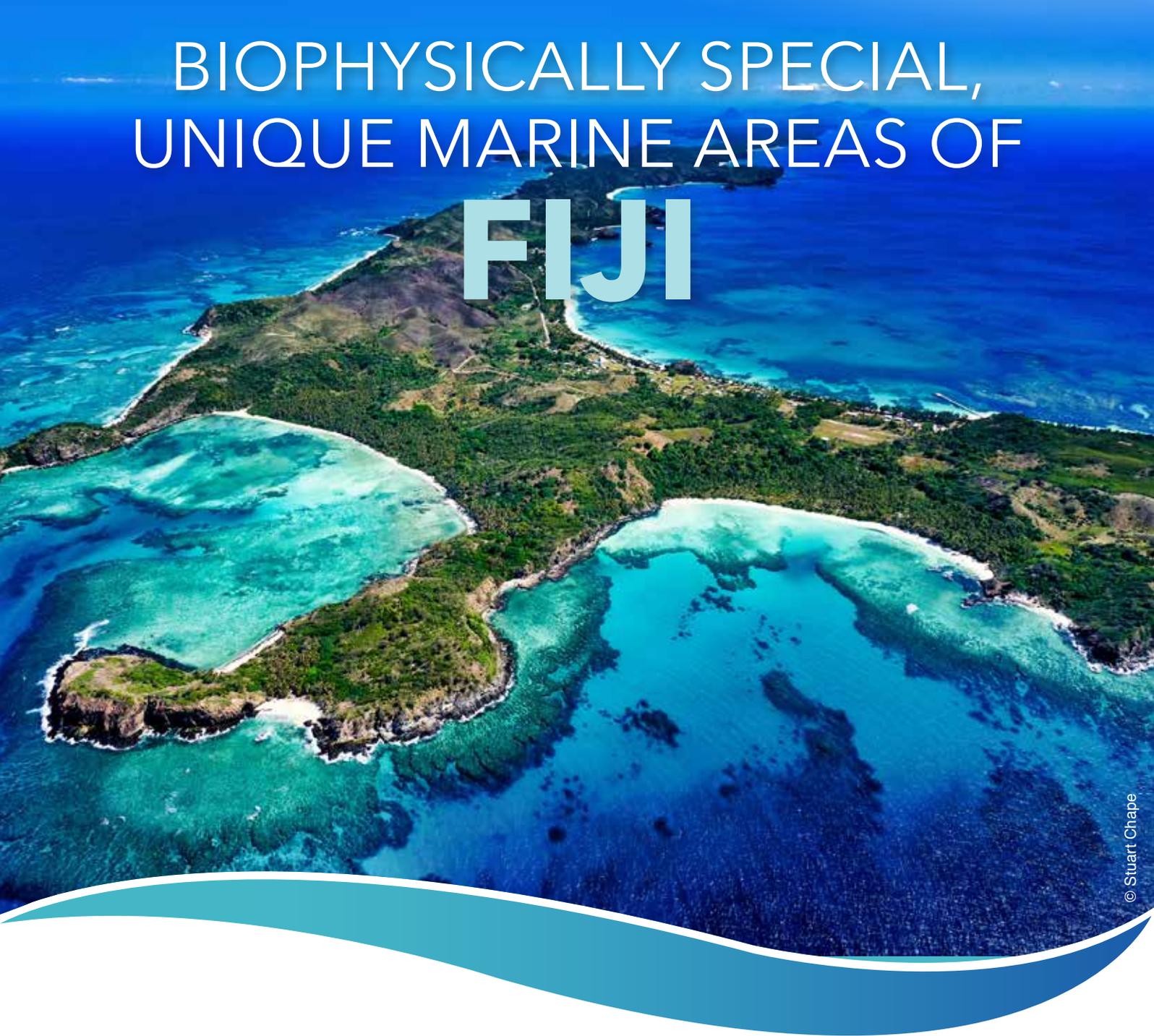
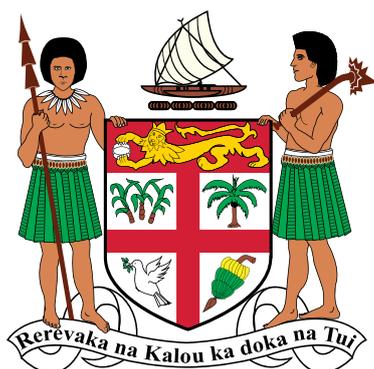




BIOPHYSICALLY SPECIAL, UNIQUE MARINE AREAS OF FIJI



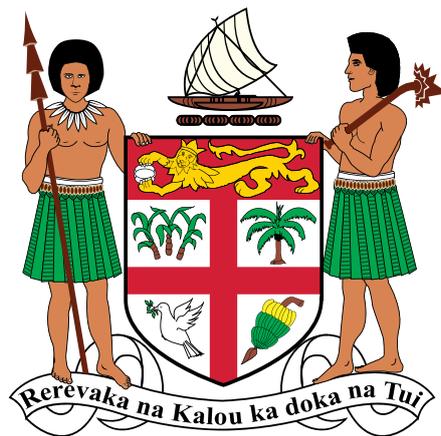
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Marine and Coastal Biodiversity Management
in Pacific Island Countries



BIOPHYSICALLY SPECIAL, UNIQUE MARINE AREAS OF FIJI





EFFECTIVE MANAGEMENT



Marine and coastal ecosystems of the Pacific Ocean provide benefits for all people in and beyond the region. To better understand and improve the effective management of these values on the ground, Pacific Island Countries are increasingly building institutional and personal capacities for Blue Planning.

But there is no need to reinvent the wheel, when learning from experiences of centuries of traditional management in Pacific Island Countries. Coupled with scientific approaches these experiences can strengthen effective management of the region's rich natural capital, if lessons learnt are shared.

The MACBIO project collaborates with national and regional stakeholders towards documenting effective approaches to sustainable marine resource management and conservation. The project encourages and supports stakeholders to share tried and tested concepts and instruments more widely throughout partner countries and the Oceania region.

This report outlines the process undertaken to define and describe the special, unique marine areas of Fiji. These special, unique marine areas provide an important input to decisions about, for example, permits, licences, EIAs and where to place different types of marine protected areas, Locally-Managed Marine Area and tabu sites in Fiji.

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MARINE ECOSYSTEM
SERVICE VALUATION

MARINE SPATIAL PLANNING

EFFECTIVE MANAGEMENT





BIOPHYSICALLY SPECIAL, UNIQUE MARINE AREAS OF FIJI

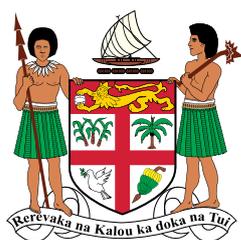
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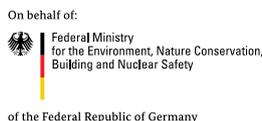
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CONTENTS

Acknowledgements	iv
Acronyms	vi
Executive Summary	1
1. Introduction	3
1.1 Background	3
1.2 Report Structure	4
1.3 Previous work	4
2. Methodology	7
2.1 Marine prioritisation expert workshop 2016	7
2.2 Assessment and priority rating of sites	8
3. Summary results – Fiji’s Special, Unique Marine Areas (SUMAs)	11
4. Detailed results and site descriptions	21
4.1 Yasawa Islands	21
4.2 Mamanuca Islands	28
4.3 South Viti Levu	39
4.4 North Viti Levu	49
4.5 West Viti Levu	61
4.6 East Viti Levu	73
4.7 Vatu-i-Ra Passage	86
4.8 Lomaiviti	92
4.9 North Vanua Levu	105
4.10 South Vanua Levu	110
4.11 Taveuni and the Ringgold Islands	118
4.12 Lau	126
4.13 Remote Offshore Islands	150
4.14 Deep Water (Open Ocean)	154
5. Discussion	191
5.1 Summary of sites by geographic cluster	192
5.2 Prioritisation by geographic cluster	193
6. References	195
7. Appendices	205

ACRONYMS

CBD	Convention on Biological Diversity
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS	Convention on Migratory Species
EBSA	Ecologically or Biologically Significant Marine Area
EPS	Endangered and Protected Species Act
FIME	Fiji Islands Marine Ecoregion
FLMMA	Fiji Locally-Managed Marine Area network
GIS	Geographic Information Systems
IBA	Important Bird Areas
IUCN	International Union for the Conservation of Nature
KBA	Key Biodiversity Area
LMMA	Locally-Managed Marine Area
MACBIO	Marine and Coastal Biodiversity Management in Pacific Island Countries
MES	Mamanuca Environment Society
MMA	Marine Managed Area
MoE	Ministry of Environment (previously Department of Environment)
MoF	Ministry of Fisheries (previously Department of Fisheries)
MPA	Marine Protected Area
NES	National Environment Strategy
NGO	Non-Government Organisation
NOAA	National Oceanic and Atmospheric Administration
SCBD	Secretariat of the Convention on Biological Diversity
USP	University of the South Pacific
WCS	Wildlife Conservation Society
WWF	World Wide Fund for Nature

EXECUTIVE SUMMARY

Fiji is committed to, and is embarking upon, a process to significantly increase the number and coverage of Marine Protected Areas (MPAs) within the country.

To help deliver on this commitment, the Marine Working Group of the Fiji national Protected Area Committee (PAC), established under the Environmental Management Act 2005, requested a review of previous efforts to describe marine priority sites for Fiji. To this end, the then Department of Environment (now Ministry of Environment) and the then Ministry of Fisheries and Forests (now Ministry of Fisheries) convened an expert workshop on the 19th and 20th July 2016. The Marine and Coastal Biodiversity Management in Pacific Island Countries (MACBIO) Project¹ and the Wildlife Conservation Society (WCS) supported the workshop.

The objectives of the workshop were to review previous efforts to identify marine priority sites and prepare a report, with maps, identifying updated Special, Unique Marine Areas (SUMAs) for Fiji.

Prior to the workshop, participants were provided with a range of resource material including, reports and maps from the earlier prioritisation studies. During the workshop additional information was made available, largely maps and GIS with new biophysical, spatial data. On the first day, participants were split into regional groups to review, amend and, in some cases, add new site descriptions to the earlier work.

On the second day, participants were asked to rate each site based on the following criteria:

- Amount, detail, and nature of biological justification
- Geographic explicitness
- Information sources
- National or international obligations

A technical expert, who participated in the workshop, and who was familiar with a range of marine environments across the Fiji Islands was engaged to review and compile the information gathered at the expert workshop. Post workshop research was also conducted, through one-on-one interviews and additional mini-workshops. This information, together with the workshop has been amalgamated into this report. In total, 98 inshore and offshore Special, Unique Marine Areas (SUMAs) were identified.

Site scores range from as low as 5 to as high as 12 (highest possible score). Both high and low scores are useful for management; high-scoring sites can be prioritised with confidence, while lower-scoring sites can be highlighted for needing more research or requiring protection for the purposes of ecosystem recovery, or even restoration efforts. Future scoring systems may take into account levels of human use or impact, as this affects the intrinsic ecological value of a habitat, assemblage, population or ecosystem. The identification and scoring of special, unique marine areas can guide the next steps in creating a network of marine protected areas, future marine spatial planning, and also inform other management measures (e.g. permit or licencing decisions) or environmental impact assessments (EIAs) that may be relevant to these locations.

¹ The MACBIO project is funded by the German Federal Ministry for Environment, Nature Conservation and Nuclear Safety (BMU) through its International Klimat Initiative (IKI). It is being implemented by the German Agency for International Cooperation (GIZ) in close collaboration with the Secretariat of the Pacific Regional Environment Programme (SPREP) and with technical support from the International Union for Conservation of Nature (IUCN).



1. INTRODUCTION

1.1 BACKGROUND

Fiji is committed to, and is embarking upon, a process to significantly increase the number and coverage of Marine Protected Areas (MPAs) within the country.

To help deliver on this commitment, the Marine Working Group of the Fiji national Protected Area Committee (PAC), established under the Environmental Management Act 2005, requested a review of previous efforts to describe marine priority sites for Fiji.

To contribute to this review, the Government of Fiji, through the then Department of Environment (now Ministry of Environment) and the then Ministry of Fisheries and Forests (now Ministry of Fisheries), convened an expert workshop on the 19th and 20th July 2016. The Marine and Coastal Biodiversity Management in Pacific Island Countries (MACBIO) project² and the Wildlife Conservation Society (WCS) supported the workshop.

The objectives of the workshop were to:

- Review and update (where necessary) previous marine priority sites identified in the National Environment Strategy (1993), the 2003 Setting Priorities for Marine Conservation in the Fiji Islands Marine Ecoregion (FIME) report (Nair et al., 2003), PAC marine ecological gap analysis (Jupiter et al., 2011), Ecologically or Biologically Significant Marine Areas (EBSAs) information (SCBD, 2014), and other available information including references, data and reports to fill critical gaps
- Develop spatial layers for updated marine priority sites
- Map updated marine priority sites for Fiji

The report should be used as a reference tool to investigate site-specific information when local or national-level decisions, policies, plans or analyses refer to marine places. Information relating to each site is specifically intended to inform the following management responses:

- Permitting and licencing decisions and conditions
- Environmental Impact Assessments
- National and local development planning decisions
- Decisions by communities and various levels of government about where to locate marine protected/managed areas³

The report will help the Government of Fiji meet its commitment to the Convention on Biological Diversity (CBD), Aichi Target 11, which states:

‘By 2020, at least 17 per cent of terrestrial and inland water areas and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscape and seascape’.

As well, in 2005 and later in 2014, at the Small Island Developing States (SIDS) meetings, the Fiji Government further committed that by 2020:

‘at least 30% of Fijis inshore (iqoliqoli) & offshore marine areas will have come under a comprehensive, ecologically, representative networks of marine protected areas (MPAs), which are effectively managed and financed’.

This commitment is now also embedded into Fiji’s Green Growth Framework (2014) and the National Development Strategy (2017).

² The MACBIO project is funded by the German Federal Ministry for Environment, Nature Conservation and Nuclear Safety (BMUB) through its International Klimat Initiative (IKI). It is being implemented by the German Agency for International Cooperation (GIZ) in close collaboration with the Secretariat of the Pacific Regional Environment Programme (SPREP) and with technical support from the International Union for Conservation of Nature (IUCN).

³ For the purposes of this report Marine Protected Areas (MPAs) and Marine Managed Areas may be used interchangeably. The definition of MPAs is in accordance with the IUCN definition.

This report will also prove useful should the Government of Fiji move towards Marine Spatial Planning as indicated in their United Nations Ocean Conference Voluntary Commitment in 2017.

‘Develop a legally recognized multiple-use marine spatial plan for the entirety of its ocean, including an ecologically representative network of marine protected areas (OceanAction #19904, UN Oceans Conference, 2017)’.

1.2 REPORT STRUCTURE

The report firstly provides background on the previous work that has been undertaken to identify priority marine sites in Fiji. Secondly, the methods used to compile this information are described, as well as guidelines as to how best to use this report. In the Results section, the Special, Unique Marine Area (SUMA) descriptions are provided within broad geographical groupings. Overarching information, applying to sites within a geographical range, is given at the start of each group of sites. Information about all the Special, Unique Marine Areas (SUMAs) is summarised and the sites are ranked in the Discussion.

1.3 PREVIOUS WORK

The workshop drew on the results of previous marine prioritisation processes. These prioritisation processes are briefly outlined below.

1.3.1 NATIONAL ENVIRONMENT STRATEGY (1993)

Fiji’s National Environment Strategy (NES, 1993) drew up a list of 140 Sites of National Significance, proposing that a formal legislative process be enacted to give them greater protection from destructive development. These sites are of biological, ecological, geological, recreational and geomorphological and/or landscape interest. A number of these sites were marine sites. While this analysis is over 20 years old and is not a complete register of sites, the report provided an initial identification of priority conservation sites for Fiji. The Sites of National Significance that were also identified as SUMAs in this report are referred to in the respective SUMA description with the code NES.

1.3.2 SETTING PRIORITIES FOR MARINE CONSERVATION IN THE FIJI ISLANDS MARINE ECOREGION (FIME)

In 2003, the World Wide Fund for Nature (WWF) conducted a marine biodiversity priorities workshop (Nair et al., 2003). This expertise-based process resulted in the identification of 35 priority conservation areas, which captured the full range of marine biodiversity, species, and communities that makes the Fiji Islands Marine Ecoregion (FIME) unique. The report stated that if these areas were conserved, it would assure the health and integrity of Fiji’s marine environment.

The report identified 35 priority conservation areas: Five areas of global significance, based on their uniqueness, endemism and high levels of biodiversity, and/or containing attributes critical to the life stages of threatened species; 15 areas of national significance; and, and 15 of sub-regional (sub-national) significance. The report identified that globally significant priority conservation areas contained more diverse range of significant attributes than national and sub-national priority conservation areas.

An additional 125 taxonomic priority areas were also defined as important for:

- Particular groups of taxa
- Species of concern
- Species with particular management requirements (e.g. vulnerable due to life histories or overharvesting)
- Feeding
- Breeding
- Nesting
- Seasonal migration
- Ecological processes

- Representativeness of habitats or community types
- Species richness
- Unique physical habitats and/or
- Unique or endemic species assemblages.

1.3.3 FILLING THE GAPS: IDENTIFYING CANDIDATE SITES TO EXPAND FIJI'S NATIONAL PROTECTED AREA NETWORK

In 2010, members of the Protected Area Committee (PAC), with support from WCS, convened a gap analysis workshop with Fiji provincial offices under the CBD Programme of Work on Protected Areas (PoWPA). This workshop aimed to identify candidate sites within each province which would satisfy national, and provincial, biodiversity conservation and/or resource management objectives if protected and managed.

Criteria used to identify marine priority areas included:

- Endemic fish species
- Important bird areas identified by existence of:
- Globally threatened species
- Restricted-range species and/or
- Biome-restricted species .

Priority habitat connectivity areas were identified by:

- Habitat intactness
- Habitat complexity
- Hydrology (for terrestrial sites) and/or
- Sensitivity to erosion (for terrestrial sites and coastal marine areas).

The workshop, amongst other things, identified gaps in priorities for marine sites that required protection. From the workshop, 48 wetland, mangrove, fringing reef, non-fringing reef and other benthic sites of national and international significance were identified (Jupiter et al., 2011).

1.3.4 ECOLOGICALLY OR BIOLOGICALLY SIGNIFICANT MARINE AREAS (EBSAS)

In 2010, at its tenth meeting, the Conference of Parties to the CBD (including Fiji) adopted a new 10-year Strategic Plan for Biodiversity, including 20 "Aichi Biodiversity Targets". Target 11 of the CBD Aichi Targets focuses, in part, on protecting at least 10% of marine and coastal biodiversity by 2020. In 2011, the Department of Environment hosted a workshop to identify regional EBSAs under the CBD, and, there, participants described the areas of the oceans that they considered the most crucial to the healthy functioning of the global marine ecosystem (SCBD, 2014).

The EBSA process used the following criteria (SCBD, 2014) to identify areas that are important to the functioning of marine ecosystems:

- Uniqueness and rarity
- Special importance for life-history stages of species
- Importance for threatened, endangered or declining species and/or habitats
- Vulnerability, fragility, sensitivity and slow recovery
- Biological productivity
- Biological diversity and/or
- Naturalness,

The publication *Ecologically or Biologically Significant Marine Areas (EBSAs) Special places in the World's Oceans. Volume 1: Western South Pacific Region* describes areas identified as EBSAs during the Western South Pacific Regional Workshop held for this purpose in Nadi, Fiji, 22–25 November 2011. The workshop identified 26 EBSAs in the Western South Pacific Regions, five of which include marine areas lying partly or wholly within Fijian seas.



2. METHODOLOGY

2.1 MARINE PRIORITISATION EXPERT WORKSHOP 2016

On 19–20 July 2016, the then-Department of Environment (now Ministry of Environment) and then-Ministry of Fisheries and Forests (now Ministry of Fisheries) hosted a technical workshop with national marine experts in Suva to identify special and/or unique marine areas (SUMAs) in Fiji (see Appendix A for Agenda and Appendix B. Participants List for participant list). The workshop was facilitated by the Marine Working Group of the Fiji PAC together with WCS and the MACBIO⁴ Project.

Prior to the workshop, participants were provided with a range of resource material including reports and maps from the earlier prioritisation studies as well as a wide variety of maps (hardcopy and on GIS) showing a range of biological and geological features including:

- Environmental parameters (e.g. sea surface temperature, depth, productivity, salinity)
- Geomorphology (e.g. continental shelf, abyssal plains, slope, seamounts)
- Probability maps of high biodiversity (e.g. benthic/demersal species richness)
- Ocean uses (e.g. shipping, fishing, underwater cables)

During the workshop, experts were briefed about the previous reports, maps and the selection criteria for rating each site.

Participants were then split into regional groups to review, amend and, in some cases, add new site descriptions to those earlier reports. Each group included a facilitator and a rapporteur as well as a Geographic Information Systems (GIS) expert to enable each group to pull up the information they needed. Maps and data were available in hardcopy and at each workstation on GIS with large screens. The list of hardcopy maps and spatial data available to the workshop participants is listed in Appendix D. The group work considered inshore and offshore marine environments.

Each group was tasked with using all the information on hand, plus any personal knowledge, to review and amend existing sites and add new sites. Site boundaries were drawn by outlining the key features being described for each area. Large hardcopy maps showing general habitat, geomorphology and bathymetry were provided to the working groups to help them complete this task. Some groups also chose to use QGIS 2.8 software⁵ to draw maps of the sites described during the expert discussions.

A technical expert familiar with a range of marine environments across the Fiji Islands (Ms Helen Sykes) was engaged to review and compile the information gathered at the expert workshop. Post workshop research and interviews were also conducted to gather additional relevant information and built into a first draft of this report. Before finalising, the draft report was circulated for input to the workshop participants. The report was revised on this basis and, in turn, examined in more detail by an expert review panel, including members of Marine Working Group (MWG) of the PAC in early 2017.

During the writing of this report, three new marine surveys were completed and one new report had been published for the Lau group of Islands. To take advantage of this information, a review of the prioritisation and ranking of the sites in the Lau group of islands was conducted using three comparable measures (number of habitats, fish species diversity and mean coral cover). This objective process, coupled with the expert advice from the workshop, was used to update the Lau island group site list and scores.

The final 'sites', totalling 98, became the Special, Unique Marine Areas (SUMAs) for Fiji, found in this report.

⁴ Marine and Coastal Biodiversity Management in Pacific Island Countries (MACBIO)

⁵ <http://qgis.org/en/site/>

2.2 ASSESSMENT AND PRIORITY RATING OF SITES

On the second day of the workshop, participants were asked to rate each site. The rating system was based upon methods used for the Great Barrier Reef, Australia but tailored to Fiji (Fernandes et al., 2010). The following criteria were applied:

- a. **Amount, detail and nature of justification** (including whether the area is likely to support rare, vulnerable or unusual habitats or species, threatened species, endemic species, important life stages of key species, or physically or biologically outstanding attributes e.g. unique geomorphology, high species diversity or high productivity). It includes whether any special, unique marine area includes any existing Important Bird Areas (IBAs), Fiji National Environment Strategy (NES) Sites of National Significance or Fiji Islands Marine Ecoregion (FIME) Sites, Ecologically or Biologically Significant Marine Areas (EBSA's) (Section 3.2).
- b. **Geographic explicitness** – Geographic explicitness– how well-defined and well-justified the boundaries of the site are. All sites identified exclude land above the high water mark. For example, if a site demarcates a ring around a fringing reef of an island (e.g. Site LV8 Gau Island), then the special, unique marine area indicated includes the entire marine environment within that ring
- c. **Information source(s)** – how reliable and verifiable the information source(s) are, and how many of them are available. Information is more likely to be correct if it can be cross-referenced and triangulated. This is possible if multiple information sources are used, and if the information source(s) are reliable and verifiable. All the sites will have at least one, locally specific, expert source, namely, one of the workshop participants; some have more expert sources. Other sources will include previous marine prioritization work described above. Aside from this, for the offshore, deeper water sites it is well understood that data, globally, are sparse and thus, for these sites, generic sources may be considered to count as sources in this criterion. For globally well studied habitats, such as coral reefs or mangroves, for which there are literally thousands of global “sources”, only locally specific sources contribute to this criterion.
- d. **National or international obligations** – are the areas associated with species or habitats for which Fiji has national or international obligations (e.g. under Conventions) or national obligations (e.g. under law). Species-specific information for each site was cross-referenced against the: Endangered and Protected Species Act 2002 (EPS 2002), Endangered and Protected Species Amendment Act 2017 (EPS 2017), Convention on International Trade of Flora and Fauna (CITES), International Union for Conservation Nature (IUCN) Red List and Convention on Migratory Species (CMS). The full species list for Fiji, cross referenced against these obligations is attached as Appendix 10.1

Experts then rated proposed special, unique sites as scoring relatively low (0–1), medium (2) or high (3) against each of the four criteria. With four criteria, the highest score possible is 12.

Nearshore/coastal systems (Table 1) were scored relative to each other, as were deep-water (open ocean) sites (Table 2). This was to avoid bias towards nearshore/coastal sites because there is significantly more information available about the values of these sites than offshore areas. This means that the scores for inshore and deep-water (open ocean) special, unique areas are not comparable.

Additional methodology notes

Boundaries of nearshore/coastal SUMAs which contain land, including whole islands, have an inshore boundary of the high water mark. The intrinsic connection between terrestrial and marine ecosystems was described for individual coastal sites but terrestrial values did not form part of the scoring system. Smaller sub-sites were demarcated to highlight particularly noteworthy areas within some SUMAs.

