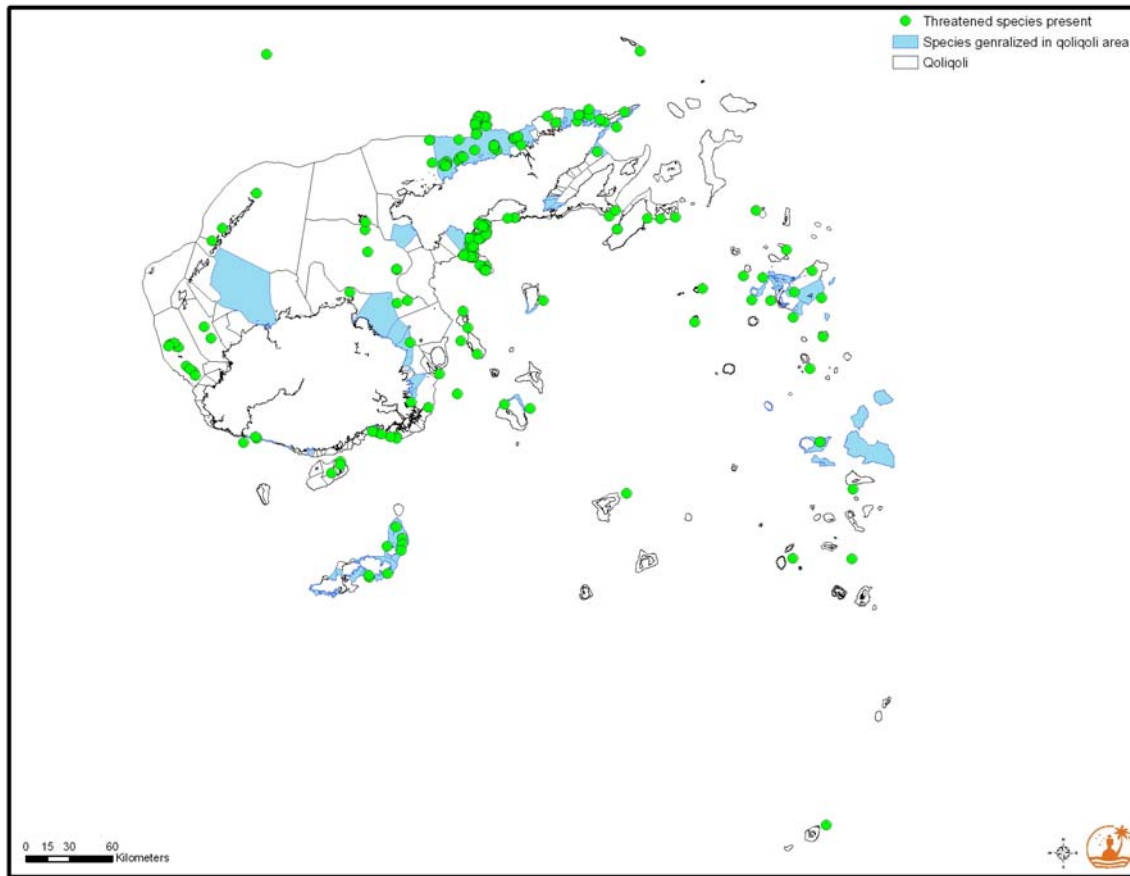


Figure 12: Threatened species location in Fiji

7. Discussion and Recommendations

The overall trends in Fiji’s near shore fisheries are evident. For example the director of Fiji’s inshore fisheries management estimates that that 250 of Fiji’s *qoliqoli* areas are fully exploited, with 70 considered over-exploited, and the Asian Development Bank fisheries specialist says “ many of Fiji’s important inshore resources are either fully exploited or very much over-exploited”. However, since the IUCN threatened species are rare, not always target food species and in many cases not priorities for data collection their nation wide trends are unclear. To determine the effects of current management efforts and the needs to conserve and preserve IUCN threatened species populations, targeted data on these species needs to be collected, over time.

Several of the species listed as threatened on the IUCN red list are already managed or protected by Fiji law including the Humphead wrasse and the Bumphead parrotfish, which are protected by the Endangered and protected species act of 2002. While time delineated, spatially explicit information on these species population trends is necessary for tracking management effectiveness and adaptive management, in the short term the management actions are clear. These actions include education of the stakeholders and fishermen regarding the current government regulations regarding rare species as well as enforcement of the regulations. Supporting existing marine managed areas to specifically identify species of concern and the behavior that constitutes appropriate management of these species as well as enforcement of village or LMMA no take zones is also necessary.

The Fiji LMMA network has a number of case studies addressing the effectiveness of MPAs that can serve as guides for conserving threatened species throughout the country, efforts need to be focused both on management and additional data collection for threatened species.