Species listed on IUCN Red List (www.iucnredlist.org) as either, Least Concern (LC), Data Deficient (DD), or Not Evaluated (NE), did not receive a score under the criteria of International / National Obligations.

Cheloniidae spp. have been recorded under the criteria National/International obligations and a scoring of 1 has been provided for all sites that have listings of marine turtles, but do not include a reference to the specific species. In the case of the Leatherback turtle, these have been identified specifically.

Similarly, *Rhizophora* spp. and *Bruguiera gymnorhiza* have been identified as having National/International obligations for Fiji and a scoring of 2 has been provided for all sites that include mangroves but do not include a reference to the species found.

TABLE 1: Rating criteria for nearshore/coastal sites

Criteria	Level	Rating
Biophysical justification	One or two reasons (e.g. presence of organisms) justifying the site, with generic/site information sources	1
	Three or four reasons justifying the site, with generic/site information sources	2
	Five or more reasons justifying the site, with generic/ site-specific information sources	3
Geographic explicitness	Boundaries loosely defined	1
	Boundaries broadly match features	2
	Boundaries exactly match biophysical features	3
Number and type of information sources	Mainly anecdotal and inferred, or a single report	1
	More than one good report and expert advice available	2
	At least one peer reviewed paper and at least one good report and expert advice	3
International / National obligations	Zero species or habitats	0
	One species or habitat	1
	Two to three species or habitats	2
	Four or more species or habitats	3

TABLE 2: Rating criteria for deep-water/open ocean sites

Criteria	Level	Rating
Biophysical justification	One or two reasons (e.g. presence of organisms) justifying the site, with generic/site information sources	1
	Three or four reasons justifying the site, with generic/site information sources	2
	Five or more reasons justifying the site, with generic/ site-specific information sources	3
Geographic explicitness	Single feature	1
	Two to three features in a connected group	2
	More than three features in a connected group	3
Number and type of information sources	Mainly anecdotal and inferred, or a single report	1
	More than one good report and expert advice available	2
	At least one peer reviewed paper and at least one good report and expert advice	3
International / National obligations	Zero species or habitats	0
	One species or habitat	1
	Two to three species or habitats	2
	Four or more species or habitats	3

Overall the site scores range from as low as 5 to the highest possible score of 12. Both high and low scores are useful for management; high-scoring sites can be prioritised with confidence, while lower-scoring sites can be highlighted for needing more research or requiring protection for the purposes of ecosystem recovery, or even restoration efforts. Future scoring systems may take into account levels of human use or impact, as this affects the intrinsic ecological value of a habitat, assemblage, population or ecosystem. The identification and scoring of special, unique marine areas can guide the next steps in creating a network of marine protected areas, future marine spatial planning, and also inform other management measures (e.g. permit or licencing decisions) or environmental impact assessments (EIAs) that may be relevant to these locations.

How to use this report

The report is organised into geographic clusters. Each geographic cluster has been provided with a cluster code which is then coupled with a unique code for each site (Table 3).

TABLE 3: Geographic clusters of sites and the “cluster” code

Geographic cluster	Site code
Yasawa Islands	Y
Mamanuca Islands	M
South Viti Levu (Beqa, Vatulele, Kadavu)	SV
North Viti Levu	NVT
West Viti Levu	WVT
East Viti Levu	EVT
Vatu-i-Ra	VIR
Lomaiviti	LV
North Vanua Levu	NVN
South Vanua Levu	SVN
Taveuni and Ringgold Islands	T
Lau	L
Remote Offshore (Rotuma and Conway)	RO
Deep Water (Open Ocean) North of Fiji	ON
Deep Water (Open Ocean) West of Fiji	OW
Deep Water (Open Ocean) South of Fiji	OS
Deep Water (Open Ocean) East of Fiji	OE

For each cluster, the following information is provided for each site:

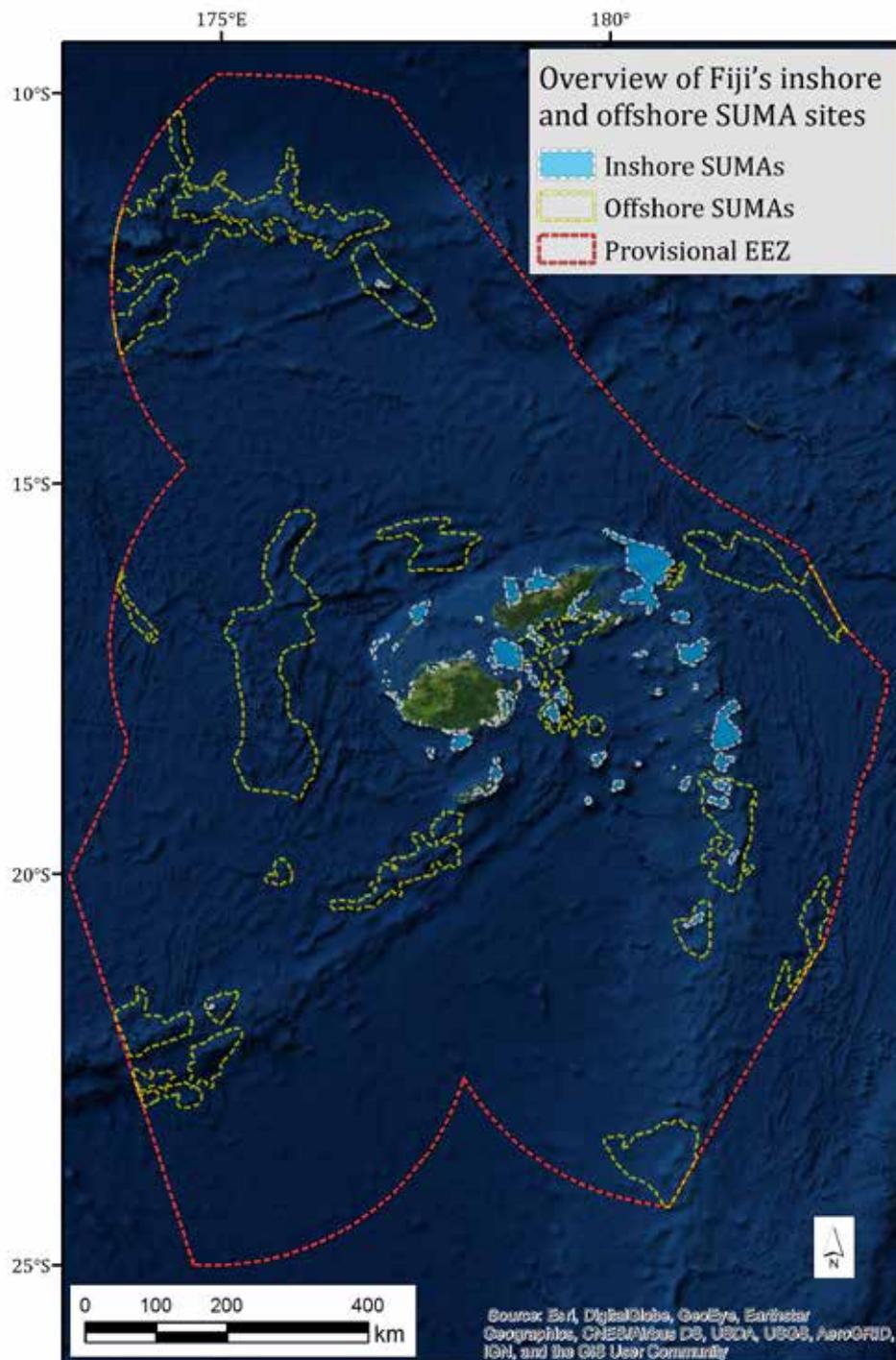
- An overall description of the biophysical characteristics of the area
- An individual site descriptions
- Details of the rating of each site
- Sources of information to support the descriptions
- Links to other prioritisation efforts.

A geographic boundary for each site was created in Arc GIS from the minimum bounding geometry enclosing each site. The diagonal coordinates (latitudes/longitudes) generated from this process were used to identify the geographic boundaries (geographic coordinates) for the special, unique marine areas of Fiji.

The maps prepared for this reports should be seen as a guide only, and readers are referred to the detailed description in each site, for additional information regarding the features identified as special and/or unique.

3. SUMMARY RESULTS – FIJI’S SPECIAL, UNIQUE MARINE AREAS (SUMAS)

The following tables list the entire set of Fiji’s Special, Unique Marine Areas (SUMAs) and the rating each site received. The tables also provide the reference code used in this report and the reference codes from previous reports, where relevant. Every site is described in more detail in the body of the report.



MAP 1: MAP OF INSHORE AND OFFSHORE SPECIAL, UNIQUE MARINE AREAS (SUMAS)

TABLE 4: Yasawa Islands

SUMA codes	Linked report codes	Name	Biophysical Justification	Rating
Y1	EBSA 14 FIME IE13 FIME CF8 FIME CR9	Yasawa Island	Connectivity between fringing and barrier reefs, seagrass beds, hawksbill and green turtles, grouper aggregations, great hammerhead sharks.	10
Y2	FIME SSC6	South Naviti and small islands	Reef passages, offshore and fringing reefs, bumphead parrot-fish, manta rays, three species of turtles, bottlenose dolphin.	11
Y3	New Site	Viwa Island and barrier reef	Section of large barrier reef, small island with large fringing reef, shallow lagoon, channels, pelagic species, turtle nesting, humphead wrasse.	7
Y4	NES 21	White Rock	Five species of shark, nesting colony of wedge-tailed shearwater.	9

TABLE 5: Mamanuca Islands

SUMA codes	Linked report codes	Name	Biophysical Justification	Rating
M1	NES 25	Kadomo Island	Seabird nesting site (wedge-tailed shearwater).	7
M2	New Site	Tavua Island	Seagrass beds and green turtle foraging area.	5
M3	FIME CT19	Monuriki Island	Seabird and turtle nesting site.	9
M4	FIME CF6	Supermarket Reef, Mana Island	Deep patch reef, white-tip, black-tip and grey reef sharks.	8
M5	NES 16	Malamala Island	Turtle nesting site.	5
M6	New Site	Malolo-Levu Island	Seagrass beds, inland mangrove area, and humphead wrasse.	8
M7	FIME CF5 FIME CR9 FIME SSC7	Navula-Malolo reef including Tavarua and Namotu Islands	Barrier reef with small islands and productive passages, green and loggerhead turtles, whale sharks, sunfish, manta rays, eagle rays, spinner dolphins and pilot whales.	11

TABLE 6: South Viti Levu

SUMA codes	Linked report codes	Name	Biophysical Justification	Rating
SVT1	FIME CF3, FIME CR 11 FIME SSC12	Beqa Lagoon and Barrier reef	Circular sunken caldera barrier reef, passages, deep lagoons, patch reefs, fringing reefs, mangroves, seagrass, sharks, dolphins, whales, high reef fish, pelagic fish, invertebrate and coral diversity, turtle nesting.	12
SVT2	NES 88 NES 90 FIME CF3 FIME CR 11 FIME CT17	Vatulele Island	Endemic red prawns, 4 species of turtles, seabirds, pelagic fish, seagrass beds, edible sea grapes, and algae.	11
SVT3	EBSA 5, NES 80, 81 FIME CF1 FIME CR13 FIME IE09	Great and North Astrolabe reef	Barrier reef, pelagic fish, grouper aggregation site, whales, unique coral formations and nationally important seabird colony.	11
SVT4	EBSA 5 FIME CF2	South Kadavu reefs	Fringing reef and passages, manta rays, turtle nesting site, dolphins, whale migration and calving, eel spawning, pelagic fish, and climate change resistant corals.	11
SVT5	EBSA 5 FIME CT23	South Kadavu mangrove bays	Mangrove trees and associated fauna, juvenile habitat for many reef species.	9

TABLE 7: North Viti Levu

SUMA codes	Linked report codes	Name	Biophysical Justification	Rating
NVT1	New Site	Nanana-i-Ra Island and reefs	Fringing reef, turtle nesting site, and soft coral diversity.	9
NVT2	FIME CT6 FIME CF7 FIME SSC15 FIME E11	Tavua Peninsula	Mangroves, estuaries, mudflats, possible peat swamp, crustacean and mollusc productivity.	9
NVT3	FIME CT6 FIME CF7 FIME SSC15 FIME E11	Ba Delta	Mangroves, estuaries, mudflats, high fish diversity and crustacean and mollusc productivity.	11
NVT4	NES 19 NES 86	Dreketi and Saweni Mangroves and mudflats	Coastal and inland mangrove connectivity, mud crabs, mud lobsters, juvenile reef fish and shorebirds.	10
NVT5	New Site	Sabeto Delta Naisoso / Vulani Islands	Coastal mangroves and mudflats, river estuaries, seagrass, hammerhead sharks, blacktip reef sharks.	11
NVT6	NES 23	Nadi Bay Reefs	Patch reefs, tiger shark, whitetip shark and scalloped hammerhead sharks.	9
NVT7	New Site	South Denarau Mangroves	Coastal mangroves and mudflats, river estuaries, seagrass beds, juvenile tiger, hammerhead and blacktip reef sharks and endemic fish.	10

TABLE 8: West Viti Levu

SUMA codes	Linked report codes	Name	Biophysical Justification	Rating
WVT1	New Site	Momi Bay and passage	Mangroves, seagrass, tidal sand flats, seabirds, green turtles, sharks, spinner dolphins.	11
WVT2	NES 2 FIME CR10 FIME IE03	Natadola Bay	Fringing reef and seagrass beds, mangrove creek, spinner dolphins.	9
WVT3	NES 1 FIME CR10 FIME IE03	Yanuca Island, Cuvu	Fringing reef and reef flats.	7
WVT4	FIME CR10 FIME CT18 FIME IE03	Sigatoka Catchment	River estuary, sand dunes, sharks, shellfish, possible leatherback turtle nesting site.	10
WVT5	FIME CR10 FIME IE03	Sovi Bay	Fringing reef, turtle nesting site, dolphin resting area, and guitarfish.	10
WVT6	FIME CF3 FIME CR11	Serua mangroves and passages	Passages through fringing reefs, mangroves, seagrass, turtles, sharks, dolphins.	11
WVT7	FIME CR11 FIME CF3 FIME CT10 FIME CT25	Wainiyabia and Galoa shark corridor	Watershed connectivity, mangroves, seagrass, fringing reefs, patch reefs, reef fish, coral diversity, and shark conservation reserve.	10

TABLE 9: East Viti Levu

SUMA codes	Linked report codes	Name	Biophysical Justification	Rating
EVT1	EBSA 14	Daveta levu passage and islands	Channel, fringing reefs seagrass beds, turtle nesting, dolphins, eagle rays, bumphead parrotfish, humphead wrasse, 3 species of shark, high fish diversity.	10
EVT2	NES 37 FIME CT9 FIME IE06	Toberua and Mabualau Islands	Limestone islets, seabird and sea snake nesting site and black mangroves.	10
EVT3	EBSA 14 FIME CR12	Tailevu mangroves and mudflats	Mangroves, seagrass and algal beds, fringing and patch reefs, connectivity from river estuary to reef, migratory shorebirds and seabird nesting, endemic estuarine fish, grouper and rabbitfish spawning.	10
EVT4	FIME CT5	Rewa delta	Intact watershed, wetland, mangrove, seagrass connectivity, scalloped hammerhead and bull shark nurseries, seabirds.	12
EVT5	NES 45 FIME CT5 FIME CF4	Nukulau and Makuluva islands	Watershed, connectivity to reef, scalloped hammerhead sharks, possible turtle nesting site.	8
EVT6	NES 87 FIME CT20 FIME IE07	Suva mudflats	Shorebirds foraging grounds (<i>Tringa incana</i> , <i>Limosa lapponica</i>), invertebrate life, seagrass	9
EVT7	NES 38 FIME IE07	Suva barrier reef	Barrier reef, back reef, patch reef, and passage.	7
EVT8	New Site	Namuka Bay	Coastal mangroves patch reefs, passage, barrier reef connectivity, local marine protection and restored biodiversity.	10

TABLE 10: Vatu-i-Ra Passage

SUMA codes	Linked report codes	Name	Biophysical Justification	Rating
VIR1	IBA FJ05 IBA FJ17 NES 35 FIME CT11 FIME CR7 FIME CF20 FIME CF25	Vatu-i-Ra Island and reef	Small island, resident seabirds, turtle nesting site, barrier reef, fish abundance, and soft corals.	12
VIR2	IBA FJ17 FIME CR7 FIME CF20 FIME SSC1	Vatu-i-Ra passage	Deep channel, barrier and patch reefs, upwelling's, pinnacles, whales, dolphins, sharks, apex predators, turtles, seabirds, and high fish and coral diversity.	11
VIR3	EBSA 14	Moon Reef and Cakau Davui	Offshore pinnacle reefs, whales, and spinner dolphin resting and calving area.	12

TABLE 11: Lomaiviti

SUMA codes	Linked report codes	Name	Biophysical Justification	Rating
LV1	EBSA 14 FIME CR5 FIME CF22	Koro Island	Green turtles frequent the reefs, and hawksbill nest of the island.	8
LV2	EBSA 14 NES 83 FIME CR5 FIME CF20	Makogai Island	Turtle nesting, giant clam restoration project, grouper, sharks, whales, dolphins	12
LV3	EBSA 14 NES 85 FIME CR5 FIME CF20 FIME CF23	Wakaya Island	Fringing and barrier reef, channels, deep wall, high reef fish diversity, scalloped hammerheads, manta rays, and whales and dolphins migratory route.	12
LV4	EBSA 14 FIME CF20	Ovalau Island	Fringing reef, whales, and dolphins.	7
LV5	EBSA 14 NES 84 FIME CR5 FIME CF20	Cakau Momo seamount	Seamount, area of high biological productivity, whales, deep-water snapper, barracuda, and trevally.	12
LV6	EBSA 14 FIME CR5 FIME CF20	Batiki Island	Fringing reef with lagoon system, whales, and nesting site for Hawksbill turtle.	10
LV7	EBSA 14 FIME CR5 FIME CF20	Nairai Island	Barrier reef, lagoon system, whales, and turtles.	8
LV8	EBSA 14 NES 72 FIME CT4 FIME CR5 FIME CF20 FIME 21 FIME IE04	Gau Island	Barrier and fringing reef system, passages, whales, manta rays, turtles, sea snakes, shark breeding site, hard and soft coral diversity, and seabird nesting site including collared and Fiji petrels.	11

TABLE 12: North Vanua Levu

SUMA codes	Other Codes	Name	Biophysical Justification	Rating
NVN1	FIME CF27 FIME CR2 FIME CT3 FIME IE02 FIME IE08	Cakaulevu reef and Kia Island, Macuata	Habitat connectivity, barrier and patch reefs, passages, mangroves, bumphead parrotfish, grouper aggregations, hammerhead and bull sharks, turtles, and fish and coral diversity.	11
NVN2	FIME CF27 FIME CR2 FIME CT3 FIME IE02 FIME IE08	Cakaulevu reef, Bua	Habitat connectivity, barrier and patch reefs, passages, mangroves, bumphead parrotfish, grouper aggregations, turtles, and fish and coral diversity.	11
NVN3	FIME CF18	Yadua Island	Bays, fringing reefs, patch reefs, turtle nesting site, and reef fish diversity.	9

TABLE 13: South Vanua Levu

SUMA codes	Linked report codes	Name	Biophysical Justification	Rating
SVN1	FIME IE12	Natewa Bay	Extremely large and deep tidal bay, unique in Fiji, coastal mangroves, seagrass beds, sandflats, banks, patch reefs, dolphins, and whales.	10
SVN2	NES 51	Qaloqalo Salt Lake, Naweni	Salt lake, mud crabs and mangroves.	8
SVN3	FIME CT 21	Yanuyanu Island, Naweni	Saltwater lake and red prawns.	8
SVN4	EBSA 14 NES 58 NES 59 FIME CT12 FIME CR6, FIME CF20 FIME CF24 FIME SSC3	Kubulau and Namena	Diverse reef and deep water habitat, sea bird and turtle nesting, shark diversity and aggregation site, seabird nesting site, migratory route for leatherback turtles and whales.	12

TABLE 14: Taveuni and Ringgold Islands

SUMA codes	Linked report codes	Name	Biophysical Justification	Rating
T1	EBSA 22 NES 115 NES 137	Ringgold and Cikobia islands and reefs	Small islands, sunken caldera and atoll reefs Seabird nesting, coconut crabs, turtles, whales, bumphead parrotfish, and humphead wrasse.	11
T2	EBSA 22 FIME CR4 FIME CF26 FIME OP10 FIME SSC11	Somosomo Straits	Narrow Strait with high currents and patch reefs, 3 species of whale, sharks, soft corals, fish diversity, humphead wrasse, pelagic fish.	11
T3	EBSA 22 FIME CT8 FIME OP10	Bouma Heritage Park	Intact watershed to reef connectivity, fish with freshwater and marine stages in their lifecycle, and endemic freshwater gobies.	10
T4	NES 75, 62 IBA FJ 23	Wailagilala atoll and Cakau Gala	Two species of turtle, coconut crabs, endemic giant clams, seabird nesting, pelagic fish, humphead wrasse, sharks.	11

TABLE 15: Lau

SUMA codes	Linked report codes	Name	Biophysical Justification	Rating
L1	NES 69	Northwest Lau Group including subsites Nukutolu and Yacata and Kaibu Island	Turtles, coconut crabs, unique coastal vegetation, sharks, giant clams, humphead wrasse, lagoon, fore reef, fringing reef, reef flat.	9
L2	NES 73 NES 74 FIME CF17 FIME CR3 FIME CT24	Vanuabalavu Island and reefs with subsites Qilaqila Bay of Islands and Masomo Bay	High diversity of reef fish and corals, turtles, sharks, tuna, dolphins, seabirds, seamounts, inland lakes, endemic giant clams, spawning aggregation site.	10
L3	EBSA 5 NES 122 NES 124	Bukatatanoa and Oneata reefs with subsites Vanua Masi, Late Reefs, Bukatatanoa Reef, Oneata Island	Whale migration route, seabird nesting colony, sharks, giant grouper, spawning aggregation.	8
L4	EBSA 5 NES 64 FIME CF13	Moce Group – with subsites Karoni Island and reef, Cakau Lekaleka, Motu and Vau Reefs	Channel, lagoon, fore reef, reef flat, patch reefs, caves, dolphins, sharks, giant sweetlips, barracuda and groupers.	9
L5	EBSA 5 NES 121 NES 140 FIME CF16	Kabara and Vuaqava Islands	Seabirds, turtles, whale migration route, sharks, lagoon, fore reef, reef flat, inland mangrove lake, possibly unusual shellfish and algal species (unconfirmed).	8
L6	New site	Yagasa Group	Small island with barrier reef, seabird and turtle nesting, sharks and whale migratory route.	10
L7	EBSA 5 IBA 14 NES 66 FIME CF15	Fulaga and Ogea Islands and reefs	Limestone islands, extensive reef and lagoon system, seagrass, mangroves, spawning aggregation site, manta rays, turtles.	9
L8	New site	Matuku	Extensive reef and lagoon with mangroves, large and deep channels, steep drop-off.	7
L9	New Site	Ono-i-Lau Group	Barrier reefs, fringing reefs, patch reefs, channel, lagoon, humphead wrasse, and bumphead parrotfish.	9
L10	New site	Vatoa Group	Channel, lagoon, fore reef, fringing reef, patch reef, reef flat, eagle rays, manta rays, giant clam, green turtles, sharks.	9
L11	New site	Tuvuca	Channel, lagoon, fore reef, fringing reef, patch reef, reef flat, seagrass.	8
L12	New site	Cicia	Channel, lagoon, fore reef, fringing reef, patch reef, reef flat, seagrass.	7
L13	New site	Navatu	Lagoons, reef flats, patch reefs, fore reef, fringing reef, sharks, giant clams, and wrasses.	10
L14	New site	Moala Island including Cakova Passage, Keteira Bay	Barrier reef, multiple passages, deep lagoon, mangroves, grouper spawning sites.	9
L15	New site	Totoya	Barrier reef, channel, Lagoon, fore reef, patch reef, reef flat, sharks, parrotfish, jobfish and unicorn fish	9
L16	New site	Tavunasici	Turtles, sharks, wrasses, seabirds, coconut crabs, channel, lagoon, fore reef, patch reef, fringing reef, spur and grooves, caves	10

TABLE 16: Remote Offshore Islands

SUMA codes	Linked report codes	Name	Biophysical Justification	Rating
RO1	EBSA 13 NES 128 FIME CT16 FIME IE01 FIME OP1	Rotuma Island	Seagrass beds, turtle foraging and breeding grounds, blue coral, sharks, humphead wrasse, and seabirds.	11
RO2	New Site	Ceva-i-Ra (Conway Island)	Sandy cay surrounded by very deep water, isolated coral reef atoll, seabird nesting, whales, tuna.	10

TABLE 17: Deep Water / Open Ocean

SUMA codes	Linked report codes	Name	Biophysical Justification	Rating
North of Fiji				
ON1	EBSA 13	Fiji Plateau west trench & canyons	Migratory pelagic including, whales, dolphins, billfish, tuna, turtles, high probability of cold water corals and benthic species richness.	12
ON2	EBSA 13	Fiji Plateau ridge and canyons	Migratory pelagic including, whales, dolphins, billfish, tuna, turtles, high probability of cold water corals and high benthic species richness	12
ON3	EBSA 13	Seamounts	Migratory pelagic including, whales, dolphins, billfish, tuna, turtles, high probability of cold water corals and benthic species richness.	11
ON4	FIME OP1 EBSA 13	Rotuma archipelago	High marine species richness, sharks, sea cucumbers, humphead wrasse, bumphead parrot fish, turtle nesting, high probability of cold water corals, high benthic species richness	12
West of Fiji				
OW1	New Site	Western Rift Valley	Very productive tuna fishing grounds, probable deep water endemic species, probability of high pelagic species richness	8
OW2	FIME OP2	West Yasawa Plateau	Very productive tuna fishing grounds, hydrothermal vent, predicted deep water corals and high pelagic species diversity	9
OW3	New Site	Western Hydro-thermal vents	Predicted high benthic and pelagic species richness, very productive tuna fishing grounds high probability of cold water corals	9
OW4	FIME OP5	North Fiji Plateau	Predicted high benthic and pelagic species richness, very productive tuna fishing grounds high probability of cold water corals and sharks.	8

TABLE 17: Deep Water / Open Ocean (cont.)

SUMA codes	Linked report codes	Name	Biophysical Justification	Rating
South of Fiji				
OS1	New Site	Southwest Seamount	Predicted high benthic and pelagic species richness, high probability of cold water corals, very productive tuna fishing grounds and possible tuna aggregating area.	8
OS2	FIME OP3 EBSA 5	South Kadavu Ridge	Marlin, sailfish, sharks, other pelagic fish, whale sharks, whales, high probability of deep water corals, predicted high benthic and pelagic species richness.	11
OS3	New Site	Southwest Ridge	Tuna, predicted high benthic and pelagic species richness, high probability of cold water corals.	7
OS4	New Site	Southwest Trench / Conway Reef	High tuna productivity, predicted high pelagic and benthic species richness, probable cold water corals.	8
OS5	New Site	Ceva-i-Ra Reef / Conway Island	Predicted high benthic and pelagic species richness, high probability of cold water corals, tuna and seabird nesting site.	10
East of Fiji				
OE1	FIME OP 9 FIME OP 10 FIME OP 11 EBSA 14 EBSA 22	Central Viti Canyons	Strong habitat connectivity, whales, dolphins, sharks, turtles, seabirds, soft corals, predicted high benthic and pelagic species richness, high probability of cold water corals.	11
OE2	FIME OP 4_B EBSA 22	Nanuku Canyon	Predicted high benthic and pelagic species richness, high probability of cold water corals, whales, turtles, seabirds.	9
OE3	FIME OP 14	Northeast Rift Valley	Predicted high benthic and pelagic species richness, high probability of cold water corals, upwelling, high biodiversity, whales, and turtles.	11
OE4	FIME OP 13 EBSA 5	Central Lau Ridge	Predicted high benthic and pelagic species richness, high probability of cold water corals, upwelling, high biodiversity, deep sea squid and pelagic fish, whales, turtles, seabirds.	11
OE5	FIME OP 12 EBSA 5	Central Lau Seamount	Predicted high benthic and pelagic species richness, high probability of cold water corals, upwelling, high biodiversity, deep sea squid and pelagic fish, whales, dolphins, turtles, seabirds.	10
OE6	FIME OP 6_A	Southeast Lau Seamounts	Seamounts, upwelling, predicted high pelagic species richness.	8
OE7	FIME OP 6_B EBSA 5	Minerva Reef	Seamount to reef connectivity, potentially high biodiversity, likely to have high diversity of benthic species, and a strong likelihood of deep water corals.	9



4. DETAILED RESULTS AND SITE DESCRIPTIONS

4.1 YASAWA ISLANDS

The Yasawa Islands are a linear chain of about 20 small, steep-sided volcanic islands lying 50–130 km north of the large island of Viti Levu. The Yasawa Islands are surrounded by very narrow fringing reefs and seagrass beds, and protected from oceanic swells by a broken barrier reef lying 10–20 km to the west. Small villages and resorts are scattered along the chain of islands, and local communities depend heavily on fishing and collection of marine resources, which are found within the reef system.

Deeper reefs have high algal cover, probably related to overfishing and harvesting of animals such as herbivorous fish and sea cucumbers, as well as eutrophication due to nutrient enrichment from anthropogenic sources (Dupouy, 1981). Shallower reefs and channels have higher levels of hard coral, which bleach frequently in periods of high water temperature, but appear to quickly recover from such events (Sykes and Morris, 2007). Sea water temperatures in this area are generally 0.5°C higher than in central Fiji waters (Lovell et al., 2008).

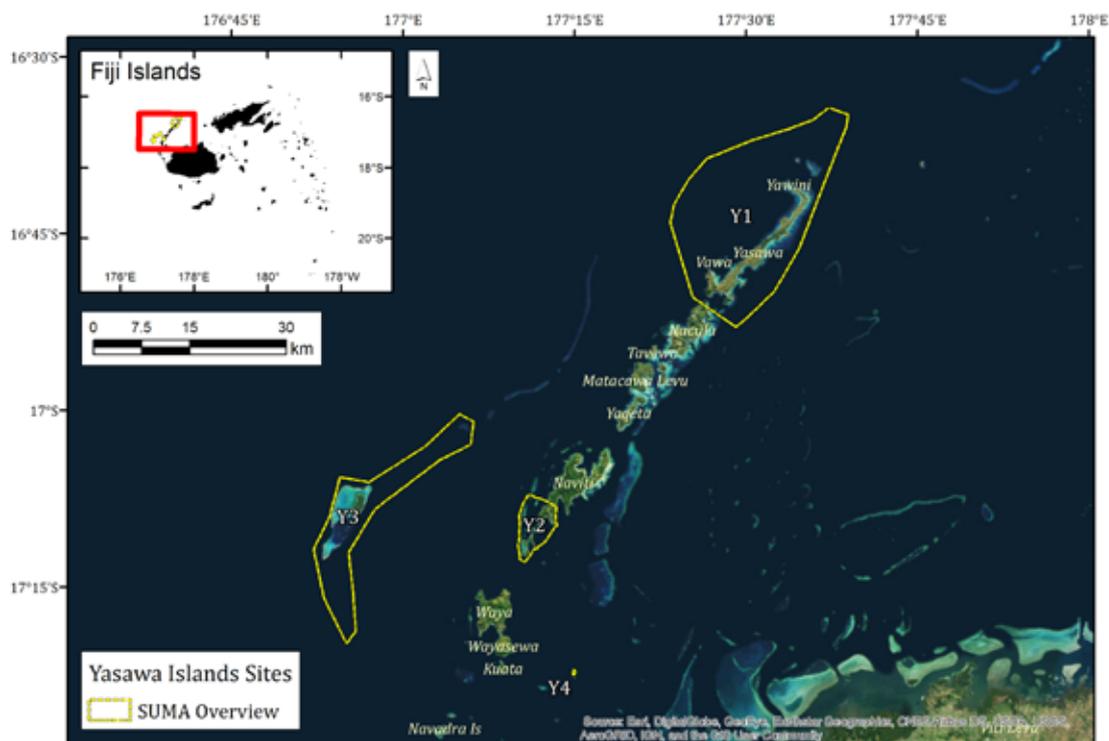
Threatened species such as the bumphead parrotfish, *Bolbometopon muricatum*, spinner dolphin, *Stenella longirostris*, and bottlenose dolphin, *Tursiops truncatus*, are regularly seen in the bays, channels, and lagoon areas⁶. At least three species of turtles are found in these waters: green turtles, *Chelonia mydas*, forage in the seagrass beds; hawksbill turtles, *Eretmochelys imbricata*, nest on many undisturbed beaches; and leatherback turtles, *Dermochelys coriacea*, are reported to have nested on at least one beach (Sykes, 2005a). Seabirds also nest on many of the smaller islets and undeveloped areas.

Narrow passages between the islands have strong tidal currents that provide very active and productive marine habitats. These include one of only two known sites in Fiji that are year-round (rather than seasonal) feeding and cleaning grounds for reef manta rays, *Manta alfredi*. This channel, south of Naviti Island, is a tourist attraction, a research site, and is currently under informal protection by community agreement. Great hammerhead sharks, *Sphyrna mokarran*, have also been seen in the northern Yasawas⁷. Connectivity between the islands, channels, and barrier reefs is important to many marine species at different times in their lifecycles, many species travel between mangroves and seagrass beds, inshore fringing reef to offshore nursery reef, and out to the barrier reef and beyond.

There are four Special, Unique Marine Areas (SUMAs) identified within the Yasawa Island group (Map 1, Table 18). These are shown and described in more detail below.

⁶ Dive operators' observations, pers. comm., 19.07.2016

⁷ S. Prasad, Ministry of Fisheries, pers. comm., 19.07.2016



MAP 2: YASAWA SITES

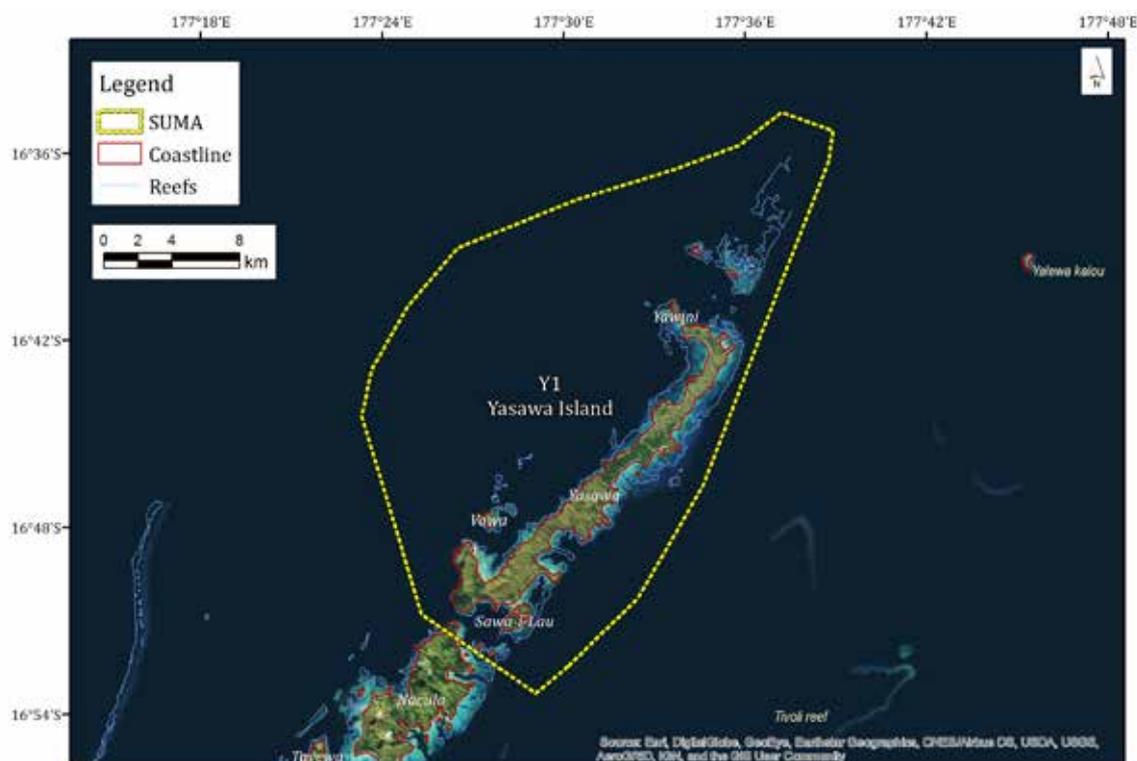
TABLE 18: YASAWA SITES

SUMA codes	Linked report codes	Name	Biophysical Justification	Rating
Y1	EBSA 14 FIME IE13 FIME CF8 FIME CR9	Yasawa Island	Connectivity between fringing and barrier reefs, seagrass beds, hawksbill and green turtles, grouper aggregations, great hammerhead sharks.	10
Y2	FIME SSC6	South Naviti and small islands	Reef passages, offshore and fringing reefs, bumphead parrotfish, manta rays, three species of turtles, bottlenose dolphin.	11
Y3	New Site	Viwa Island and barrier reef	Section of large barrier reef, small island with large fringing reef, shallow lagoon, channels, pelagic species, turtle nesting, humphead wrasse.	7
Y4	NES 21	White Rock	Five species of shark, nesting colony of wedge-tailed shearwater.	9

SITE Y1: YASAWA ISLAND

TABLE 19: Site description Y1

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
Y1	EBSA 14 FIME IE13 FIME CT8 FIME CR19	Yasawa Island		10



MAP 3: SITE Y1

Geographic coordinates: S16° 34' 43", E177° 38' 53" and S16° 54' 11", E177° 22' 43"

Area (km²): 527.7

Division: Western

Unique *iQoliqoli* ID number: Ba_MAP33_FOL35

TABLE 20: Details of Site Rating Y1

Criteria	Details	Rating (out of 3)
Biophysical Justification	Connectivity between fringing and barrier reefs, seagrass beds, hawksbill and green turtles, grouper aggregations, great hammerhead sharks.	3
Geographic Explicitness	From western edge of barrier reef to eastern edges of fringing reef, including lagoon areas.	2
Source Number and Type	More than one good report and expert advice available.	2
Obligations (See Appendix C)	Relevant taxa: <i>Sphyrna mokarran</i> ; <i>Chelonia mydas</i> ; <i>Eretmochelys imbricata</i> ; <i>Epinephelus malabaricus</i> ; <i>E. lanceolatus</i> .	3
Overall Rating (out of 12)		10

DETAILED DESCRIPTION OF PRIORITY HABITAT/ FEATURE

This site received a high overall rating of 10 (Table 20) and includes Yasawa Island (Map 3), the northernmost island of the Yasawas chain (Map 2). It is a long and narrow volcanic island about 23 km long and 1–2 km wide, with steep cliffs of black volcanic rock and long white sandy beaches. There are seven villages or settlements, and a luxury resort on the island, which has its own airstrip.

The fringing and patch reefs around the island have high levels of coral cover in the shallower areas (Sykes and Morris, 2007). The western side of the barrier reef comes closer to shore than anywhere else in the Yasawa chain of islands. Consequently, connectivity between the fringing and barrier reefs is very strong. Great hammerhead sharks, *Sphyrna mokarran*, have been seen off these deep reefs⁸.

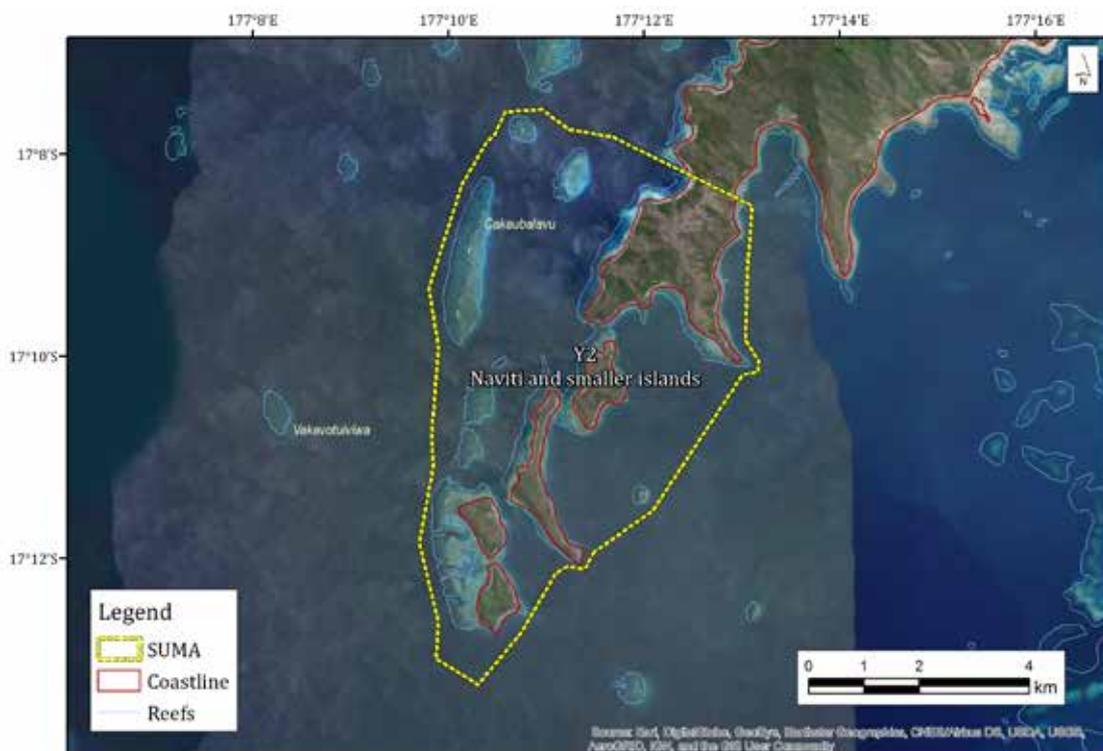
⁸ S. Prasad, Ministry of Fisheries, pers. comm., 19.07.2016

There are green turtle, *Chelonia mydas*, foraging areas and hawksbill turtle, *Eretmochelys imbricata*, nesting sites along the coast. Within the lagoon and back-reef areas, there are very productive seagrass beds and sites where grouper, *Epinephelus malabaricus*, *E. lanceolatus*, breeding occurs between June and September annually⁹. Overall, macro-invertebrate numbers, particularly of sea cucumbers, are low, attributed to both historical and recent over-collection.

SITE Y2: SOUTH NAVITI AND SMALLER ISLANDS

TABLE 21: Site description Y2

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
Y2	FIME SSC6 FIME IE13	South Naviti and smaller islands		11



MAP 4: SITE Y2

Geographic coordinates: S17° 7' 40", E177° 9' 48" and S17° 13' 17", E177° 13' 5"

Area (km²): 41.6

Division: Western

Unique *iQoliqoli* ID number: Ba_MAP15_FOL23 and MAP45_FOL67

⁹ A. Batibasaga, Ministry of Fisheries, pers. comm., 19.07.2016

TABLE 22: Details of Site Rating Y2

Criteria	Details	Rating (out of 3)
Biophysical Justification	Reef passages, offshore and fringing reefs, bumphead parrotfish, manta rays, three species of turtles, bottlenose dolphin.	3
Geographic Explicitness	Reefs surrounding five islands, and channels in between.	2
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice available.	3
Obligations (See Appendix C)	Relevant taxa: <i>Manta alfredi</i> ; <i>Bolbometopon muricatum</i> ; <i>Eretmochelys imbricata</i> ; <i>Chelonia mydas</i> ; <i>Dermochelys coriacea</i> ; <i>Stenella longirostris</i> ; <i>Tursiops truncatus</i> .	3
Overall Rating (Out of a potential 12)		11

DETAILED DESCRIPTION OF HABITAT/FEATURE

This site received a high overall rating of 11 (Table 22). It includes the southern tip of Naviti Island (Map 4), which is separated from four smaller islands by narrow passages with high tidal flow, creating areas of high coral cover and rich fish life. Further, the channel between Naviti and Drauwaqa Islands is frequented by reef manta rays, *Manta alfredi* (Sykes, 2015a). These rays are seen across Fiji in the warmer months of November through to February, but in the Drauwaqa channel they appear to be resident year round, one of only two such places currently known in Fiji¹⁰ where this occurs. This phenomenon is being researched and managed cooperatively by tourism and the local community¹¹. There have been 63 individual manta rays identified in the channel, and two have been recorded travelling to Kadavu and Namena Marine Reserve. Site fidelity and reproductive behaviour indicates the channel is an important site in the lifecycle of the rays¹².

Threatened bumphead parrotfish, *Bolbometopon muricatum*, are seen in the channels, bays and outer reefs west of the islands¹³, one of the few remaining places in Fiji where they are still found (Sykes, 2006a). Hawksbill turtle, *Eretmochelys imbricata*, hatchlings has been recorded on Manta Ray Island Resort beaches¹⁴, green turtles, *Chelonia mydas*, are often seen on the reefs and feeding in seagrass beds off the eastern coast¹⁵, and a possible leatherback turtle, *Dermochelys coriacea*, nesting site was identified on Nanuya Balavu, but not yet confirmed (Sykes, 2005a). Spinner dolphin *Stenella longirostris* and bottlenose dolphin *Tursiops truncatus* are also regularly seen in the bays, channels and lagoon areas (Miller et al., 2016).

SITE Y3: VIWA ISLAND AND BARRIER REEF

TABLE 23: Site description Y3

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
Y3	EBSA 14	Viwa Island and Barrier Reef		7

¹⁰ Manta Trust (2017) <http://www.mantatrust.org/in-the-field/fiji/>

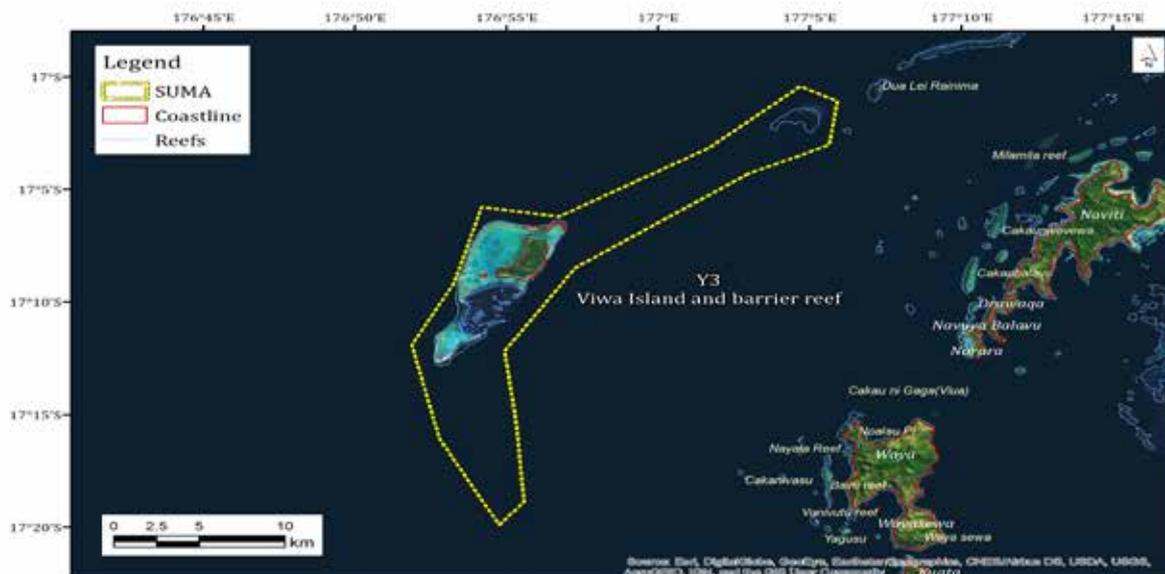
¹¹ Dive Operators (2017) <http://www.thebarefootcollection.com/manta-island/manta-rays.htm>

¹² Fiji Manta Ray Project (2015) Annual report www.mantatrust.org

¹³ Dive operators, pers. comm., 19.07.2016

¹⁴ R. Irvine, Manta Ray Island Resort, pers. comm., 19.07.2016

¹⁵ A. Batibasaga, Ministry of Fisheries, pers. comm., 19.07.2016



MAP 5: SITE Y3

Geographic coordinates: S17° 0' 38", E176° 51' 43" and S17° 20' 1", E177° 5' 52"

Area (km²): 193.5

Division: Western

Unique *iQoliqoli* ID number: Ba_MAP45_FOL69

TABLE 24: Details of Site Rating Y3

Criteria	Details	Rating (out of 3)
Biophysical Justification	Section of large barrier reef, small island with large fringing reef, shallow lagoon, channels, pelagic species, turtle nesting, humphead wrasse.	2
Geographic Explicitness	Section of barrier reef, and surrounding fringing reefs.	2
Source Number and Type	Mainly anecdotal and inferred information.	1
Obligations (See Appendix C)	Relevant taxa: <i>Cheilinus undulatus</i> ; <i>Eretmochelys imbricata</i> ; Cheloniidae spp.	2
Overall Rating (Out of a potential 12)		7

DETAILED DESCRIPTION OF HABITAT/FEATURE

This site has a medium overall rating of 7 (Table 24) and includes Viwa Island (Map 5). Viwa Island is in a unique position as the only island on the Yasawa barrier reef, as opposed to within the main island chain. It is about 3.5 km long, situated on a corner of the reef opposite the large passage between Naviti and Waya Islands. It has a fringing reef and lagoon system, dropping onto the deeper barrier reef and then finally into deep oceanic water. The barrier reef extends to the north east and south of the island.

There is little information available about the marine resources of Viwa, but it is known that turtles, many parrotfish and the endangered humphead wrasse, *Cheilinus undulatus*, are found on the fringing reefs and in the lagoon, and that hawksbills turtles, *Eretmochelys imbricata*, nest on the island¹⁶. In addition, the barrier reef is likely to attract large pelagic species.

¹⁶ A. Batibasaga, Ministry of Fisheries, pers. comm., 19.07.2016

SITE Y4: WHITE ROCK

TABLE 25: Site Description Y4

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
Y4	NES 21	White Rock		9



MAP 6: SITE Y4

Geographic coordinates: S17° 22' 52", E177° 14' 17" and S17° 22' 24", E177° 14' 41"

Area (km²): 0.3

Division: Western

Unique *iQoliqoli* ID number: Ba_MAP15_FOL21

TABLE 26: Details of Site Rating Y4

Criteria	Details	Rating (out of 3)
Biophysical Justification	Five species of shark, nesting colony of wedge-tailed shearwater, turtles.	2
Geographic Explicitness	Rock and surrounding reef.	3
Source Number and Type	Mainly anecdotal and inferred information.	1
Obligations (See Appendix C)	Relevant taxa: <i>Carcharhinus albimarginatus</i> , <i>C. melanopterus</i> ; <i>C. amblyrhynchos</i> ; <i>Triaenodon obesus</i> ; <i>Puffinus pacificus</i> ; Sphyrnidae spp.	3
Overall Rating (Out of a potential 12)		9

DETAILED DESCRIPTION OF HABITAT/FEATURE

This site has an overall rating of 9 (Table 26) and includes White Rock (Map 6). White Rock, lying east of Waya Island, is a tiny rocky outcrop less than 80 m long, with 60 m long sand spit and a surrounding fringing reef-flat, which slopes to deeper water, 200 – 300 m offshore. It has steep rocky sides, and is a naturally protected wedge-tailed shearwater, *Puffinus pacificus*, breeding colony, for which it was listed as a Site of National Significance in the 1993 Fiji National Environment Strategy (NES).