Acknowledgments

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Appendix 1: 2009 IUCN Red List

Search terms

Show taxa:

Species

Search by location:

Fiji

(Native)

Match any habitat:

9. Marine Neritic

10. Marine Oceanic

11. Marine Deep Benthic

12. Marine Intertidal

13. Marine Coastal/Supratidal

Search by assessment:

Categories: CR, EN, VU

Genus	Species	Common names (Eng)	Red List status	Population trend
Plectropomus	laevis	Blacksaddled Coral Grouper	VU	decreasing
Heliopora	coerulea	Blue Coral	VU	decreasing
Epinephelus	lanceolatus	Brindle Bass	VU	decreasing
Pavona	decussata	Cactus Coral	VU	unknown
Hippocampus	kuda	Common Seahorse	VU	decreasing
Balaenoptera	physalus	Fin Whale	EN	unknown
Cheilinus	undulatus	Giant Wrasse,	EN	decreasing
Chelonia	mydas	Green Turtle	EN	decreasing
Eretmochelys	imbricata	Hawksbill Turtle	CR	decreasing
Dermochelys	coriacea	Leatherback	CR	decreasing
Pectinia	lactuca	Lettuce Coral	VU	unknown
Carcharhinus	longimanus	Oceanic Whitetip Shark	VU	decreasing
Plectropomus	areolatus	Polkadot Cod	VU	decreasing
Negaprion	acutidens	Sharptooth Lemon Shark	VU	decreasing
Isurus	oxyrinchus	Shortfin Mako	VU	decreasing
Physeter	macrocephalus	Sperm Whale	VU	unknown
Acanthastrea	bowerbanki		VU	unknown
Acanthastrea	brevis		VU	unknown
Acanthastrea	hemprichii		VU	unknown
Acanthastrea	ishigakiensis		VU	unknown
Acanthastrea	regularis		VU	unknown
Acropora	abrolhosensis		VU	decreasing
Acropora	aculeus		VU	decreasing
Acropora	acuminata		VU	decreasing
Acropora	anthocercis		VU	decreasing
Acropora	aspera		VU	decreasing
Acropora	caroliniana		VU	decreasing
Acropora	dendrum		VU	decreasing
Acropora	donei		VU	decreasing
Acropora	echinata		VU	decreasing
Acropora	globiceps		VU	decreasing

Acropora	horrida		VU	decreasing
Acropora	kirstyae		VU	decreasing
Acropora	listeri		VU	decreasing
Acropora	lokani		VU	decreasing
Acropora	loveli		VU	decreasing
Acropora	microclados		VU	decreasing
Acropora	palmerae		VU	decreasing
Acropora	paniculata		VU	decreasing
Acropora	pharaonis		VU	decreasing
Acropora	polystoma		VU	decreasing
Acropora	retusa		VU	decreasing
Acropora	solitaryensis		VU	decreasing
Acropora	speciosa		VU	decreasing
Acropora	spicifera		VU	decreasing
Acropora	vaughani		VU	decreasing
Acropora	verweyi		VU	decreasing

Genus	Species	Common names (Eng)	Red List status	Population trend
Alveopora	allingi		VU	unknown
Alveopora	fenestrata		VU	unknown
Alveopora	marionensis		VU	unknown
Alveopora	verrilliana		VU	unknown
Anacropora	matthai		VU	decreasing
Anacropora	puertogalerae		VU	decreasing
Astreopora	cucullata		VU	decreasing
Barabattoia	laddi		VU	decreasing
Catalaphyllia	jardinei		VU	unknown
Caulastrea	curvata		VU	decreasing
Cyphastrea	agassizi		VU	decreasing
Cyphastrea	ocellina		VU	decreasing
Euphyllia	cristata		VU	stable
Favia	rosaria		VU	decreasing
Galaxea	astreata		VU	unknown
Goniastrea	ramosa		VU	decreasing
Isopora	crateriformis		VU	decreasing
Isopora	cuneata		VU	decreasing
Leptoria	irregularis		VU	decreasing
Leptoseris	incrustans		VU	unknown
Leptoseris	yabei		VU	unknown
Lobophyllia	diminuta		VU	unknown
Montastrea	multipunctata		VU	decreasing
Montastrea	salebrosa		VU	decreasing
Montipora	altasepta		VU	decreasing
Montipora	angulata		VU	decreasing
Montipora	australiensis		VU	decreasing
Montipora	calcareo		VU	decreasing
Montipora	caliculata		VU	decreasing
Montipora	capricornis		VU	decreasing
Montipora	cebuensis		VU	decreasing
Montipora	corbettensis		VU	decreasing
Montipora	crassituberculata		VU	decreasing
Montipora	lobulata		VU	decreasing
Montipora	samarensis		VU	decreasing
Pachyseris	rugosa		VU	unknown
Pavona	bipartita		VU	unknown
Pavona	cactus		VU	unknown
Pavona	venosa		VU	unknown
Pectinia	alcicornis		VU	unknown
Physogyra	lichtensteini		VU	unknown
Pocillopora	elegans		VU	unknown
Porites	attenuata		VU	unknown
Porites	horizontalata		VU	unknown
Porites	nigrescens		VU	unknown
Seriatopora	aculeata		VU	unknown
Symphyllia	hassi		VU	unknown
Tridacna	Derasa	Southern giant clam	VU	unknown

Genus	Species	Common names (Eng)	Red List status	Population trend
Turbinaria	heronensis		VU	unknown
Turbinaria	mesenterina		VU	unknown
Turbinaria	patula		VU	unknown
Turbinaria	peltata		VU	unknown
Turbinaria	reniformis		VU	unknown
Turbinaria	stellulata		VU	unknown