Hammerhead sharks as well as silvertip, *Carcharhinus albimarginatus*, blacktip, *Carcharhinus melanopterus*, grey reef, *Carcharhinus amblyrhynchos*, and white tip reef sharks, *Triaenodon obesus*, have been reported in the area¹⁷. There are also undocumented reports that it may be a shark aggregation and breeding site H. Sykes, pers. comm¹⁸).

4.2 MAMANUCA ISLANDS

The Mamanuca Islands are a group of small volcanic islands and tiny coral cays, lying immediately north of Nadi on the north west of Viti Levu. The islands are surrounded by very narrow fringing reefs, and some seagrass beds, with a few small lagoons. They are protected from oceanic swells by, a broken barrier reef lying 5–10 km west of the islands, the large island of Viti Levu to the south, and extensive patch reefs and shoals to the east. Consequently, the waters are usually calm and relatively current free.

Most islands have one or more tourism resorts, and the larger ones have several villages. The boat traffic between the islands is very active. Many patch and fringing reefs in the area are adversely impacted by sedimentation and nutrient pollution (Dupouy, 1981) from factors such as sugar cane farming, watershed degradation on the main island and development on some of the other islands (Comley et al., 2003). Additionally, these reefs have suffered from severe outbreaks of the coral-eating crown-of-thorns starfish (COTS), *Acanthaster planci*, although coral regrowth and recovery has usually occurred within a few years of such attacks (Sykes and Morris, 2007).

The more offshore reefs support large populations of reef fish, and one site in particular is known for reef shark encounters¹⁹. The outer barrier reef and channels attract large megafauna such as sharks, rays, and green turtles, *Chelonia mydas*. Whale sharks, *Rhincodon typus*, and ocean sunfish, *Mola mola*, have also been seen on rare occasions on the outer reef walls²⁰.

Hawksbill turtles, *Eretmochelys imbricata*, nest on a few of the more undeveloped beaches, green turtles forage in the seagrass beds around some of the islands²¹, and there are seabird nesting sites on smaller rocky islets²².

There are seven Special, Unique Marine Areas (SUMAs) identified within the Mamanuca Island group (Map 7, Table 27). These are shown and described in more detail below.

¹⁷ A. Batibasaga, Ministry of Fisheries, pers. comm., 19.07.2016

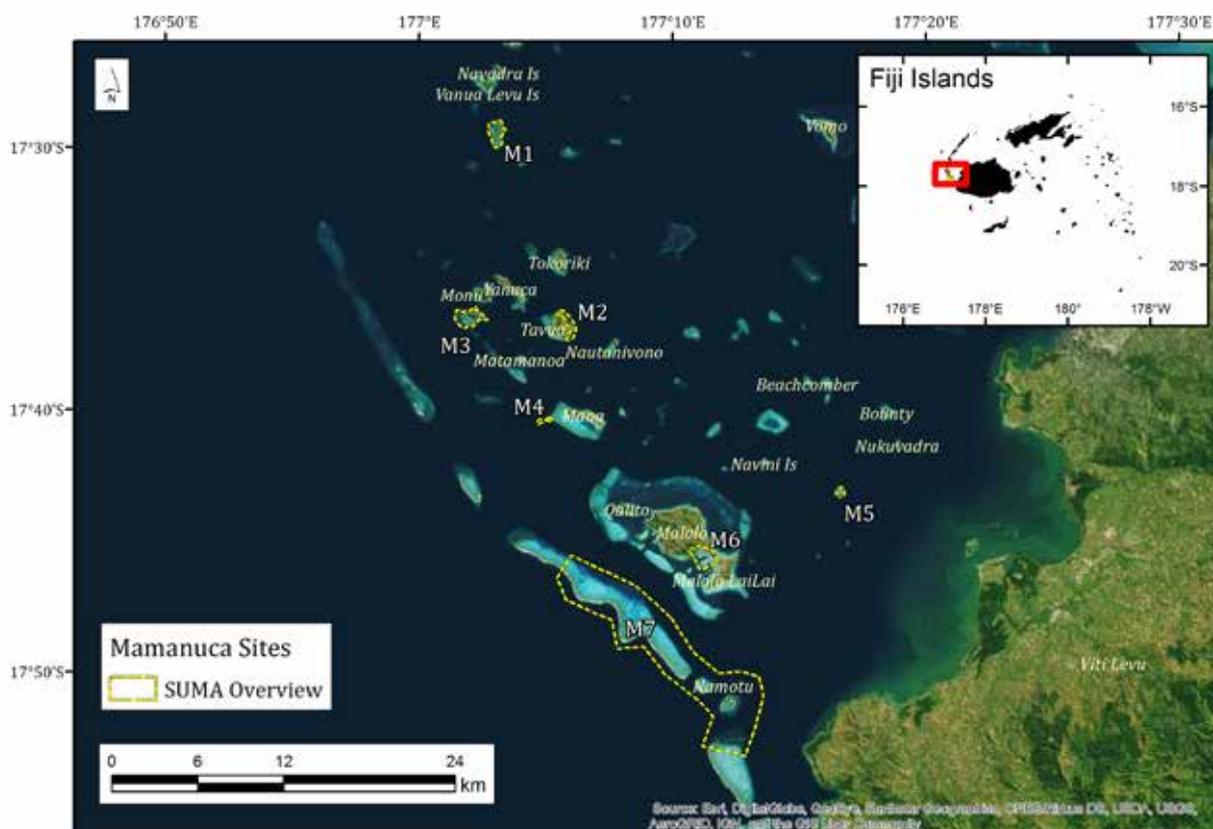
¹⁸ H. Sykes, pers. comm., 19.07.2016

¹⁹ Dive Operators (2017). <http://www.thebarefootcollection.com/manta-island/manta-rays.htm>

²⁰ Dive operators, pers. obs. n.d

²¹ M. Vakaoca, Mamanucas Environment Society, pers. comm., 19.07.2016

²² M. Vakaoca, Mamanucas Environment Society, pers. comm., 19.07.2016



MAP 7: MAMANUCA SITES

TABLE 27: MAMANUCA SITES

SUMA codes	Linked report codes	Name	Biophysical Justification	Rating
M1	NES 25	Kadomo Island	Seabird nesting site (wedge-tailed shearwater).	7
M2	New Site	Tavua Island	Seagrass beds and green turtle foraging area.	5
M3	FIME CT19	Monuriki Island	Seabird and turtle nesting site.	9
M4	FIME CF6	Supermarket Reef, Mana Island	Deep patch reef, white-tip, black-tip and grey reef sharks.	8
M5	NES 16	Malamala Island	Turtle nesting site.	5
M6	New Site	Malolo-Levu Island	Seagrass beds, inland mangrove area, and humphead wrasse.	8
M7	FIME CF5 FIME CR9 FIME SSC7	Navula-Malolo reef including Tavarua and Namotu Islands	Barrier reef with small islands and productive passages, green and loggerhead turtles, whale sharks, sunfish, manta rays, eagle rays, spinner dolphins and pilot whales.	11

SITE M1: KADOMO ISLAND

TABLE 28: Site description M1

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
M1	NES 25	Kadomo Island		7



MAP 8: SITE M1

Geographic coordinates: S17° 29' 7", E177° 2' 41" and S17° 30' 10", E177° 3' 23"

Area (km²): 1.5

Division: Western

Unique *iQoliqoli* ID number: Nadroga_MAP15_FOL22

TABLE 29: Details of Site Rating M1

Criteria	Details	Rating (out of 3)
Biophysical Justification	Seabird nesting site (wedge-tailed shearwater) and potential feeding grounds for green turtle.	1
Geographic Explicitness	Fringing reef and reef slope surrounding the entire Island.	2
Source Number and Type	More than one good report and expert advice available.	2
Obligations (See Appendix C)	Relevant taxa: <i>Chelonia mydas</i> ; <i>Eretmochelys imbricata</i> ; <i>Puffinus pacificus</i> .	2
Overall Rating (Out of a potential 12)		7

DETAILED DESCRIPTION OF HABITAT/FEATURE

This site received a medium overall rating of 7 (Table 29). It includes Kadomo (Map 8), a small, uninhabited, rocky island just over 1 km long, lying within a scattered group of small uninhabited islands and submerged reefs. It has a fringing reef and seagrass beds, which are possible but unconfirmed feeding grounds for green turtles, *Chelonia mydas*²³.

During October to May, the western side of the island becomes a seabird nesting site for the wedge-tailed shearwater, *Puffinus pacificus* (NatureFiji-MareqetiViti, 2013).

SITE M2: TAVUA ISLAND

TABLE 30: Site description M2

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
M2	New Site	Tavua Island		5



MAP 9: SITE M2

Geographic coordinates: S17° 30' 37", E177° 5' 29" and S17° 30' 8", E177° 6' 37"

Area (km²): 1.0

Division: Western,

Unique *iQoliqoli* ID number: Nadroga_MAP15_FOL22

²³ M. Vakaoca, Mamanucas Environment Society, pers. comm., 19.07.2016

TABLE 31: Details of Site Rating M2

Criteria	Details	Rating (out of 3)
Biophysical Justification	Seagrass beds, green turtles forage and feed.	1
Geographic Explicitness	Shallow flats east of the island.	2
Source Number and Type	Mainly anecdotal and inferred information.	1
Obligations (See Appendix C)	Relevant taxa: <i>Chelonia mydas</i> .	1
Overall Rating (Out of a potential 12)		5

DETAILED DESCRIPTION OF HABITAT/FEATURE

This site has a low overall rating of 5 (Table 31). It includes Tavua (Map 9), a small island just under 2 km long, with a single village on the north-west coast, and several uninhabited beaches on the eastern side. It lies within a scattered group of small islands, some uninhabited, some with villages, and others with resorts. The island has a narrow fringing reef, and the reef flats east of the island have seagrass beds where green turtles, *Chelonia mydas*, forage and feed²⁴.

SITE M3: MONURIKI ISLAND

TABLE 32: Site description M3

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
M3	FIME CT19	Monuriki Island		9



MAP 10: SITE M3

²⁴ M. Vakaoca, Mamanucas Environment Society, pers. comm., 19.07.2016

Geographic coordinates: S17° 36' 14", E177° 1' 19" and S17° 37' 2", E177° 2' 36"

Area (km²): 1.9

Division: Western

Unique *iQoliqoli* ID number: Nadroga_MAP15_FOL22

TABLE 33: Details of Site Rating M3

Criteria	Details	Rating (out of 3)
Biophysical Justification	Seabirds, turtle nesting.	2
Geographic Explicitness	Fringing reef and reef slope surrounding the entire Island.	3
Source Number and Type	More than one good report and expert advice available.	2
Obligations (See Appendix C)	Relevant taxa: <i>Puffinus pacificus</i> ; Cheloniidae spp.	2
Overall Rating (Out of a potential 12)		9

DETAILED DESCRIPTION OF HABITAT/FEATURE

This site received an overall rating of 9 (Table 33), and includes Monuriki (Map 10), a small uninhabited island 1 km long, lying within a group of slightly larger islands, some with villages. The dry coastal forest on Monuriki Island is a rehabilitation site for the endemic crested iguana, *Brachylophus vitiensis*.

The marine habitat is a small fringing reef and flat, about which there is little information. Turtles are reported to nest on the beaches²⁵, and from October to May annually it is a nesting site for the wedge-tailed shearwater, *Puffinus pacificus* (NatureFiji-MaraqetiViti, 2013). In order to protect the wedge-tailed shearwater, a rat and goat eradication programme was carried out in 2011.

SITE M4: SUPERMARKET REEF, MANA ISLAND

TABLE 34: Site description M4

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
M4	FIME CF6	Supermarket Reef, Mana Island		8

²⁵ M. Vakaoca, Mamanucas Environment Society, pers. comm., 19.07.2016



MAP 11: SITE M4

Geographic coordinates: S17° 40' 43", E177° 4' 30" and S17° 40' 27", E177° 5' 6"

Area (km²): 0.2

Division: Western

Unique *iQoliqoli* ID number: Nadroga_MAP15_FOL22

TABLE 35: Details of Site Rating M4

Criteria	Details	Rating (out of 3)
Biophysical Justification	Deep patch reef, white-tip, black-tip and grey reef sharks.	1
Geographic Explicitness	Discrete patch reef west of Mana Island.	3
Source Number and Type	Good reports and expert advice.	2
Obligations (See Appendix C)	Relevant taxa: <i>Carcharhinus amblyrhynchos</i> ; <i>C. melanopterus</i> ; <i>Triaenodon obesus</i> .	2
Overall Rating (Out of a potential 12)		8

DETAILED DESCRIPTION OF HABITAT/FEATURE

This site received a medium overall rating of 8 (Table 35) and includes Mana Island and Supermarket reef (Map 11). Mana Island, a little under 3 km long, is a developed island with an airstrip, three resorts, private houses, and a settlement for resort staff. The surrounding fringing reef has been quite heavily impacted from bleaching, crown-of-thorns starfish (COTs) predation, development and land-based factors, and has high algal coverage (Sykes, 2010a).

West of Mana Island, a slightly deeper patch reef known by its tourism dive site name, the Supermarket, extends 1 km out from the main reef. The slopes and passage have resident populations of grey reef sharks, *Carcharhinus amblyrhynchos*, black tip reef sharks, *Carcharhinus melanopterus*, and white tip reef sharks, *Triaenodon obesus* (Sykes, 2015a). In the past, the area was used as a tourism-related shark feeding site. While this no longer occurs, the site is still a popular tourist SCUBA diving site for regular shark encounters²⁶.

²⁶ Dive operators websites: <http://fijidiving.com/dive-sites/> <http://www.tokorikidiving.com/dive-sites-map>
http://www.wannadive.net/spot/Australia_Pacific/Fiji/Mamanuca_Group/Supermarket/
<http://www.diveworldwide.com/locations/mamanuca-yasawa-islands>

SITE M5: MALAMALA ISLAND

TABLE 36: Site description M5

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
M5	NES 16	Malamala Island		5



MAP 12: SITE M5

Geographic coordinates: S17° 43' 14", E177° 16' 18" and S17° 43' 37", E177° 16' 39"

Area (km²): 0.3

Division: Western

Unique *iQoliqoli* ID number: Nadroga_MAP15_FOL22

TABLE 37: Details of Site Rating M5

Criteria	Details	Rating (out of 3)
Biophysical Justification	Turtle nesting.	1
Geographic Explicitness	Fringing reef surrounding the entire Island.	2
Source Number and Type	Mainly anecdotal and inferred information.	1
Obligations (See Appendix C)	Relevant taxa: Cheloniidae spp.	1
Overall Rating (Out of a potential 12)		5

DETAILED DESCRIPTION OF HABITAT/FEATURE

This site has a low overall rating of 5 (Table 37), and includes Malamala (Map 12), a low, vegetated, small, sandy cay about 100 m long, with a circular fringing reef flat, lying about 10 km north west of Nadi and Port Denarau, on the coast of Viti Levu. It was registered as a Site of National Significance in Fiji's National Environment Strategy (NES) for its marine ecosystem.

There is a small resort for overnight stays, and it is used daily for tourism day trips. Reefs are heavily impacted by influences from the main island.

The area is a known turtle nesting site²⁷, possibly now disturbed by tourism²⁸.

SITE M6: MALOLOLEVU ISLAND

TABLE 38: Site description M6

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
M6	New Site	Malololevu Island		8



MAP 13: SITE M6

²⁷ T. Vodivodi, Ministry of Fisheries, pers. comm., 19.07.2016

²⁸ H. Sykes, pers. comm., 19.07.2016

Geographic coordinates: S17° 46' 19", E177° 10' 29" and S17° 45' 25", E177° 11' 34"

Area (km²): 2.1

Division: Western

Unique *iQoliqoli* ID number: Nadroga_MAP15_FOL22

TABLE 39: Details of Site Rating M6

Criteria	Details	Rating (out of 3)
Biophysical Justification	Seagrass beds, inland mangrove swamp, humphead wrasse	2
Geographic Explicitness	Reef flats and inland mangrove lagoon.	2
Source Number and Type	Good reports and expert advice available.	2
Obligations (See Appendix C)	Relevant taxa: <i>Cheilinus undulatus</i> ; <i>Rhizophora</i> spp; and <i>Bruguiera</i> sp.	2
Overall Rating (Out of a potential 12)		8

DETAILED DESCRIPTION OF HABITAT/FEATURE

This site has a medium overall rating of 8 (Table 39). It includes Malolo Island (Map 13), the largest of the Mamanuca Islands, over 5 km long, lying 13–18 km north-west of Nadi and Port Denarau, off the coast of Viti Levu. A smaller island, Malololailai, is connected to the larger Malolo Island by small sand flat exposed at low tide. The site is heavily developed with multiple resorts, boat channels, marinas, and private housing. Reefs are impacted by development and terrestrial influences from the main island, heavy small boat traffic, and other tourism uses. Despite this, there are some remaining healthy corals, mostly on shallow reef crests and slopes, as well as seagrass beds and a few patches of mangroves²⁹.

On the eastern tip of Malolo Island, next to the channel between the two islands, there is a swampy inland mangrove lake that connects to an extensive reef flat with deeper channels and inlets as well as a deeper pool. This area has seagrass and beds of edible algae, and the reef slope has been identified as juvenile habitat for humphead wrasse, *Cheilinus undulatus* (Sykes, 2006b).

SITE M7: NAVULA-MALOLO REEF INCLUDING TAVARUA AND NAMOTU ISLANDS

TABLE 40: Site description M7

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
M7	FIME CF5 FIME SSC7	Navula-Malolo reef including Tavarua & Namotu Islands		11

²⁹ T. Vodivodi, Ministry of Fisheries, pers. comm., 19.07.2016



MAP 14: SITE M7

Geographic coordinates: S17° 45' 45", E177° 5' 15" and S17° 53' 27", E177° 13' 22"

Area (km²): 57.2

Division: Western

Unique *iQoliqoli* ID number: Nadroga_MAP15_FOL22 and MAP07_FOL06

TABLE 41: Details of Site Rating M7

Criteria	Details	Rating (out of 3)
Biophysical Justification	Barrier reef with small islands and productive passages, green and loggerhead turtles, whale sharks, sunfish, manta rays, eagle rays, spinner dolphins, pilot whales.	3
Geographic Explicitness	Section of barrier reef and two discreet islands.	2
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice.	3
Obligations (See Appendix C)	Relevant taxa: <i>Stenella longirostris</i> ; <i>Globicephala macrorhynchus</i> ; <i>Aetobatus narinari</i> ; <i>Manta alfredi</i> ; <i>Chelonia mydas</i> ; <i>Caretta caretta</i> ; <i>Rhincodon typus</i> ; <i>Mola mola</i>	3
Overall Rating (Out of a potential 12)		11

DETAILED DESCRIPTION OF HABITAT/FEATURE

This site has a high overall rating of 11 (Table 41), and includes Navula and Malolo reef (Map 14) and is the southern extent of the barrier reef lying to the west of the Mamanuca and Yasawa Islands. The outer western edge slopes off into very deep water, while the inner, eastern edge faces the protected inner Mamanuca Islands and the north-west coast of Viti Levu. Large passages break up the reef, with two small sandy cays (Tavoro and Namotu Islands) lying on patch reefs within them.

Currents run through the channels alongside the islands, creating a flow of nutrients that support healthy corals and an abundance of small reef fish. Parts of the reef are under protection from fishing by agreement between the local communities and the tourism operators in the area. Tavarua Island has active turtle nesting and feeding grounds³⁰.

Off the western slope of the barrier reef, large pelagic marine life such as sharks, spinner dolphins, *Stenella longirostris* (Miller et al., 2016), short-finned pilot whales, *Globicephala macrorhynchus*, eagle rays, *Aetobatus narinari*, manta rays, *Manta alfredi*, green turtles, *Chelonia mydas*, and loggerhead turtles, *Caretta caretta*, are frequently sighted³¹. Whale sharks, *Rhincodon typus* and ocean sunfish, *Mola mola*, have been seen on rare occasions on the outer walls³².

4.3 SOUTH VITI LEVU

Beqa, Vatulele and Kadavu islands lie between 8 km (Beqa) and 90 km (Kadavu) south of the large island of Viti Levu. Kadavu is one of the largest “medium sized” islands in Fiji, approximately 60 km long, while Beqa and Vatulele are smaller, about 10 km long each. All three islands have narrow fringing reefs along the coastline, offshore barrier reefs that drop off into deep oceanic waters, and interior lagoon systems between the two. Kadavu and Vatulele lagoons are on one side of the island only, 2-3 km from shore, while Beqa sits in a large circular lagoon (30 km across), formed from an ancient volcanic caldera. All islands have villages and small ecologically-sensitive tourism resorts, but no large-scale development.

The outer reef walls and channels of these systems attract large marine life such as sharks and other pelagic predatory fish such as walu (Spanish mackerel), *Scomberomorus commerson*, wahoo, *Acanthocybium solandri*, mahi-mahi (dolphinfish), *Coryphaena hippurus*, pacific blue marlin, *Makaira mazara*, black marlin, *Istiompax indica*, and Pacific sailfish, *Istiophorus platypterus*³³.

Dolphins are frequently found in the lagoons and passages, and whales are seen on migratory routes passing the outer reefs (Miller et al., 2016). Beqa and Kadavu both have large stands of intact coastal and mangrove forest.

Beqa is known for high reef biodiversity, soft corals and large nudibranchs³⁴; Vatulele for anchialine pools (fresh water with a salt water connection and influence) with endemic and culturally significant red prawns (Stock and Illiffe, 1991); and Kadavu for an unusual population of reef manta rays, *Manta alfredi*, which are found year-round rather than seasonally³⁵, one of only two such sites known in Fiji. These islands are a focus for tourism SCUBA diving and game fishing activities.

Kadavu is the southernmost island of any size in Fiji, with sea water temperatures off the south coast usually a full degree colder than those in central Fiji (Lovell et al., 2008), making this an important reservoir of hard corals that have survived past temperature-related coral mortality events in Fiji. These corals are likely to be a vital part of Fiji reefs’ resilience to climate change, as their spawning probably contributes to restocking and recovery of reefs in Beqa, the Coral Coast and the Mamanuca Islands (Lovell and Sykes, 2008).

There are five Special, Unique Marine Areas (SUMA) identified within the South Viti Levu group (Map 15, Table 42). These are shown and described in more detail below.

³⁰ M. Vakaoca, Mamanucas Environment Society, pers. comm., 19.07.2016

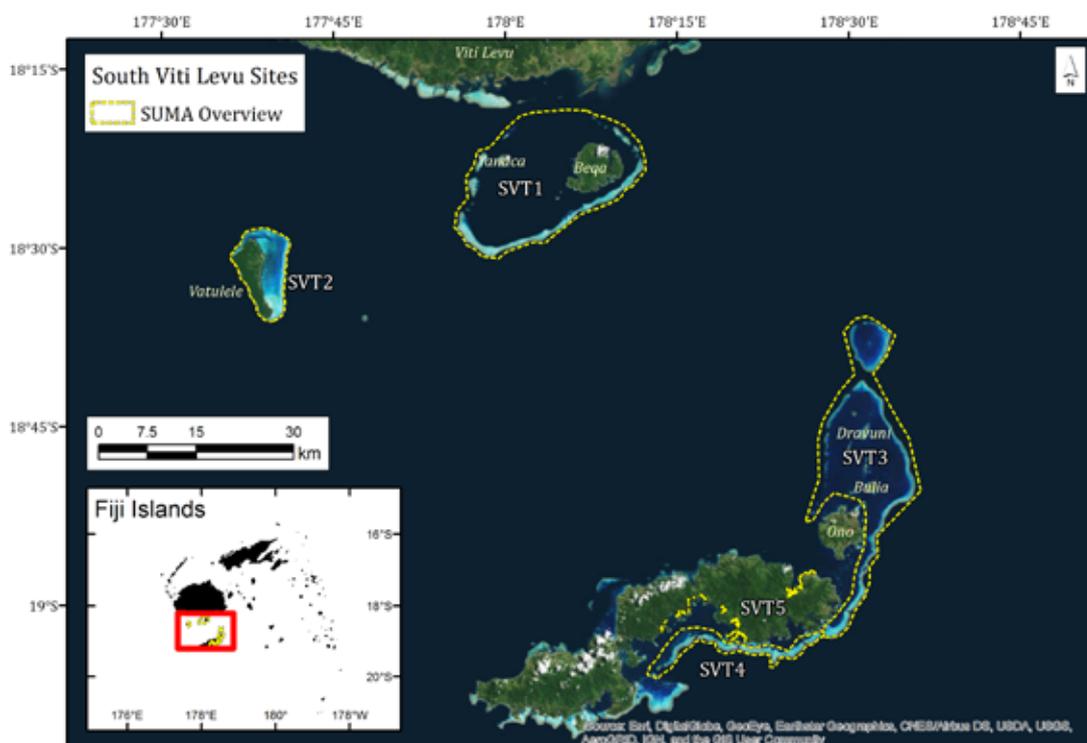
³¹ Divers operators’ websites: <http://www.travelonline.com/fiji/diving.html>http://www.divesitedirectory.co.uk/dive_site_fiji_mamanuca_reef_big_w.html

³² Subsurface, pers. comm., 19.07.2016

³³ Species Archives– Gamefishing Fiji– The best of Fiji Fishing, <http://gamefishingfiji.com/fish-species-fiji>

³⁴ H. Sykes, pers. comm., 19.07.2016

³⁵ Mad Fish Dive Centre, Kadavu <http://scuba-diving-fiji.com/fiji-dive-sites/vesi-kadavu-fiji/manta-reef/>



MAP 15: SOUTH VITI LEVU SITES

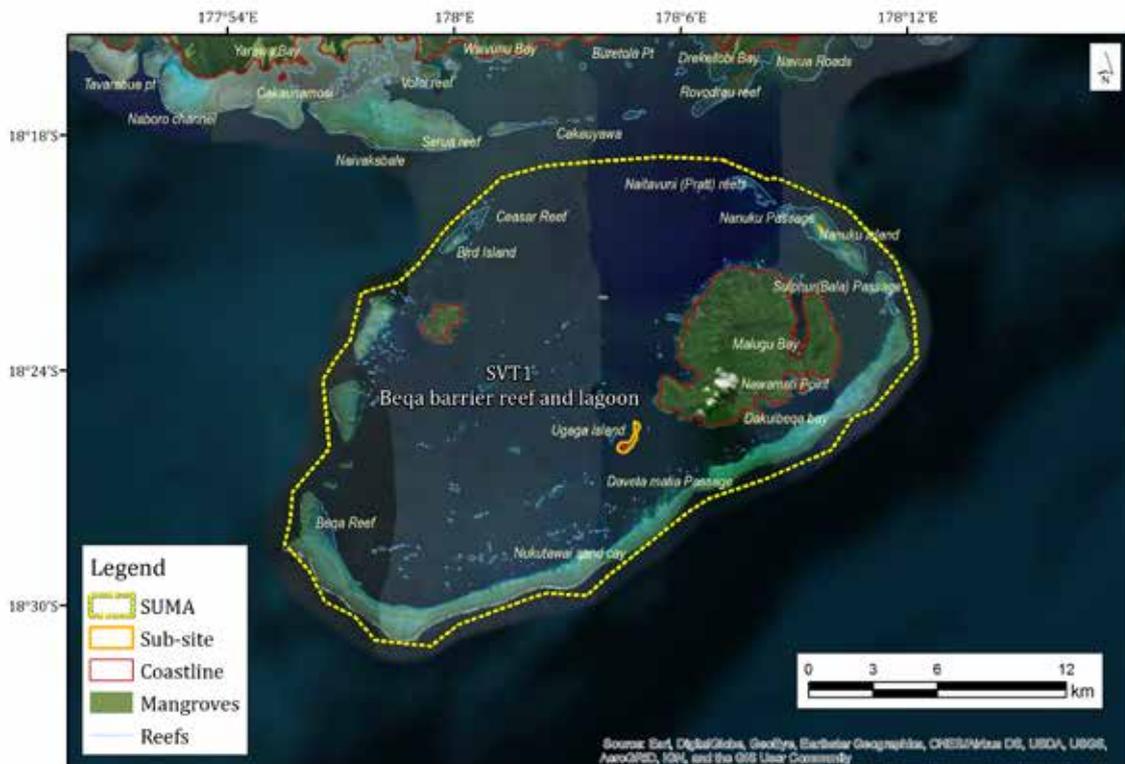
TABLE 42: SOUTH VITI LEVU SITES

SUMA codes	Linked report codes	Name	Biophysical Justification	Rating
SVT1	FIME CF3, FIME CR 11 FIME SSC12	Beqa Lagoon and Barrier reef	Circular sunken caldera barrier reef, passages, deep lagoons, patch reefs, fringing reefs, mangroves, seagrass, sharks, dolphins, whales, high reef fish, pelagic fish, invertebrate and coral diversity, turtle nesting.	12
SVT2	NES 88 NES 90 FIME CF3 FIME CR 11 FIME CT17	Vatulele Island	Endemic red prawns, 4 species of turtles, seabirds, pelagic fish, seagrass beds, edible sea grapes, and algae.	11
SVT3	EBSA 5, NES 80, 81 FIME CF1 FIME CR13 FIME IE09	Great and North Astrolabe reef	Barrier reef, pelagic fish, grouper aggregation site, whales, unique coral formations nationally important seabird colony.	11
SVT4	EBSA 5 FIME CF2	South Kadavu reefs	Fringing reef and passages. Manta rays, turtle nesting site, dolphins, whale migration and calving, eel spawning, pelagic fish, and climate change resistant corals.	11
SVT5	EBSA 5 FIME CT23	South Kadavu mangrove bays	Mangrove trees and associated fauna. Juvenile habitat for many reef species.	9

SITE SVT1: BEQA BARRIER REEF AND LAGOON

TABLE 43: Site description SVT1

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
SVT1	FIME CF3, FIME CR 11, FIME SSC12	Beqa Barrier reef and Lagoon with subsites Nanuku/Storm Island and Ugaga/Royal Davui Island		12



MAP 16: SITE SVT1

Geographic coordinates: S18° 31' 4", E177° 55' 27" and S18° 18' 37", E178° 12' 13"

Area (km²): 441.5

Division: Central

Unique *iQoliqoli* ID number: Serua_MAP01_FOL05 (Yanuca) and Rewa_MAP01_FOL01, 02, 03, 04, 06 and 07

TABLE 44: Details of Site Rating SVT1

Criteria	Details	Rating (out of 3)
Biophysical Justification	Circular sunken caldera barrier reef, passages, deep lagoons, patch reefs, fringing reefs, mangroves, seagrass, sharks, dolphins, whales, high reef fish, pelagic fish, invertebrate and coral diversity, turtle nesting and historical sea snake breeding area.	3
Geographic Explicitness	Barrier reef and confines.	3
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice.	3
Obligations (See Appendix C)	Relevant taxa: <i>Scomberomorus commerson</i> ; <i>Acanthocybium solandri</i> ; <i>Katsuwonus pelamis</i> ; <i>Thunnus albacares</i> ; <i>Galeocerdo cuvier</i> ; <i>Carcharhinus leucas</i> ; <i>Laticauda</i> spp; Cheloniidae spp; <i>Rhizophora</i> spp; and <i>Bruguiera</i> sp.	3
Overall Rating (Out of 12)		12

DETAILED DESCRIPTION OF HABITAT/ FEATURE

This site has a high overall rating of 12 (Table 44) and includes Beqa Island and Lagoon (Map 16). Beqa Lagoon is the largest lagoon in Fiji, 30 km across, enclosed by an almost circular barrier reef formed on the rim of an ancient volcanic caldera, with one large and three small islands (Nunn, 1990). It has nine villages and three small resorts.

The outer walls of the caldera drop steeply into water 200–300 m deep, and then down to depths of over 2,000 m. It is broken into patch reefs on the northern side, facing the main island of Viti Levu, and large passages on the western and eastern sides. The inner lagoon is between 40 and 50 m deep, with numerous patch reefs and shoals.

In the passages and lagoon, large pelagic fish such as Spanish mackerel, *Scomberomorus commerson*, wahoo, *Acanthocybium solandri*, skipjack tuna, *Katsuwonus pelamis*, and yellowfin tuna, *Thunnus albacares*, are often found³⁶. Sharks and dolphins are also frequently sighted inside the lagoon. Tiger sharks, *Galeocerdo cuvier*, and bull sharks, *Carcharhinus leucas*, are also known to frequent the area.

The numerous patch reefs and shoals are sites of considerable marine life diversity; with fish, soft corals, and giant nudibranchs and opisthobranchs attracting tourist SCUBA divers³⁷; rich macro invertebrate life, particularly bioactive ascidians and sponges, attracting scientific researchers (Feussner et al., 2012); and ornamental fish and corals providing a resource for the marine aquarium trade (Lovell and Whippy-Morris, 2009).

There are turtles, seabirds and sea snakes, *Laticauda colubrine*, nesting sites, particularly on Nanuku and Ugaga Island (subsites)³⁸. Beqa Island also has large stands of intact mangrove forest, in coastal forests and bays.

Beqa Lagoon is a virtual station for satellite-recorded sea surface temperature observations by the National Oceanic and Atmospheric Administration (NOAA)³⁹ and, as such, is of scientific interest in researches into coral resilience to climate change.

³⁶ <http://www.beqalagoonresort.com/fishing>

³⁷ H. Sykes, pers. comm., 19.07.2016

³⁸ A. Batibasaga, Fiji Ministry Fisheries, pers. comm., 19.07.2016

³⁹ Coral Reef Watch, National Oceanic and Atmospheric Administration (2016). https://coralreefwatch.noaa.gov/satellite/vs/melanesia.php#Beqa_Fiji

SITE SVT2: VATULELE ISLAND

TABLE 45: Site description SVT2

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
SVT2	NES 88 NES 90 FIME CT17	Vatulele Island		11



MAP 17: SITE SVT2

Geographic coordinates: S18° 28' 24", E177° 37' 5" and S18° 36' 12", E177° 41' 7")

Area (km²): 57.8

Division: Central

Unique *iQoliqoli* ID number: Nadroga_MAP09_FOL16

TABLE 46: Details of Site Rating SVT2

Criteria	Details	Rating (out of 3)
Biophysical Justification	Endemic red prawns, 4 species turtles, seabirds, pelagic fish, seagrass beds, edible sea grape algae.	3
Geographic Explicitness	Fringing reef and lagoon around island, inland tidal pools.	2
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice.	3
Obligations (See Appendix C)	Relevant taxa: <i>Liagoceradocus unciferus</i> ; <i>Phaethon lepturus</i> ; <i>Chelonia mydas</i> ; <i>Caretta caretta</i> ; <i>Dermochelys coriacea</i> .	3
Overall Rating (Out of 12)		11

DETAILED DESCRIPTION OF HABITAT/ FEATURE

This site has a high overall rating of 11 (Table 46). It includes Vatulele Island (Map 17) which has a raised coral limestone coastline with fringing reefs and a shallow lagoon with seagrass beds and edible sea grapes algae, *Caulerpa* spp; which are collected by the local inhabitants (Morris and Bala, 2012). Green, *Chelonia mydas*, hawksbill, *Eretmochelys imbricata*, loggerhead, *Caretta caretta*, and leatherback turtles, *Dermochelys coriacea*, are seen in the lagoon and on the outer reef slopes. Hawksbill and possibly (unconfirmed) leatherback turtles nest on the island, which is also a habitat for the white tailed tropic bird, *Phaethon lepturus*⁴⁰.

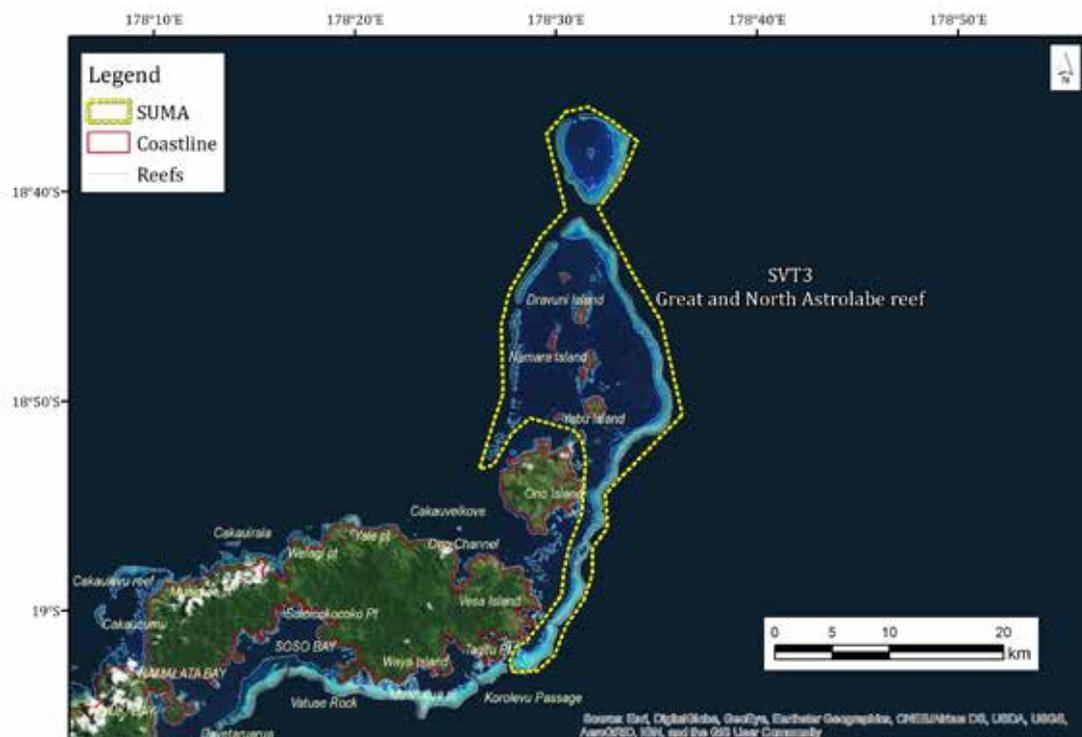
The offshore waters are known for productive game fishing of pelagic species⁴¹. Anchialine pools (inland but with tidal influence), caves and passages (sites of National Significance 88 and 90⁴²) house endemic red prawns *Liagoceradocus unciferus*, (Stock and Iliffe, 1991), and are of great cultural importance to the local people.

The site was registered as a Site of National Significance in the 1993 Fiji National Environment Strategy (NES) for the red prawn pools, and for a “marine notch”: a geological feature in the reef flat.

SITE SVT3: GREAT AND NORTH ASTROLABE REEF, KADAVU ISLAND

TABLE 47: Site description SVT3

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
SVT3	EBSA 5, NES 80, 81 FIME CF1 FIME CR13 FIME IE09	Great and North Astrolabe reef, Kadavu Island		11



MAP 18: SITE SVT3

⁴⁰ A. Batibasaga, Ministry of Fisheries, pers. comm., 19.07.2016

⁴¹ South Pacific Holidays, TropicalFiji. http://www.tropicalfiji.com/sights_and_activities/activities/fishing/

⁴² Government of Fiji, 1993. The National Environment Strategy. In: Watling D, Chape SA (eds). IUCN - World Conservation Union, Suva, Fiji

Geographic coordinates: S19° 2' 59", E178° 26' 9" and S18° 36' 0", E178° 36' 15"

Area (km²): 347.8

Division: Eastern

Unique *iQoliqoli* ID number: Kadavu_MAP12_FOL29 and MAP13_FOL34, 35

TABLE 48: Details of Site Rating SVT3

Criteria	Details	Rating (out of 3)
Biophysical Justification	Barrier reef, pelagic fish, grouper aggregation site, whales, unique coral formations nationally important seabird colony.	2
Geographic Explicitness	Barrier reef and confines.	3
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice.	3
Obligations (See Appendix C)	Relevant taxa: <i>Epinephelus polyphekadion</i> ; <i>E. fuscoguttatus</i> ; <i>Plectropomus areolatus</i> ; <i>P. laevis</i> ; <i>Megaptera novaeangliae</i> ; <i>Sula sula</i> , <i>Fregata ariel</i>	3
Overall Rating (Out of 12)		11

DETAILED DESCRIPTION OF HABITAT/ FEATURE

This site has a high overall rating of 11 (Table 48) and includes the Great and North Astrolabe reef of Kadavu Island (Map 18). Ono Island and the northern tip of Kadavu Island are encircled by a barrier reef stretching 50 km north-south and 15 km east-west, which becomes a fringing reef along the south coast of Kadavu. The outer reef drops to a shelf between 100 and 200 m deep, and then to deeper oceanic waters over 1,000 m. The inner lagoon floor is between 20 and 30 m deep, with numerous islets, rocks and shoals. There are shallow “blue hole” environments not seen in many other parts of Fiji.

The reef was badly hit by temperature related coral bleaching and crown-of-thorns predatory starfish, *Acanthaster planci*, in 2000–2002, reflected in low coral cover in 2002–2004⁴³. A unique “mountain” of fungoid corals recorded in the northern section (Littler et al., 1997) was not found in 2002.

Higher coral cover and fish populations are found in the North Astrolabe reef (around Ono Island) than on the Great Astrolabe, and larger pelagic fish are found in the channel between the two reefs. However, the reefs are the target of high fishing and sea cucumber collection pressures from both Kadavu and the Suva area of Viti Levu, resulting in only moderate fish, and low invertebrate numbers (Obura and Mangubhai, 2003).

The Naiqoro Passage, close to the Kadavu Island at the southern extent of the Great Astrolabe reef, is an important site for grouper breeding aggregations between June and September. Camouflage grouper, *Epinephelus polyphekadion*, brown marble grouper, *E. fuscoguttatus*, squaretail coral grouper, *Plectropomus areolatus*, and black saddle grouper, *Plectropomus laevis*, are known to spawn in this passage (Sadovy, 2011). Humpback whales, *Megaptera novaeangliae*, have also been seen in this passage (Miller et al., 2016).

The Ulunikoro Marine Conservation Area, within the North Astrolabe reef, was the first marine protected area (MPA) to be formally recognised and gazetted by the Fiji Government in 2002⁴⁴. Kadavu currently has over 60 small marine managed areas formed by local communities with assistance from the Fiji Locally-Managed Marine Areas (FLMMA) network^{45,46}. Both the North and the Great Astrolabe Reefs are registered as Sites of National Significance in the National Environment Strategy (NES) for their marine lagoon ecosystems.

Yabu Island is nationally important breeding seabird colony with more than 300 pairs of Red-footed boobies and substantial numbers of Lesser and Great Frigate birds. This island is also considered as a potential for rat eradication to benefit seabirds.

⁴³ Planetary Coral Reef Foundation (2005), Health of the Great Astrolabe Reef 31 May – 7 June 2005 <http://www.pcrf.org/science/Astrolabe/reefreport.html>

⁴⁴ Fiji's first marine conservation area officially gazetted (2002). WWF News and Stories http://www.panda.org/wwf_news/?4183%2FFijis-first-marine-conservation-area-officially-gazetted%3E

⁴⁵ Ulunikoro Marine Reserve/Narikoso Village/Vabea Village in Fiji <http://lmmnetwork.org/who-we-are/country-networks/fiji/>

⁴⁶ Ulunikoro Marine Reserve/Narikoso Village/Vabea Village in Fiji <https://www.protectedplanet.net/ulunikoro-marine-reserve-narikoso-village-vabea-village-locally-managed-marine-area>

SITE SVT4: SOUTH KADAVU REEFS

TABLE 49: Site description SVT4

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
SVT4	EBSA 5, FIME CF2	South Kadavu Reefs		11



MAP 19: SITE SVT4

Geographic coordinates: S19° 2' 6", E178° 12' 14" and S19° 6' 26", E178° 27' 42"

Area (km²): 58.6

Division: Eastern

Unique *iQoliqoli* ID number: Kadavu_MAP11_FOL05, 09 and Kadavu_MAP12_FOL29-33

TABLE 50: Details of Site Rating SVT4

Criteria	Details	Rating (out of 3)
Biophysical Justification	Barrier reef, passages, manta rays, turtle nesting, dolphins, whale migration and calving, eel spawning, pelagic fish, climate change resistant corals.	3
Geographic Explicitness	Barrier reef and fringing reefs along the south coast of Kadavu.	2
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice.	3
Obligations (See Appendix C)	Relevant taxa: <i>Manta alfredi</i> ; <i>Carcharhinus amblyrhynchos</i> ; <i>C. brachyurus</i> ; <i>C. falciformis</i> ; <i>Stenella longirostris</i> ; <i>Globicephala macrorhynchus</i> ; <i>Megaptera novaeangliae</i> ; <i>Isurus oxyrinchus</i> ; <i>Scomberomorus commerson</i> ; <i>Acanthocybium solandri</i> ; <i>Coryphaena hippurus</i> ; <i>Makaira nigricans</i> ; Cheloniidae spp	3
Overall Rating (Out of 12)		11

DETAILED DESCRIPTION OF HABITAT/ FEATURE

This site has a high overall rating of 11 (Table 50) and includes the southern part of the Great Astrolabe reef (Map 19). South of Kadavu Island the Great Astrolabe barrier reef continues as a complex of barrier and fringing reefs with deep channels running through into a narrow lagoon 30–40 m deep. South Kadavu has colder waters than most of Fiji (Lovell et al., 2008), and hard corals regularly escape temperature-related bleaching, forming an important reservoir of climate-change resistant coral spawn for restocking damaged reefs (Lovell and Sykes, 2008).

The passages are important areas where large marine life gathers. Soso Passage has a resident population of reef manta rays, *Manta alfredi*, which are found there year-round rather than seasonally (only one of two such sites known in Fiji)⁴⁷. The passage between Ucuinaqaralevu and Nuanasalia Point is a grey reef shark, *Carcharhinus amblyrhynchos*, aggregation site in, although this has been impacted by shark fishers in recent years⁴⁸.

Spinner dolphins, *Stenella longirostris*, are regularly seen inside the lagoon, while pilot whales, *Globicephala macrorhynchus*, and humpback whales, *Megaptera novaeangliae*, have been seen in the deeper waters and passages (Miller et al., 2016)⁴⁹ with some anecdotal evidence of humpback whale calving as well. There are turtle nesting sites in the bays, and spawning grounds for eels⁵⁰ in the creek estuaries.

The outer reef walls and channels of these systems attract large marine pelagic life such as bronze whaler sharks, *Carcharhinus brachyurus*, (Near Threatened status on the IUCN Red List of Threatened Species), silky sharks, *Carcharhinus falciformis* and mako sharks, *Isurus oxyrinchus*, as well as other pelagic predatory fish, such as walu (Spanish mackerel), *Scomberomorus commerson*, wahoo, *Acanthocybium solandri*, mahi-mahi (dolphinfish), *Coryphaena hippurus*, Indo-Pacific blue marlin, *Makaira nigricans*, black marlin, *Istiompax indica*, and Pacific sailfish, *Istiophorus platypterus*⁵¹. There is also anecdotal evidence of whale shark sightings along the outer reefs.

⁴⁷ Mad Fish Dive Centre, Kadavu. <http://scuba-diving-fiji.com/fiji-dive-sites/vesi-kadavu-fiji/manta-reef/>

⁴⁸ R. Ahktar, pers. comm., 19.07.2016

⁴⁹ Matava Resort, Kadavu. <http://matava.com/nature/whales-and-dolphins/>

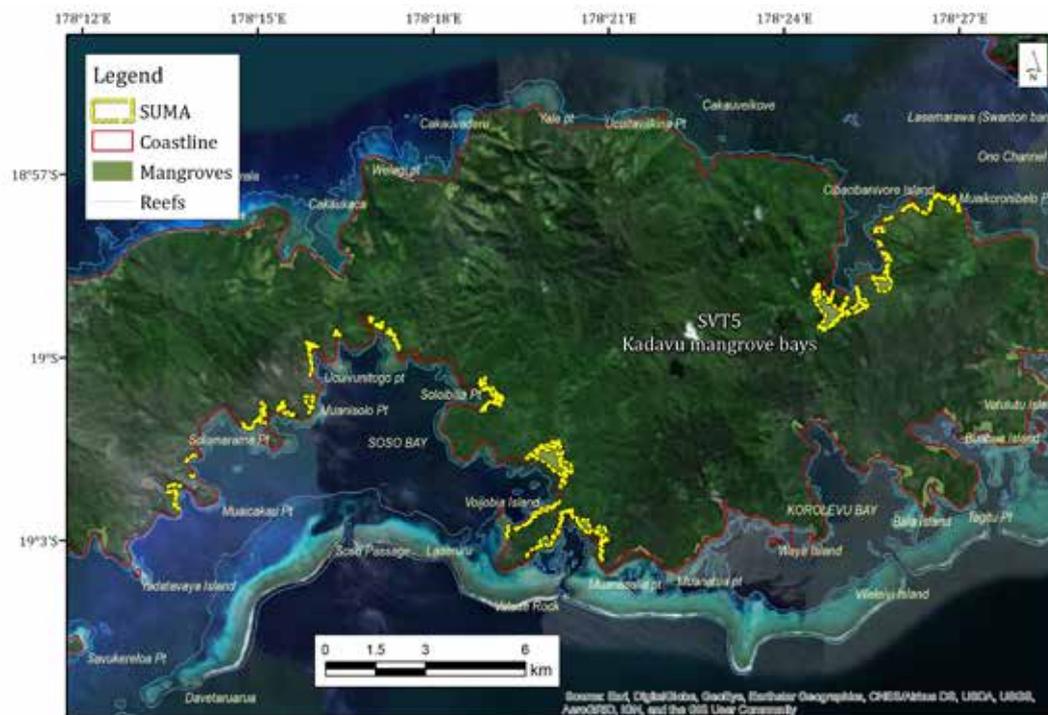
⁵⁰ A. Batibasaga, Fiji Ministry of Fisheries, pers. comm., 19.07.2016

⁵¹ Species Archives– Gamefishing Fiji– The best of Fiji Fishing, <http://gamefishingfiji.com/fish-species-fiji>

SITE SVT5: KADAVU MANGROVE BAYS

TABLE 51: Site description SVT5

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
SVT5	EBSA 5, FIME CT23	Kadavu mangrove bays		9



MAP 20: SITE SVT5

Geographic coordinates: S18° 57' 21", E178° 13' 24" and S19° 3' 20", E178° 27' 0"

Area (km²): 2.6

Division: Eastern

Unique *iQoliqoli* ID number: Kadavu_MAP11_FOL05 and MAP12_FOL29, 32-33

TABLE 52: Details of Site Rating SVT5

Criteria	Details	Rating (out of 3)
Biophysical Justification	Mangroves and associated fauna, juvenile habitat for many reef species	3
Geographic Explicitness	Several isolated bays on south of island	2
Source Number and Type	More than one good report and expert advice available	2
Obligations (See Appendix C)	Relevant taxa: <i>Rhizophora</i> spp; and <i>Bruguiera</i> sp.	2
Overall Rating (Out of 12)		9

DETAILED DESCRIPTION OF HABITAT/ FEATURE

This site has a medium overall rating of 9 (Table 52) and includes the mangrove bays of south Kadavu (Map 20). Coastal mangroves found in sheltered bays along the coastline, connected to nearby fringing and barrier reefs, and passages, form an important network of juvenile habitats for many reef species⁵². The mangroves of Kadavu are still considered to be in good condition⁵³.

4.4 NORTH VITI LEVU

The north coast of the large island of Viti Levu is characterised by coastal mangroves, wetlands and tidal saline mudflats, with shallow patch reefs. It is relatively densely populated with one city, a town, and rural and semi-rural residential areas. There is intensive tourism development around Nadi town and the Denarau Peninsula. To the east of the area there are a few volcanic islands with fringing and offshore patch reefs, and several tourism resorts.

Sugar cane farming occurs all along this coast, and there are several large river estuaries. Due to watershed deforestation, many of the rivers carry a heavy sediment and nutrient load, and the offshore reefs and shoals are affected by muddy sediment deposition and algal overgrowths. Reefs in Nadi Bay have largely been buried under silt (Sykes, 2010b).

It is likely that at one time there were extensive mangrove forests along this coast, important for marine life productivity and coastal protection. Many have been removed, are currently being removed, or are projected for future removal for coastal development. In the Nadi and Vuna areas in particular, much of the remaining mangrove forest lies within areas planned for development (Watling, 1985, 1986), and clearance is ongoing. A few select developments are considering mangrove conservation and landscaping.

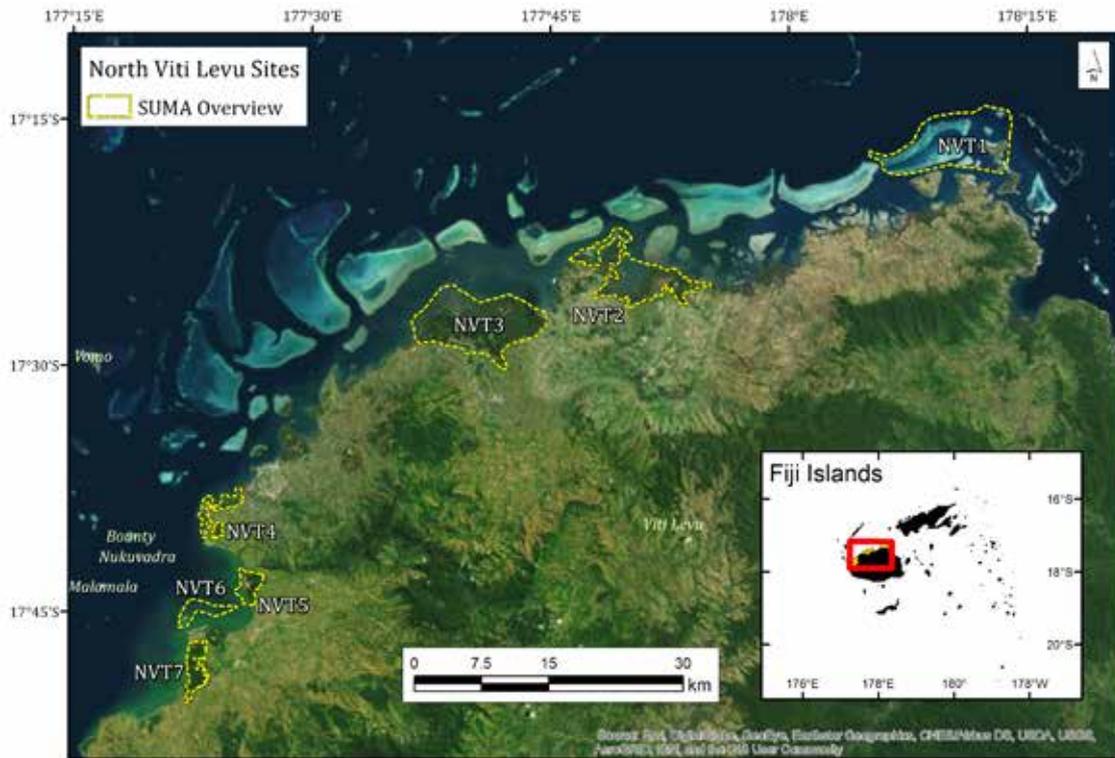
The tidal flats and mangroves are important feeding areas for a range of marine life including invertebrates, fish, sharks, turtles and marine mammals, as well as migratory and residential seabirds. In particular, the river estuaries of north Viti Levu are juvenile habitats for the scalloped hammerhead sharks, *Sphyrna lewini*, and blacktip reef sharks, *Carcharhinus melanopterus*, and are productive sources of estuarine fish and invertebrates important to local subsistence fishing (Sykes, 2006c).

To the east there are small islands with villages, resorts and private houses. These islands have narrow fringing reefs and an outer system of deeper patch reefs. Coral types on the fringing reefs are limited by sedimentation, but have reasonably high reef fish abundance, and the outer reefs have a high diversity of soft corals.

There are seven Special, Unique Marine Areas (SUMAs) identified to the north of Viti Levu (Map 21, Table 53). These are shown and described in more detail below.

⁵² A. Batibasaga, Fiji Ministry of Fisheries, pers. comm., 19.07.2016

⁵³ H. Wendt, IUCN, pers. Comm., 19.07.2016



MAP 21: NORTH VITI LEVU SITES

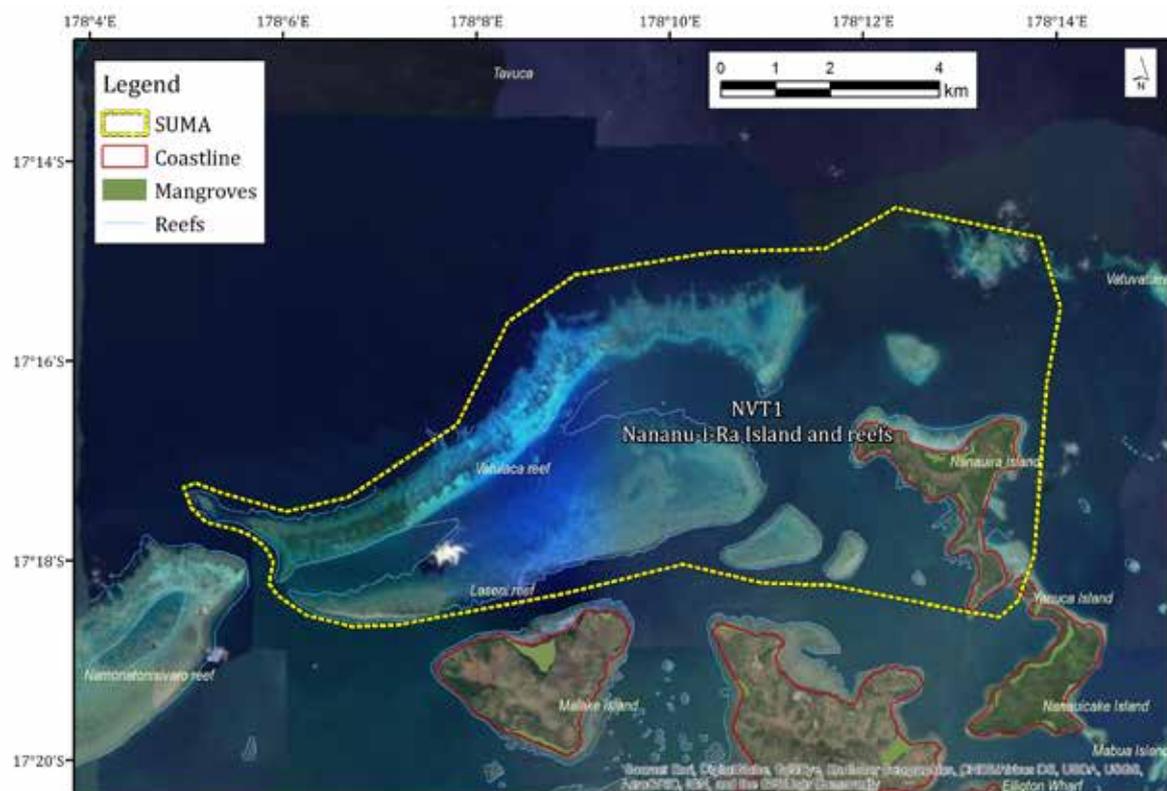
TABLE 53: NORTH VITI LEVU SITES

SUMA codes	Linked report codes	Name	Biophysical Justification	Rating
NVT1	New Site	Nananu-i-Ra Island and reefs	Fringing reef, turtle nesting site, and soft coral diversity.	9
NVT2	FIME CT6 FIME CF7 FIME SSC15 FIME E11	Tavua Peninsula	Mangroves, estuaries, mudflats, possible peat swamp, possible shorebirds, crustacean and mollusc productivity.	9
NVT3	FIME CT6 FIME CF7 FIME SSC15 FIME E11	Ba Delta	Mangroves, estuaries, mudflats, high fish diversity and crustacean and mollusc productivity.	11
NVT4	NES 19 NES 86	Dreketi and Saweni Mangroves and mudflats	Coastal and inland mangrove connectivity, mud crabs, mud lobsters, juvenile reef fish, shorebirds.	10
NVT5	New Site	Sabeto Delta Naisoso / Vulani Islands	Coastal mangroves and mudflats, river estuaries, seagrass, hammerhead sharks, blacktip reef sharks, seabirds.	11
NVT6	NES 23	Nadi Bay Reefs	Patch reefs, tiger shark, whitetip shark and scalloped hammerhead sharks.	9
NVT7	New Site	South Denarau Mangroves	Coastal mangroves and mudflats, river estuaries, seagrass beds, juvenile tiger, hammerhead and blacktip reef sharks, endemic fish, seabirds	10

SITE NVT1: NANANU-I-RA ISLAND AND REEFS

TABLE 54: Site description NVT1

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
NVT1	New Site	Nananu-i-Ra Island and reefs		9



MAP 22: SITE NVT1

Geographic coordinates: S17° 18' 39", E178° 6' 39" and S17° 14' 29", E178° 14' 1"

Area (km²): 75.5

Division: Western

Unique *iQoliqoli* ID number: Ra_MAP21_FOL25

TABLE 55: Details of Site Rating NVT1

Criteria	Details	Rating (out of 3)
Biophysical Justification	Fringing reef, turtle nesting, mangroves, humphead wrasse, soft coral diversity.	2
Geographic Explicitness	Island and fringing reefs, to outer patch reefs.	2
Source Number and Type	More than one good report and expert advice available.	2
Obligations (See Appendix C)	Relevant taxa: <i>Eretmochelys imbricata</i> ; <i>Cheilinus undulates</i> ; <i>Rhizophora</i> spp; and <i>Bruguiera</i> sp.	3
Overall Rating (Out of a potential 12)		9

DETAILED DESCRIPTION OF HABITAT/FEATURE

This site has a medium overall rating of 9 (Table 55) and includes Nananu-i-Ra Island and reefs (Map 22). Nananu-i-Ra is a grassy volcanic island almost 4 km long, separated from Nananu-i-Cake Island to the south by a narrow, shallow, passage, and about 4 km from the main north-east coast of the large island of Viti Levu. There are a few small-scale budget resorts and some private housing on the island, and two larger resorts and more houses on the facing main coast. Yachts frequent the bay.

It has a narrow fringing reef dropping to a shallow sandy seabed, in a highly sediment area where there are deep pools within unusual fine white aragonite deposits on the western leeward side (Sykes, 2003). Further offshore, the patch reefs, also heavily sediment, are broken by many passages and dominated by soft corals of the *Sarcophyton*, *Sinularia*, and *Dendronephthya genera* (Sykes, 2005b).

On the western side of the island hawksbill turtles, *Eretmochelys imbricata*, nest on the north-west beaches and patchy mangrove forests are found in the south-western bays (ibid). The reef slopes of the north and eastern sides of the Island are a juvenile habitat for humphead wrasse, *Cheilinus undulates* (Sykes, 2005c, 2012a).

SITE NVT2: TAVUA PENINSULA

TABLE 56: Site description NVT2

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
NVT2	FIME CT6 FIME CF7 FIME SSC15 FIME IE11	Tavua Peninsula		9



MAP 23: SITE NVT2

Geographic coordinates: S17° 21' 48", E177° 46' 46" and S17° 26' 47", E177° 52' 10"

Area (km²): 51.3

Division: Western

Unique *iQoliqoli* ID number: Ba_MAP06_FOL17

TABLE 57: Details of Site Rating NVT2

Criteria	Details	Rating (out of 3)
Biophysical Justification	Mangroves, estuaries, mudflats, possible peat swamp, crustacean and mollusc productivity.	3
Geographic Explicitness	Defined around coastline and watersheds.	2
Source Number and Type	More than one good report and expert advice available.	2
Obligations (See Appendix C)	Relevant taxa: <i>Rhizophora</i> spp; and <i>Bruguiera</i> sp.	2
Overall Rating (Out of a potential 12)		9

DETAILED DESCRIPTION OF HABITAT/FEATURE

This site has a medium overall rating of 9 (Table 57) and includes the Tavua Peninsula (Map 23). Along the long northern coastline of Viti Levu, the combined Ba and Nadi river catchment area covers 15 % of Viti Levu, and includes extensive saline mudflat areas and mangroves with adjacent highly silted reef systems supporting high fish biodiversity and productive fisheries⁵⁴.

Watershed deforestation contributes to elevated levels of suspended sediments and nutrient content in coastal waters (Klein et al., 2012). Riparian vegetation and mangroves along much of this coastline have been cleared to the high tide mark for agriculture and coastal development, leaving only narrow mangrove fringes with reduced ecological and coastal protection functions. This makes the remaining deeper, more intact mangrove forests of special conservation and fisheries interest (Watling, 1985).

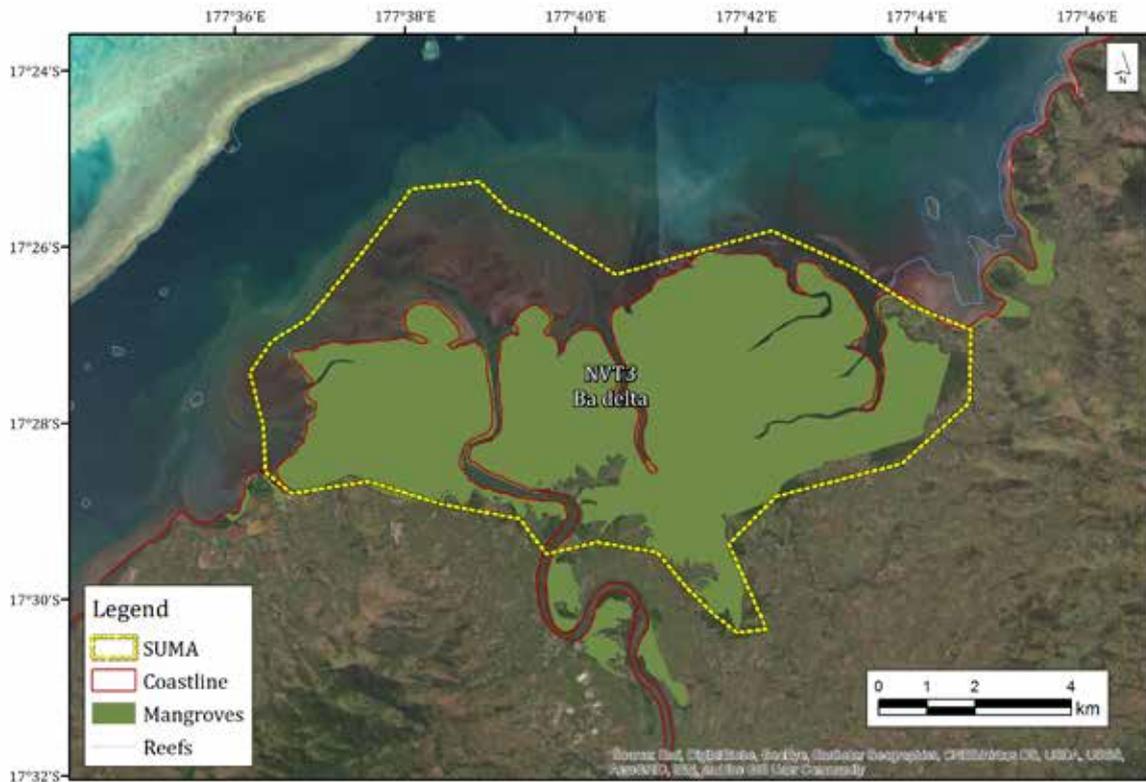
The Tavua Peninsula is an outcrop from the main coastline into the sea, with surrounding shallow reef flats, shoals, and small islands. Habitat diversity and connectivity between creeks, mangroves, bays and reefs form important feeding and breeding ground for marine life. It is also a productive area for crustaceans collected by local fishers.

SITE NVT3: BA DELTA

TABLE 58: Site description NVT3

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
NVT3	FIME CT6 FIME CF7 FIME SSC15 FIME IE11	Ba Delta		11

⁵⁴ M. Tuiwawa, University of the South Pacific, pers. comm., 19.07.2016



MAP 24: SITE NVT3

Geographic coordinates: S17° 30' 25", E177° 36' 9" and S17° 25' 17", E177° 44' 37"

Area (km²): 78.6

Division: Western

Unique *iQoliqoli* ID number: Ba_MAP06_FOL18

TABLE 59: Details of Site Rating NVT3

Criteria	Details	Rating (out of 3)
Biophysical Justification	Mangroves, estuaries, mudflats, high fish diversity and crustacean and mollusc productivity.	3
Geographic Explicitness	Mangrove delta and flats.	3
Source Number and Type	More than one good report and expert advice available.	2
Obligations (See Appendix C)	Relevant taxa: <i>Bruguiera gymnorrhiza</i> ; <i>Rhizophora stylosa</i> ; <i>R. samoensis</i> ; <i>R. sealea</i> .	3
Overall Rating (Out of a potential 12)		11

DETAILED DESCRIPTION OF HABITAT/FEATURE

This site has a high overall rating of 11 (Table 59) and includes the Ba Delta (Map 24). Similar to site NVT2, this area includes the Ba and Nadi river catchment area, which covers 15 % of Viti Levu, and includes extensive saline mudflat areas and mangroves with adjacent high silted reef systems, supporting high fish biodiversity and productive fisheries⁵⁵.

The Ba Delta supports the largest contiguous stand of mangroves in Fiji, some 3,995 hectares (of which 281 hectares is saline mudflat), which presumably in the past, would have included deeper forest with black mangrove, *Bruguiera gymnorrhiza*. Clearance of land to the high tide mark has reduced this to forest entirely made up of red mangrove, *Rhizophora species* in two main associations; one dominated by short *R. stylosa*, the other a mixed forest of *R. stylosa* and *R. samoensis*, but dominated by their taller hybrid, *R. sealea* (Watling, 1985).

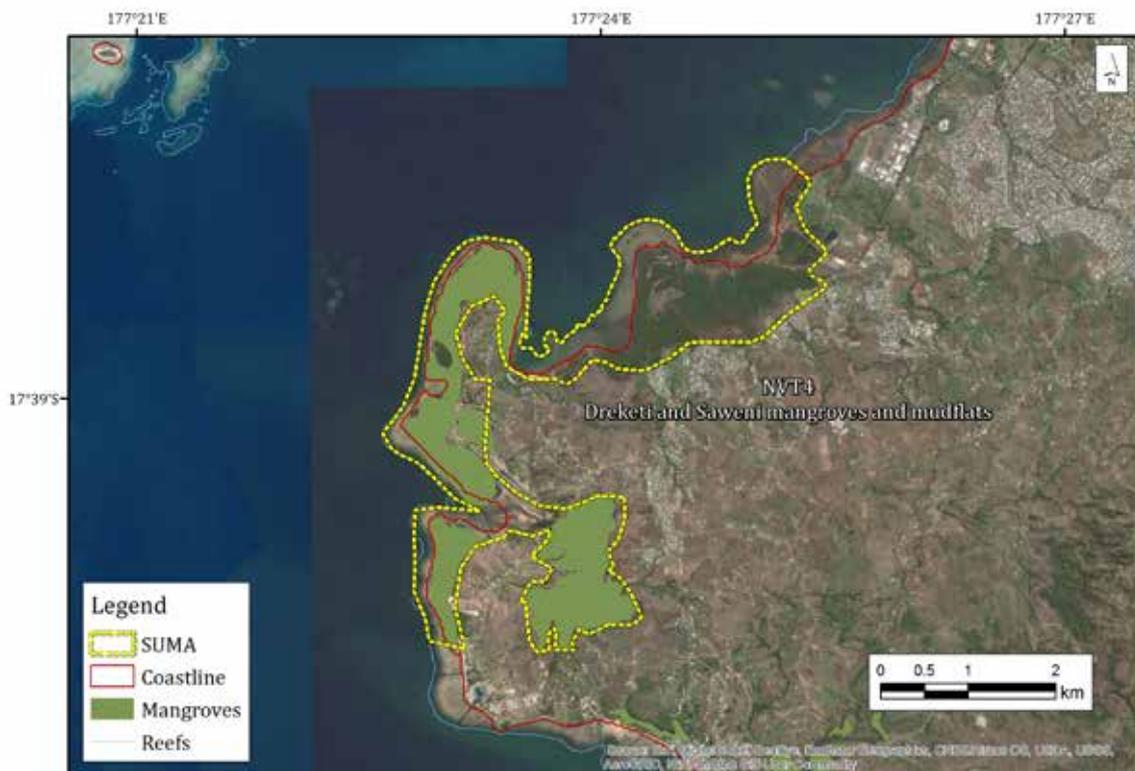
⁵⁵ M. Tuiwawa, University of the South Pacific, pers. comm., 19.07.2016

In Fiji's Mangrove Management Plan of 1985, this delta is described as sustaining one of the most important offshore fisheries in Fiji, making its preservation a national priority. The zoning suggested by Watling (1985) is for the seaward side to be a Resource Reserve, with its primary function for local fisheries, feeding, breeding and nursery grounds for marine species, and the landward side to be a Traditional Use Zone, where the primary use would be fisheries and limited wood cutting for traditional firewood, building and medicinal purposes. No large-scale cutting for commercial wood production or clearance for development would have been allowed.

SITE NVT4: DREKETI AND SAWENI MANGROVES AND MUDFLATS

TABLE 60: Site description NVT4

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
NVT4	NES 19 NES 86	Dreketi and Saweni mangroves and mudflats		10



MAP 25: SITE NVT4

Geographic coordinates: S17° 37' 32", E177° 22' 34" and S17° 40' 36", E177° 25' 26"

Area (km²): 9.2

Division: Western

Unique *iQoliqoli* ID number: Ba_MAP15_FOL21

TABLE 61: Details of Site Rating NVT4

Criteria	Details	Rating (out of 3)
Biophysical Justification	Coastal and inland mangrove connectivity, mud crabs, mud lobsters, juvenile reef fish, shorebirds.	3
Geographic Explicitness	Coordinates of mangroves along fringing reef and Dreketi Bay.	3
Source Number and Type	More than one good report and expert advice.	2
Obligations (See Appendix C)	Relevant taxa: <i>Rhizophora</i> spp; and <i>Bruguiera</i> sp.	2
Overall Rating (Out of a potential 12)		10

DETAILED DESCRIPTION OF HABITAT/FEATURE

This site has a high overall rating of 10 (Table 61) and includes the Dreketi/Saweni mudflats and mangroves (Map 25). Saweni mudflats lie in a wide bay between two outcrops of coastal mangrove forest. The saline mudflats provide important foraging grounds for migratory wading shorebirds⁵⁶. The mangrove forest extends to the west of the bay, providing coastal protection to the farmland and residential areas behind it, as well as creating feeding, breeding and nursery grounds for marine life species⁵⁷. In the past, the coastal forest has been cleared down to the high tide mark for agricultural land and coastal development (Sykes, 2009a), so the remaining forest is almost exclusively *Rhizophora* spp. (Watling, 1986).

At Dreketi Inlet, on rising and falling tides, swift currents run through a narrow channel into an inland bay filled with *Rhizophora* spp. And stunted *Rhizophora* trees in a shallow, muddy, tidal bay (Sykes, 2006d, 2007a). The bay is a foraging ground for migratory wading shorebirds, and is also a very productive fishery for local communities who collect mangrove crabs and fish amongst the mangrove forest and edges.

The bay is surrounded by higher land with small farms and local community residential houses. At times of high rainfall, all these areas drain into the bay, filling it with freshwater with a high load of coliform bacteria, thought to originate from untreated domestic sewage and farm animal excreta. The mangroves are very important in retaining and filtering this type of pollution, and stabilising the water quality in the coastal areas (Sykes, 2015b).

The seafront is the site of a resort, and there are plans for several more, including a yacht marina and an oil terminal. Current and future mangrove clearance remains a significant threat (Sykes, 2015c).

Two areas are registered as Sites of National Significance under the NES: Dreketi Inlet for its coastal environment and mangroves, and Saweni mudflats as a feeding site for migratory shorebirds.

SITE NVT5: SABETO DELTA, INCLUDING NAISOSO AND VULANI ISLANDS

TABLE 62: Site description NVT5

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
NVT5	New Site	Sabeto Delta, including Naisoso and Vulani Islands		11

⁵⁶ Government of Fiji, 1993. The National Environment Strategy. In: Watling D, Chape SA (eds). IUCN - World Conservation Union, Suva, Fiji

⁵⁷ T. Vodovodi, Ministry of Fisheries, pers. comm., 19.07.2016



MAP 26: SITE NVT5

Geographic coordinates: S17° 44' 44", E177° 25' 4" and S17° 42' 28", E177° 26' 54"

Area (km²): 7.8

Division: Western

Unique *iQoliqoli* ID number: Ba_MAP01_FOL03, 04

TABLE 63: Details of Site Rating NVT5

Criteria	Details	Rating (out of 3)
Biophysical Justification	Coastal mangroves and mudflats, river estuaries, seagrass, hammerhead sharks, blacktip reef sharks, seabirds.	3
Geographic Explicitness	Mangroves and flats between 2 estuaries.	3
Source Number and Type	More than one good report and expert advice available.	2
Obligations (See Appendix C)	Relevant taxa: <i>Rhizophora stylosa</i> ; <i>R. samoensis</i> ; <i>R. sealea</i> ; <i>Anas superciliosa</i> ; <i>Sphyrna lewini</i> ; <i>Carcharhinus melanopterus</i> ; <i>Trichiurus lepturus</i> ; <i>Polydactylus plebeius</i> .	3
Overall Rating (Out of a potential 12)		11

DETAILED DESCRIPTION OF HABITAT/FEATURE

This site received a high overall rating of 11 (Table 63) and includes the Sabeto Delta (Map 26). Between two large rivers emptying into Nadi Bay there are extensive stands of estuarine mangroves and tidal mudflats. The delta is proximate to Nadi Airport, and is surrounded by suburban residential areas expanding from the outskirts of Nadi town, and sugar cane farm fields. The coastal fringe of mangroves is *Rhizophora stylosa*, but the deeper forest along the river banks is a taller mixed forest of *R. stylosa* and *R. samoensis*, dominated by their hybrid, *R. sealea* (Watling, 1986).

Watershed deforestation contributes to elevated levels of suspended sediments and nutrient content in coastal waters (Klein et al., 2012), and clearance of riparian vegetation and mangroves in the Nadi Bay area has led to high levels of sediment run off from rivers into the bay and onto the heavily silted coral reefs⁵⁸. The seagrass beds and tidal mudflats provide feeding grounds for migratory shorebirds, and the Pacific Black Duck, *Anas superciliosa* (Sykes, 2006e).

⁵⁸ H. Sykes, pers. comm., 19.07.2016

The river estuaries and mangroves are productive grounds used by local fishers, many of whom net within the estuaries on falling tides, and collect significant amounts of estuarine and marine species (Batibasaga and Korovulavula, 1997). The river mouths are also a juvenile habitat for scalloped hammerhead sharks, *Sphyrna lewini*, blacktip reef sharks, *Carcharhinus melanopterus*, the hairtail “Tovisi”, *Trichiurus lepturus*, the striped threadfin “Uculuka”, *Polydactylus plebeius*, and other estuarine species (Sykes, 2006f).

SITE NVT6: NADI BAY REEFS

TABLE 64: Site description NVT6

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
NVT6	NES 23	Nadi Bay Reefs		9



MAP 27: SITE NVT6

Geographic coordinates: S17° 44' 44", E177° 25' 4" and S17° 42' 28", E177° 26' 54"

Area (km²): 8.2

Division: Western

Unique *iQoliqoli* ID number: Ba_MAP05_FOL01

TABLE 65: Details of Site Rating NVT6

Criteria	Details	Rating (out of 3)
Biophysical Justification	Patch reefs, tiger shark, whitetip shark and scalloped hammerhead shark ⁵⁹ .	2
Geographic Explicitness	Reefs within bay – quite loosely defined.	1
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice available or report.	3
Obligations (See Appendix C)	Relevant taxa: <i>Sphyrna lewini</i> , <i>Triaenodon obesus</i> , <i>Galeocerdo cuvier</i> , <i>Rhizophora</i> spp; and <i>Bruguiera</i> sp.	3
Overall Rating (Out of a potential 12)		9

DETAILED DESCRIPTION OF HABITAT/FEATURE

This site has a medium overall rating of 9 (Table 65). It includes Nadi Bay (Map 27), a wide bay around 9 km across with estuarine mangroves and patch reefs. Several large rivers empty into the bay, running through deforested land used for sugar cane farming. Nadi town is adjacent to the bay, and there is extensive residential, agricultural and tourism development in the area, including a busy port.

Mining of river rock and gravel used in land creation and construction of the Denarau, Sonaisali and Wailoaloa Fantasy resorts has contributed to frequent flooding in the area, and high sediment load in the river water (NatureFiji-MareqetiViti, 2010), resulting in the need to regularly dredge the port due to the rate of sedimentation from the watershed.

There are small areas of coral reef offshore of the estuaries and mangrove areas, and deeper patch reefs are found 1–2 km offshore (Lovell, 1995). In 1993, these reefs were considered to be Sites of National Significance for their recreational function. High levels of siltation have resulted in the death or near-death of most at these patch reefs and they can no longer be considered significant for ecosystems, community resources or for tourism uses (Sykes, 2010b)⁶⁰. However, the area remains a site that links riverine, mangrove and reef habitats, thus, the connectivity between these systems remains important (Jenkins and Mailautoka, 2011). Further, there is evidence that tiger sharks, scalloped hammerhead sharks and whitetip sharks are caught in the Nadi Bay River (Rasalato, et al., 2010); including juvenile hammerheads and whitetip, indicating that it may be a valuable breeding ground for these species⁶¹

SITE NVT7: SOUTH DENARAU MANGROVES

TABLE 66: Site description NVT7

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
NVT7		South Denarau Mangroves		10

⁵⁹ <https://divingfiji.blogspot.com/2012/01/to--rescue--fiji--times--online.html?m=0> accessed 16 November 2017

⁶⁰ T. Vodivodi, Ministry of Fisheries, pers. comm., 19.07.2016

⁶¹ <https://divingfiji.blogspot.com/2012/01/to-rescue-fiji-times-online.html?m=0> accessed 16 November 2017



MAP 28: SITE NVT7

Geographic coordinates: S17° 49' 40", E177° 21' 46" and S17° 46' 46", E177° 23' 10"

Area (km²): 9.4

Division: Western

Unique *iQoliqoli* ID number: Ba_MAP05_FOL01

TABLE 67: Details of Site Rating NVT7

Criteria	Details	Rating (out of 3)
Biophysical Justification	Coastal mangroves and mudflats, river estuaries, seagrass beds, juvenile tiger, hammerhead and blacktip reef sharks, endemic fish, and seabirds.	3
Geographic Explicitness	Estuaries of Nadi River, Denarau Peninsula.	2
Source Number and Type	More than one good report and expert advice available.	2
Obligations (See Appendix C)	Relevant taxa: <i>Sphyrna lewini</i> ; <i>Carcharhinus melanopterus</i> ; <i>Aetobatus narinari</i> ; <i>Mesopristes kneri</i> , <i>Rhizophora</i> spp; and <i>Bruguiera</i> sp.	3
Overall Rating (Out of a potential 12)		10

DETAILED DESCRIPTION OF HABITAT/FEATURE

This site has a high overall rating of 10 (Table 67) and includes the south Denarau Mangroves (Map 28). In 1961, there was an extensive mangrove swamp in the delta of the Nadi River⁶². Since the 1970s, much of it has been cleared and in-filled to create land for resort and residential developments, destroying a large portion of the mangrove forest, and altering the flow of the Nadi River (Watling, 1986).

Sections of the remaining mangroves south of the Denarau development are still undergoing clearance and in-filling⁶³. These remaining mangroves are productive grounds for estuarine and marine species, including scalloped hammerhead sharks, *Sphyrna lewini*, blacktip reef sharks, *Carcharhinus melanopterus*, eagle rays, *Aetobatus narinari*, and other estuarine species such as the endemic orange-spotted tharapon perch, *Mesopristes kneri* (Sykes, 2006c, 2006g).

⁶² Map of Viti Levu, Sheet 4, First Edition, constructed, drawn and photographed by the Directorate of Overseas Surveys 1961 (D.O.S. 648), Dept of Lands and Surveys, Fiji, 1983, reprinted 1989

⁶³ H. Sykes, pers. comm., 19.07.2016

4.5 WEST VITI LEVU

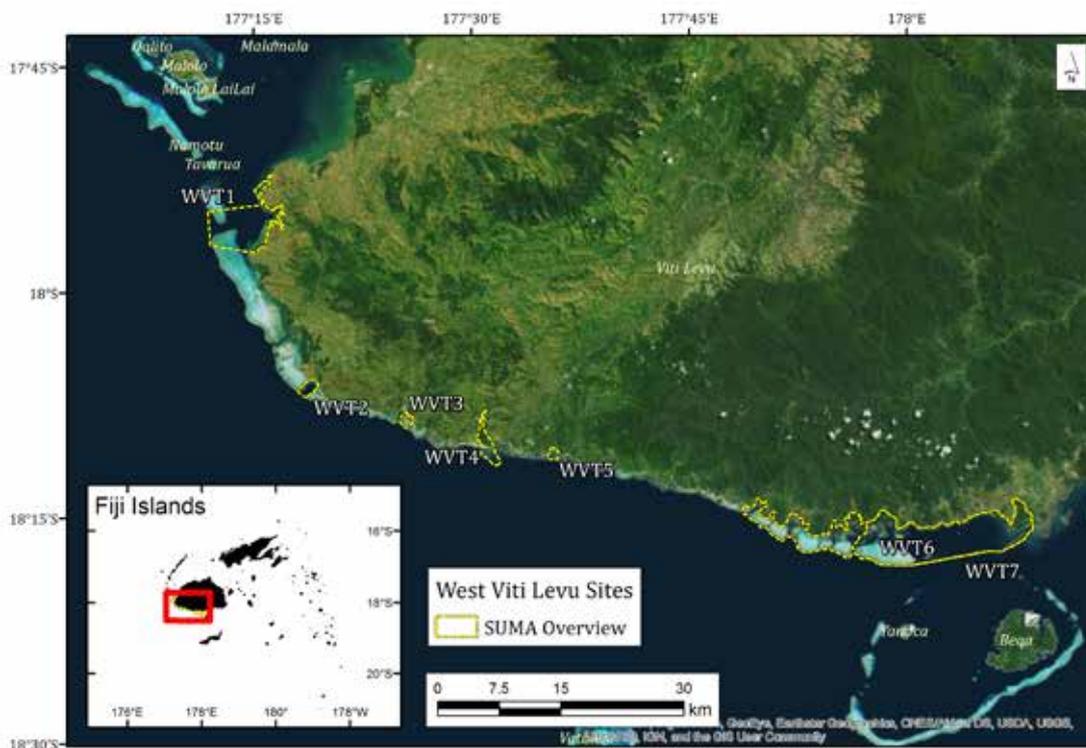
The west coast of the large island of Viti Levu (the “Coral Coast”) is characterised by a continuous narrow fringing reef flat, dropping over walls and steep slopes to deep oceanic waters, 400 m to 2 km from shore. The reef is broken by many channels and bays along the coast. There is no off-shore barrier reef, and islands are limited to small islets within the flat. The area has two towns, many villages, settlements and residential developments, and the highest level of tourism development in Fiji, particularly in the northern section (Fiji Bureau of Statistics, 2016).

Reef and seagrass health on the flats have been affected by coastal development⁶⁴, watershed degradation and over fishing. However, studies done in a series of small Locally-Managed Marine areas (LMMAs) have shown improvements in habitat quality and become hotspots for fish diversity and abundance, including humphead wrasse, *Cheilinus undulatus*, groupers and rabbitfish (Bonito et al., 2012).

The bays, channels and deeper reefs are focuses for megafauna such as, spinner dolphins, *Stenella longirostris* (Miller et al., 2016), green turtles, *Chelonia mydas*, tawny nurse sharks, *Nebrius ferrugineus*, leopard sharks, *Stegostoma fasciatum*, and guitarfish, *Rhynchobatus australiae*⁶⁵. A very high level of reef fish diversity has been recorded on one of the northern reef passages (Lovell and Sykes, 2004). Hawksbill turtles, *Eretmochelys imbricata*, nest on some of the remaining undisturbed beaches, but these are becoming few and far between⁶⁶.

In the southern half of the area there remain a few intact mangrove forests and seagrass beds (Sykes, 2016a), mostly around river estuaries and bays, remote from the highway. In the far south of the section there are patch reefs, which are part of an important tourism-driven shark conservation effort. Bull sharks, *Carcharhinus leucas*, and other sharks are known to utilise the river estuaries as juvenile habitat (Cardenosa et al., 2016).

There are seven Special, Unique Marine Areas (SUMAs) around the West of Viti Levu (Map 29, Table 68). These are shown and described in more detail below.



MAP 29: WEST VITI LEVU SITES

⁶⁴ V. Bonito, Reef Explorer, pers. comm., 19.07.2016

⁶⁵ Scuba Bula Dive Centre Fiji– WWF Relationship, <http://www.scubabula.com/HTML/ScubaBula/WWF.html>

⁶⁶ Preliminary Report on Turtle Occurrence in Sovi Bay, Viti Levu, Fiji (2007), Institute of Marine Resources, University of the South Pacific

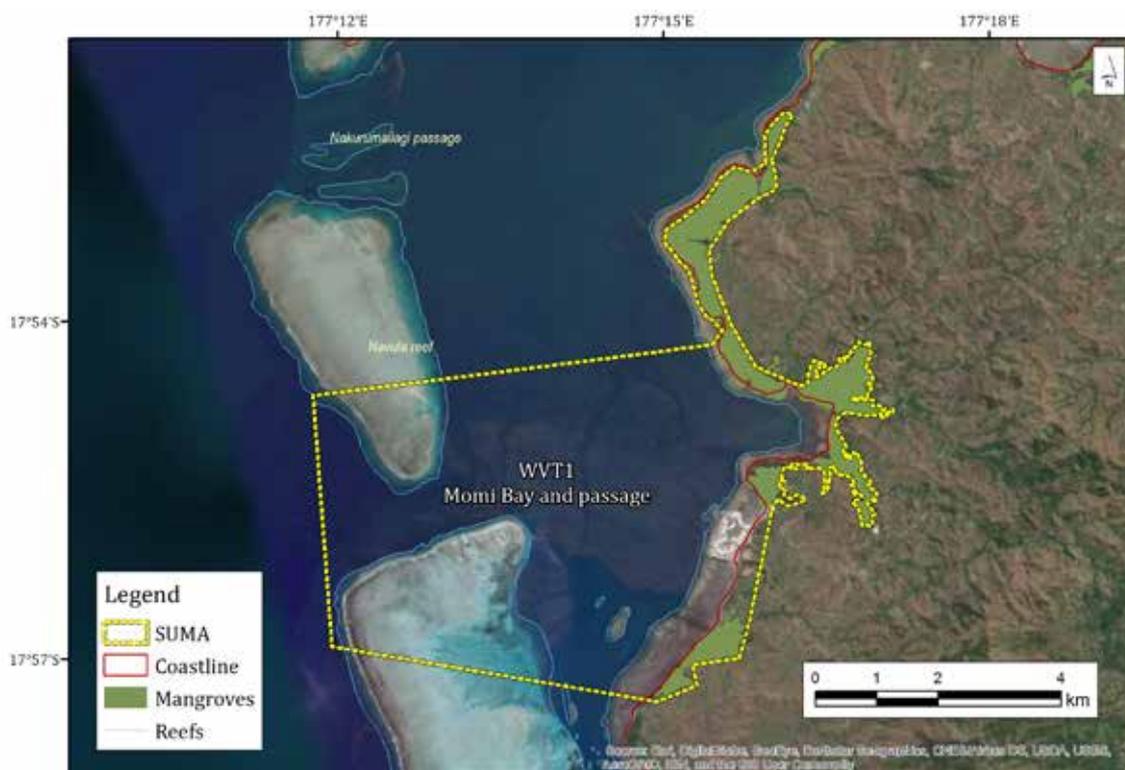
TABLE 68: WEST VITI LEVU SITES

SUMA codes	Linked report codes	Name	Biophysical Justification	Rating
WVT1	New Site	Momi Bay and passage	Mangroves, seagrass, tidal sand flats, seabirds, green turtles, sharks, spinner dolphins.	11
WVT2	NES 2 FIME CR10 FIME IE03	Natadola Bay	Fringing reef and seagrass beds, mangrove creek, spinner dolphins.	9
WVT3	NES 1 FIME CR10 FIME IE03	Yanuca Island, Cuvu	Fringing reef and reef flats.	7
WVT4	FIME CR10 FIME CT18 FIME IE03	Sigatoka Catchment	River estuary, sand dunes, sharks, shellfish, possible leatherback turtle nesting site.	10
WVT5	FIME CR10 FIME IE03	Sovi Bay	Fringing reef, turtle nesting site, dolphin resting area, and guitarfish.	10
WVT6	FIME CF3 FIME CR11	Serua mangroves and passages	Passages through fringing reefs, mangroves, seagrass, turtles, sharks, dolphins.	11
WVT7	FIME CR11 FIME CF3 FIME CT10 FIME CT25	Wainiyabia and Galoa shark corridor	Watershed connectivity, mangroves, seagrass, fringing reefs, patch reefs, reef fish, coral diversity, and shark conservation reserve.	10

SITE WVT1: MOMI BAY AND PASSAGE

TABLE 69: Site Description WVT1

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
WVT1	New site	Momi Bay		11



MAP 30: SITE WVT1

Geographic coordinates: S17° 52' 11", E177° 11' 44" and S17° 57' 25", E177° 17' 5"

Area (km²): 40.6

Division: Western

Unique *iQoliqoli* ID number: Nadroga_MAP07_FOL06, 07

TABLE 70: Details of Site Rating WVT1

Criteria	Details	Rating (out of 3)
Biophysical Justification	Mangroves, seagrass, tidal sand flats, seabirds, green turtles, sharks, spinner dolphins.	3
Geographic Explicitness	Mangroves and coastal sand flats to back of outer reef.	2
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice available or report.	3
Obligations (See Appendix C)	Relevant taxa: <i>Anas superciliosa</i> ; <i>Sphyrna lewini</i> ; <i>Chelonia mydas</i> ; <i>Carcharhinus leucas</i> ; <i>Aetobatus narinari</i> ; <i>Stenella longirostris</i> , <i>Rhizophora</i> spp; and <i>Bruguiera</i> sp.	3
Overall Rating (Out of 12)		11

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a high overall rating of 11 (Table 70), and includes Momi Bay (Map 30), a large bay with extensive mangroves, tidal sand flats, and a lagoon system with a wide passage through a barrier reef that drops steeply to deep water. The passage is the entry to the main navigable route for large ships accessing Lautoka Port. There are a few small resorts, a very large resort complex, and many small sugar cane farming settlements and residences.

The nearshore habitats include intact coastal and estuarine mangroves, which are juvenile fish habitats and productive grounds for collection of crustaceans and fish. The wide tidal sand flats provide feeding grounds for migratory and other seabirds, including the Pacific Black Duck, *Anas superciliosa* (Sykes, 2016b).

In the lagoon area, seagrass beds provide foraging grounds for green turtles, *Chelonia mydas*, which are frequently seen in the bay and on the outer reefs, and small patch reefs provide a valuable fishing resource for the local communities.

On the coral reefs of the passage and outer barrier reef slopes, there is great fish diversity (Lovell and Sykes, 2004), and there are frequent sightings of green turtles, bull sharks, *Carcharhinus leucas*, scalloped hammerhead sharks, *Sphyrna lewini*, and eagle rays, *Aetobatus narinari*⁶⁷. Spinner dolphins, *Stenella longirostris*, frequent the deeper waters of the bay and passage (Miller et al., 2016).

SITE WVT2: NATADOLA BAY

TABLE 71: Site Description WVT2

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
WVT2	NES 2 FIME CR10 FIME IE03	Natadola Bay		9



MAP 31: SITE WVT2

Geographic coordinates: S18° 7' 8", E177° 17' 50" and S18° 5' 52", E177° 19' 17"

Area (km²): 3.2

Division: Western

Unique *iQoliqoli* ID number: Nadroga_MAP08_FOL08, 09 and MAP_43_FOL56

⁶⁷ Scuba Bula Dive Centre Fiji– WWF Relationship, <http://www.scubabula.com/HTML/ScubaBula/WWF.html>

TABLE 72: Details of Site Rating **WVT2**

Criteria	Details	Rating
Biophysical Justification	Fringing reef and seagrass beds, mangrove creek, spinner dolphins.	2
Geographic Explicitness	Bay and enclosed reefs.	3
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice available or report.	3
Obligations (See Appendix C)	Relevant taxa: <i>Stenella longirostris</i> .	1
Overall Rating (Out of 12)		9

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a medium overall rating of 9 (Table 72), and includes Natadola Bay (Map 31), a long white sand beach in a deep, sheltered bay, with patches of coral reefs and seagrass. It is backed by a mangrove creek with standing water that breaks through the beach in times of flood⁶⁸.

The area has long been used for recreational purposes, with a surf break and several resorts, and was registered as a Site of National Significance under the NES for its coastal ecosystem, and recreational function.

Spinner dolphins, *Stenella longirostris*, rest in the deeper water of the bay (Miller et al., 2016), but otherwise there is little available information about the marine life.

SITE **WVT3**: YANUCA ISLAND, CUVU

TABLE 73: Site description **WVT3**

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
WVT3	NES 1 FIME CR10 FIME IE03	Yanuca Island, Cuvu		7

⁶⁸ H. Sykes., pers. comm., 19.07.2016



MAP 32: SITE WVT3

Geographic coordinates: S18° 8' 11", E177° 24' 52" and S18° 9' 9", E177° 25' 50"

Area (km²): 2.1

Division: Western

Unique *iQoliqoli* ID number: Nadroga_MAP07_FOL05

TABLE 74: Details of Site Rating WVT3

Criteria	Details	Rating
Biophysical Justification	Fringing reef, reef flats and mangroves.	1
Geographic Explicitness	Barrier reefs around island.	1
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice.	3
Obligations (See Appendix C)	Relevant taxa: <i>Rhizophora</i> spp; and <i>Bruguiera</i> sp.	2
Overall Rating (Out of 12)		7

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a medium rating of 7 (Table 74) and includes Yanuca Island (Map 32), a small, flat island situated on the fringing reef flats on the edge of Cuvu Bay, separated from the main Coral Coast by a narrow channel, only 100 m across. The area is heavily populated with two large villages on Viti Levu immediately facing the island, and a town less than 9 km away. The island is the site of the largest resort in Fiji with over 440 rooms, and a guest capacity of over 1,500⁶⁹.

The reef flats are wide and tidal, with deeper sections on the side of the bay. The reef flats to the south are shallow and frequently dry on low tides. Coral growth is sparse, and the flats are dominated by macro algae such as, *Sargassum* and *Turbinaria*. The reef on the western side of the island, on the edge of the bay, is deeper with more coral and fish life, and is the focus of most tourism activities, such as snorkelling. The channel between Yanuca Island and the coast of Viti Levu is narrow with coral and seagrass beds on the eastern section, but more sediment and muddy on the north side,

⁶⁹ List of Licensed Hotels in Fiji – 2016 Fiji Ministry of Tourism

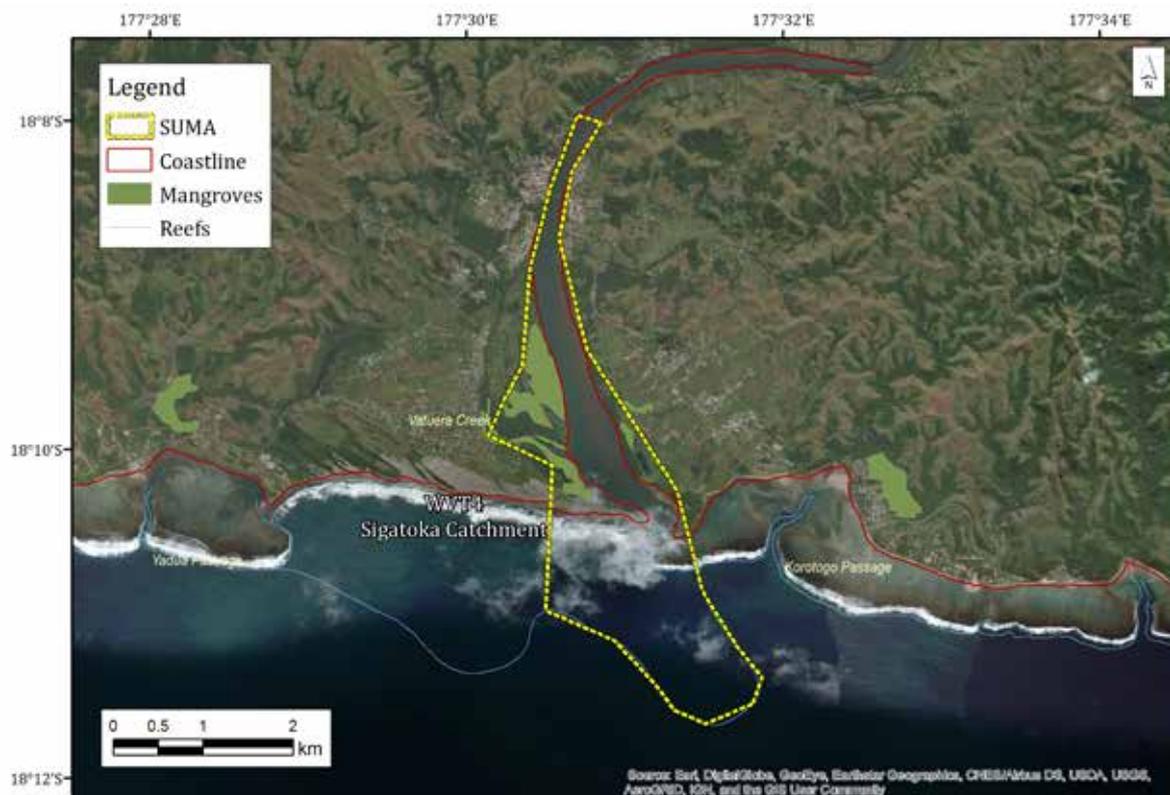
west of the culvert bridge. The resort has a mangrove planting programme focusing on the channel sides of the island (Sykes, 2012b).

In 1993, this site was listed on the Preliminary Register of Sites of National Significance, mainly for the importance of its coastal ecosystem as a recreational asset. Since that time there has been considerable degradation of the reef systems due to watershed influences and heavy siltation (Terry et al., 2006). In 2002, the resort and local community, in a unique partnership with an non-government organisation, formed a traditional marine protected area around the west and south coast (MPA News Staff, 2002).

SITE WVT4: SIGATOKA CATCHMENT

TABLE 75: Site description WVT4

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
WVT4	FIME CR10 FIME IE03 FIME CT18	Sigatoka Catchment		10



MAP 33: SITE WVT4

Geographic coordinates: S18° 11' 41", E177° 30' 7" and S18° 7' 59", E177° 31' 50"

Area (km²): 6.6

Division: Western

Unique *iQoliqoli* ID number: Nadroga_MAP08_FOL13

TABLE 76: Details of Site Rating WVT4

Criteria	Details	Rating
Biophysical Justification	River estuary, mangroves, sharks, shellfish, possible leatherback turtle nesting.	3
Geographic Explicitness	Estuary, mangroves and surrounding reef.	2
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice.	3
Obligations (See Appendix C)	Relevant taxa: <i>Dermochelys coriacea</i> ; Sphyrnidae spp; <i>Rhizopohora</i> spp; and <i>Bruguiera</i> sp.	2
Overall Rating (Out of 12)		10

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site received a high overall rating of 10 (Table 76) and includes the Sigatoka catchment area (Map 33). The Sigatoka river is the second largest river in Fiji, and its estuary contains the only existing sand dune formation in the South Pacific, a site of great archaeological interest⁷⁰ due to the Lapita pottery found there, dating from 800 BC and providing evidence of the first indigenous people of Fiji (Anderson and Clark, 1999). The estuary has been a traditional source of seafood for the past 3,000 years (Robb and Nunn, 2014).

Knowledge about the marine environment is less well known, as the water is very turbid with sandy sediments from the shore, exacerbated by sand and gravel mining in the river mouth⁷¹. However, hammerhead sharks (*Sphyrna* spp.) and larger sharks have been reported near to the river mouth, and an unknown shark species reported up to 30 km upriver (Rasalato et al., 2010). Satellite tagging has suggested that this may be a leatherback turtle, *Dermochelys coriacea*, nesting site⁷².

SITE WVT5: SOVI BAY

TABLE 77: Site description WVT5

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
WVT5	FIME CR10 FIME IE03	Sovi Bay		10

⁷⁰ National Sites and places of Heritage Significance in Fiji, A collaborative submission by the Department of Heritage & Arts, Fiji Museum and National Trust of Fiji. <http://www.fijiembassydc.com/about-fiji/FIJIS-NATIONAL-HERITAGE-SITES.pdf>

⁷¹ Naiova, M (2008), Environmental and Resource Management Consultants December 2007, Fiji Preliminary Environmental Impact Assessment Report– Aggregate Extraction in Selected Sites of the Navua and Sigatoka Rivers and The Sigatoka Sand Dunes, South Viti Levu, EU-EDF 8/9 SOPAC Project Report 99 Reducing Vulnerability of Pacific ACP States

⁷² A. Ralifo, WWF, pers. comm., 19.07.2016



MAP 34: SITE WVT5

Geographic coordinates: S18° 10' 25", E177° 35' 4" and S18° 11' 20", E177° 35' 48"

Area (km²): 1.7

Division: Western

Unique *iQoliqoli* ID number: Nadroga_MAP09_FOL14

TABLE 78: Details of Site Rating WVT5

Criteria	Details	Rating
Biophysical Justification	Fringing reef, turtle nesting site, dolphin resting area, guitarfish.	2
Geographic Explicitness	Bay, enclosed reefs and beach.	3
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice.	3
Obligations (See Appendix C)	Relevant taxa: <i>Eretmochelys imbricata</i> ; <i>Stenella longirostris</i> ; <i>Rhynchobatus australiae</i> .	2
Overall Rating (Out of 12)		10

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a high overall rating of 10 (Table 78). It includes Sovi Bay (Map 34), a large bay on the Coral Coast. There are reefs along the edge of the bay, and a long, steep beach with an extensive area of beach rock in the centre. Waves in the bay are often large, breaking with force on the central area of the beach. A creek lies behind the beach head, normally stagnant, but which breaks through the beach at times of heavy rainfall, carrying river silt onto the reefs. The beach head, between the bay and the creek, was, until recently, covered with littoral forest, but there has been recent clearance for development alongside the road (Sykes, 2007b).

The beach was identified as an active hawksbill turtle, *Eretmochelys imbricata*, nesting site in 2007, one of the few remaining along the Coral Coast⁷³. Dive operators in the area have reported regularly seeing guitarfish, *Rhynchobatus australiae* (not recorded in Fiji except on the Coral Coast) on the reefs at the corner of the bay, and spinner dolphins, *Stenella longirostris*, are known to rest in the deeper waters of the bay, especially females with young calves (Miller et al., 2016)⁷⁴.

⁷³ Preliminary Report on Turtle Occurrence in Sovi Bay, Viti Levu, Fiji (2007) Institute of Marine Resources, University of the South Pacific

⁷⁴ K. Birch, Aquasafari, Fiji, pers. comm., 19.07.2016

SITE WVT6: SERUA MANGROVES AND PASSAGES

TABLE 79: Site description WVT6

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
WVT6	FIME CF3 FIME CR 11	Serua mangroves and passages		11



MAP 35: SITE WVT6

Geographic coordinates: S18° 18' 4", E177° 48' 38" and S18° 13' 57", E177° 57' 13"

Area (km²): 136.3

Division: Central

Unique *iQoliqoli* ID number:

Geographic coordinates: S18° 18' 4", E177° 48' 38" and S18° 13' 57", E177° 57' 13"

Area (km²): 42.8

Division: Central

Unique *iQoliqoli* ID number: Serua_MAP04_FOL25-32

TABLE 80: Details of Site Rating WVT6

Criteria	Details	Rating
Biophysical Justification	Passages through fringing reefs, mangroves, seagrass, turtles, sharks, dolphins.	3
Geographic Explicitness	Stretch of connected mangrove bays, fringing reefs, and passages.	2
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice available or report.	3
Obligations (See Appendix C)	Relevant taxa: <i>Chelonia mydas</i> ; <i>Stenella longirostris</i> ; <i>Rhynchobatus australiae</i> ; <i>Stegostoma fasciatum</i> ; <i>Nebrius ferrugineus</i> , <i>Rhizophora</i> spp; and <i>Bruguiera</i> sp.	3
Overall Rating (Out of 12)		11

DETAILED DESCRIPTION OF HABITAT/ FEATURE:

This site has a high overall rating of 11 (Table 80) and covers a stretch of connected mangrove bays, fringing reefs, patch reefs and passages off the coastline of Fiji's largest volcanic island (Map 35). Most development in the area is along the roadside, quite far from the coast, but there are several villages and small-scale resorts on the coast.

There are extensive estuarine and coastal mangroves and coastal vegetation in the bays, particularly near Galoa-Namatakula, Nadiri-Malomalo, Namaqumaqua and Komave villages. Serua village has a mangrove replanting project. These mangroves and associated seagrass beds are important to local fisheries and juvenile reef species⁷⁵. Some of the villages (Namaqumaqua and Serua, and possibly others) have Locally-Managed Marine protected areas⁷⁶.

The passages through the fringing reefs harbour the most diverse range of shark species recorded on the Coral Coast, including guitarfish, *Rhynchobatus australiae* (not recorded in Fiji except on the Coral Coast), zebra sharks, *Stegostoma fasciatum*, and nurse sharks, *Nebrius ferrugineus*. Green turtles are frequently seen on the outer reefs (Sykes, 2015a). Spinner dolphins, *Stenella longirostris*, are known to rest in the deeper bays (Miller et al., 2016).

SITE WVT7: WAINIYABIA AND GALOA SHARK CORRIDOR

TABLE 81: Site description WVT7

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
WVT7	FIME CF3 FIME CR 11 FIME CT10 FIME CT25	Wainiyabia and Galoa shark corridor		10

⁷⁵ A. Batibasaga, Ministry of Fisheries, pers. comm., 19.07.2016

⁷⁶ H. Sykes, pers. comm., 19.07.2016



MAP 36: SITE WVT7

Geographic coordinates: S18° 14' 3", E177° 57' 2" and S18° 18' 29", E178° 8' 36")

Area (km²): 91.5

Division: Central

Unique *iQoliqoli* ID number: Serua_MAP03_FOL22-24 and Serua_MAP04_FOL25, 26

TABLE 82: Details of Site Rating WVT7

Criteria	Details	Rating
Biophysical Justification	Watershed connectivity, mangroves, seagrass, fringing reefs, patch reefs, reef fish and coral diversity, shark conservation reserve	3
Geographic Explicitness	River estuary and coastal area out to patch reefs	2
Source Number and Type	At least one peer reviewed paper or report	3
Obligations (See Appendix C)	Relevant taxa: <i>Carcharhinus leucas</i> , <i>Rhizophora</i> spp; and <i>Bruguiera</i> sp.	2
Overall Rating (Out of 12)		10

DETAILED DESCRIPTION OF HABITAT/ FEATURE:

This site has a high overall rating of 10 (Table 82) and covers a stretch of low coastal land (Map 36), which is quite densely developed with villages, local residential complexes, resorts and a town.

The Navua River watershed is part of a RAMSAR site, a recognised wetland of international importance. This terrestrial site includes the largest patch of wild endemic Sago palm, *Metroxylon vitiense*, and the Melimeli and Vunimoli peat swamps, the only extensive swamp forest in Fiji (262 ha)⁷⁷. The connectivity of this wetland with the mangroves and marine habitat is unique in Fiji.

⁷⁷ RAMSAR Convention http://ramsar.rgis.ch/cda/en/ramsar-news-archives-2012-fiji-report-unca/main/ramsar/1-26-45-520%5E25939_4000_0__

Downstream of the wetland, the Navua river estuary opens out onto sandy shores, seagrass beds, and patch reefs. Patchy mangrove forests remain along the estuary of the river and certain creek mouths, but many have been cleared or are currently being cleared, for coastal developments and flood control (Watling, 1986). A few areas, such as the Waikalou creek, have areas of entire black and white mangrove forest, with tree species, and endemic reptile and bird inhabitants, which are becoming less common as land is cleared to the high tide mark (Sykes, 2016a).

The Navua river and creek mouths are important juvenile habitats for many fish and for bull sharks, *Carcharhinus leucas* (Cardenosa et al., 2016). A nationally gazetted marine reserve used for shark diving was established on one of the patch reefs in 2004, along with an agreement to ban shark fishing in a larger shark corridor as part of a shark conservation programme run by a dive tourism operator⁷⁸. A high level of fish diversity, including, at least, eight shark species (Sykes, 2015a) are found in this protected area⁷⁹.

4.6 EAST VITI LEVU

This area stretches from Suva City, the capital of Fiji and the largest city in the South Pacific Islands with an active commercial port and a population of around 80,000 people in 2007⁸⁰, around the Rewa delta, the largest mangrove wetland in Fiji, and up the eastern coast, an area of traditional villages, mangrove forests, tidal mudflats and patch reefs.

Suva City and its suburbs are heavily populated, and this, along with the large amount of shipping in the harbour, poses multiple pollution problems for the marine ecosystem (Sykes and Morris, 2007). Despite this, the tidal mudflats, mangroves and shallow reefs are still a viable resource for migratory and indigenous seabirds, sharks, and invertebrate life. The Rewa delta is a critical pupping habitat for the survival of scalloped hammerhead sharks (Marie et al., 2017) and the Rewa River itself is an important habitat for Bull Sharks (pers comm. Ciro Riko). Around the Suva peninsula, there are extensive and productive mudflats, reef flats, and mangroves important to local communities, including some community managed protected areas with high biodiversity (IUCN, 2009).

The eastern coast supports extensive mangrove forests, particularly the delta of the Rewa River, recognised as the most productive mangrove community in Fiji, on which many subsistence and small scale commercial fishers rely, and which has been strongly recommended for protection against felling, clearance and pollution (Watling, 1985). Of additional importance is the function of mangroves as a carbon sink. The more than 8,600 hectares of mangrove forest in the Rewa delta represent approximately 15 million tonnes of carbon dioxide equivalent, (tCO₂e), and that clearance of only 500 hectares would be the equivalent of Fiji's entire annual carbon emissions from fossil fuels (Heider, 2013).

The offshore reefs tend to be sediment, but the numerous sandbanks and shoals support seagrass and algal beds important to foraging turtles and feeding seabirds, and provide rich invertebrate habitats, important to community fishing economies. There are turtle and seabird nesting grounds found on two small coral islands and several sand banks of the outer reef systems. The channel and reefs between them have spinner dolphins, *Stenella longirostris*, large numbers of eagle rays, *Aetobatus narinari*, is a migratory route for whales (Miller et al., 2016), and has one of the highest levels of reef fish biodiversity recorded for Fiji on one of the patch reefs in this area⁸¹.

The threat level to reefs in the area varies greatly with proximity to land. Those close to the densely populated coastline are under very high threat from coastal development, watershed degradation and over fishing. Those near Suva Harbour have an additional threat from marine pollution, while the offshore reefs have a lower threat level, mainly from overfishing⁸².

There are eight Special, Unique Marine Areas (SUMAs) in the east of Viti Levu (Map 37, Table 83). These are shown and described in more detail below.

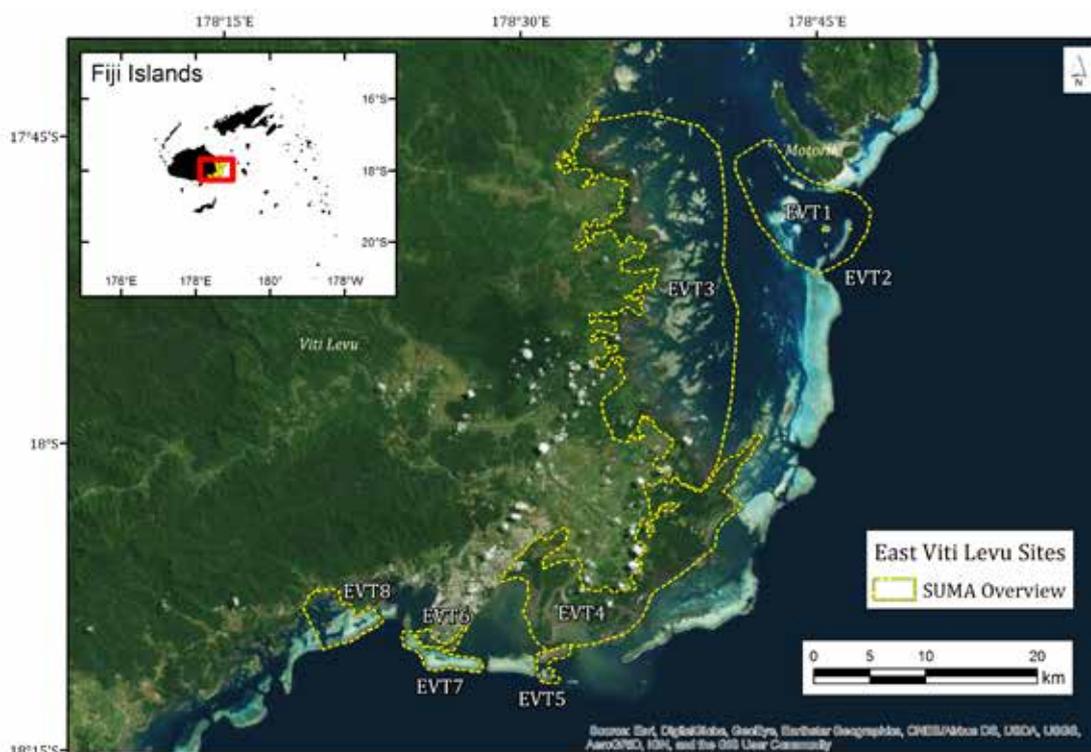
⁷⁸ Fisheries Shark Reef Marine Reserve, Serua Regulations 2014., Legal notice No.41 Government of Fiji Gazette Supplement No. 20, pp 264–266

⁷⁹ Earle, J., Whitton, R., Pyle, R (2010), Shark Reef Marine Reserve (SRMR) Fish List <http://fijisharkdive.com/conservation/shark-reef-fish-list/>

⁸⁰ Census 2007 Results: Population Size, Growth, Structure and Distribution Statistical News No 45, 15 October 2008 Fiji Islands Bureau of Statistics

⁸¹ H. Sykes, unpublished data

⁸² Burke et al 2011 Reefs at Risk Revisited. WRI: Washington DC. and ReefBase: a Global Information System for Coral Reefs



MAP 37: EAST VITI LEVU SITES

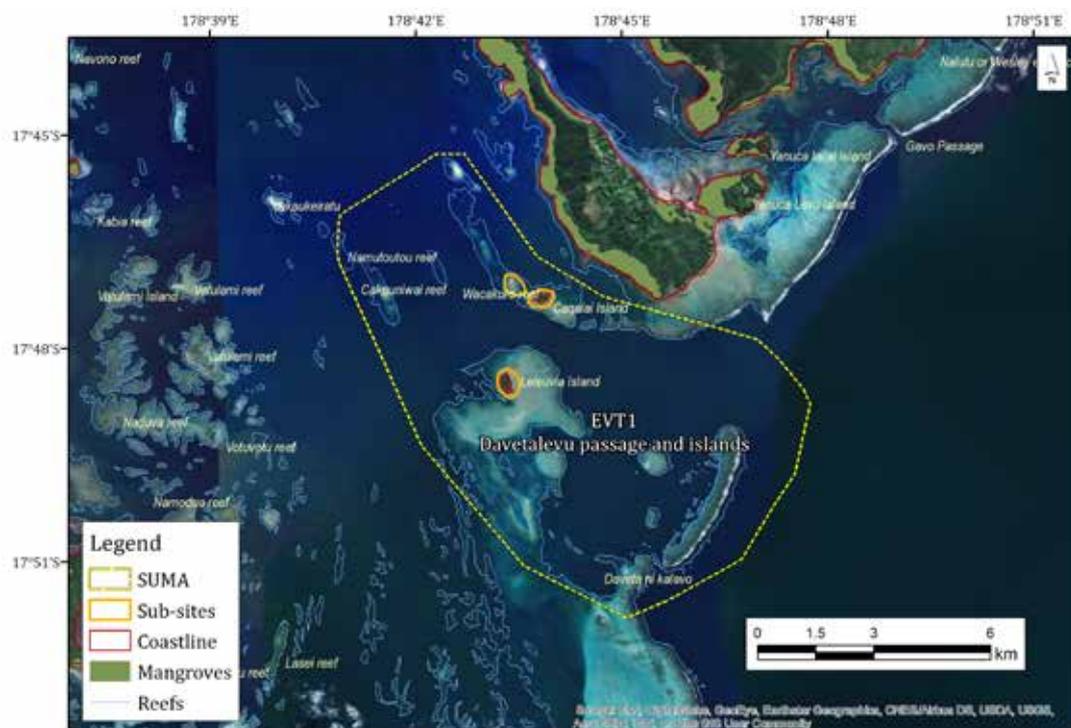
TABLE 83: EAST VITI LEVU SITES

SUMA codes	Linked report codes	Name	Biophysical Justification	Rating
EVT1	EBSA 14	Daveta levu passage and islands	Channel, fringing reefs seagrass beds, turtle nesting, dolphins, eagle rays, bumphead parrotfish, humphead wrasse, 3 species of shark, high fish diversity.	10
EVT2	NES 37 FIME CT9 FIME IE06	Toberua and Mabualau Islands	Limestone islets, seabird and sea snake nesting site and black mangroves.	10
EVT3	EBSA 14 FIME CR12	Tailevu mangroves and mudflats	Mangroves, seagrass and algal beds, fringing and patch reefs, connectivity from river estuary to reef, migratory shorebirds and seabird nesting, endemic estuarine fish, grouper and rabbitfish spawning.	10
EVT4	FIME CT5	Rewa delta	Intact watershed, wetland, mangrove, seagrass connectivity, scalloped hammerhead and bull shark nurseries, seabirds.	12
EVT5	NES 45 FIME CT5 FIME CF4	Nukulau and Makuluva islands	Watershed, connectivity to reef, scalloped hammerhead sharks, possible turtle nesting site.	8
EVT6	NES 87 FIME CT20 FIME IE07	Suva mudflats	Shorebirds foraging grounds (<i>Tringa incana</i> , <i>Limosa lapponica</i>), invertebrate life, seagrass	8
EVT7	NES 38 FIME IE07	Suva barrier reef	Barrier reef, back reef, patch reef, and passage.	7
EVT8	New Site	Namuka Bay	Coastal mangroves patch reefs, passage, barrier reef connectivity, local marine protection and restored biodiversity.	10

SITE EVT1: DAVETALEVU PASSAGE AND ISLANDS

TABLE 84: Site description EVT1

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
EVT1	EBSA 14	Daveta levu passage and islands with subsites Wacakuro, Leleuvia and Cagalai Islands		10



MAP 38: SITE EVT1

Geographic coordinates: S17° 51' 47", E178° 40' 51" and S17° 45' 15", E178° 47' 44")

Area (km²): 80.1

Division: Central

Unique *iQoliqoli* ID number: Tailevu_MAP23_FOL67 and MAP_14_FOL70 & 71

TABLE 85: Details of Site Rating EVT1

Criteria	Details	Rating scale of 1:12
Biophysical Justification	Channel, fringing reefs seagrass beds, turtle nesting, dolphins, eagle rays, bumphead parrotfish, humphead wrasse, 3 species of shark, high fish diversity.	3
Geographic Explicitness	Passage and islands.	2
Source Number and Type	More than one good report and expert advice available.	2
Obligations (See Appendix C)	Relevant taxa: <i>Carcharhinus albimarginatus</i> ; <i>Stenella longirostris</i> ; <i>Tursiops truncatus</i> ; <i>Aetobatus narinari</i> ; <i>Nebrius ferrugineus</i> ; <i>Bolbometopon muricatum</i> ; <i>Cheilinus undulatus</i> ; <i>Eretmochelys imbricata</i> .	3
Overall Rating (Out of 12)		10

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a high overall rating of 10 (Table 85). It includes the Daveta Levu passage (Map 38), which lies between Ovalau and Viti Levu Islands, forming a deep channel flanked by patch reefs with two sandy low-lying islets on either side, emerging from extensive shallow reef shoals. The channel has strong traditional implications, believed to be the site of a vanished island still held in reverence by the local community (Nunn et al., 2005). The islands are the sites of small tourism developments.

In the waters of the passages and deeper patch reefs, grouper breeding aggregations and chainsaw shark/sawfish, *Pristiophoridae*, (species unconfirmed) have been reported⁸³. Very high fish diversity has been recorded from one of the outer patch reefs⁸⁴. Pelagic apex predators such as silvertip sharks, *Carcharhinus albimarginatus*, spinner dolphins, *Stenella longirostris*, and bottlenose dolphins, *Tursiops truncatus*, are often seen, and on the shallower reefs, eagle rays, *Aetobatus narinari*, tawny nurse sharks, *Nebrius ferrugineus*, bumphead parrotfish, *Bolbometopon muricatum*, and humphead wrasse, *Cheilinus undulatus*, are found⁸⁵.

Hawksbill turtles, *Eretmochelys imbricata*, are frequently seen foraging on the shallow reef shoals and nest on Leleuvia and Caqalai Islands (subsites) (Laveti et al., 2011)⁸⁶. Seagrass and edible seaweed (sea grapes, *Caulerpa* spp; lumi, *Gracilaria* spp.) beds are found on the shallow shoals between Leleuvia Island and the Rewa delta, and are collected by the local population for food and for sale⁸⁷.

Leleuvia Island Resort also manages a MPA and coral planting programme. A sandbank on Wacakuro reef (subsites) is known for seabird nesting. Caqalai reef flat supports aggregation of sea snakes on an islet⁸⁸.

SITE EVT2: TOBERUA AND MABUALAU ISLANDS

TABLE 86: Site description EVT2

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
EVT2	NES 37 FIME CT9 FIME IE06	Mabualau (Bird Island) and Toberua Island		10

⁸³ A. Batibasaga, Fiji Ministry of Fisheries, pers. comm., 19.07.2016

⁸⁴ H. Sykes, unpublished data

⁸⁵ Seru, Leleuvia Island Divemaster, pers. comm., 19.07.2016

⁸⁶ Nature Fiji: Hawksbill turtle (*Eretmochelys imbricata*), <https://naturefiji.org/hawksbill-turtle-eretmochelys-imbricata/>

⁸⁷ M. Tuiwawa, University of the South Pacific, pers. comm., 19.07.2016

⁸⁸ L. Fernandes, pers. comm., 19.07.2016



MAP 39: SITE EVT2

Geographic coordinates:

Toberua S17° 49' 32", E178° 45' 16" and S17° 49' 42", E178° 45' 28"

Area (km²): 0.1

Mabualau S17° 49' 39", E178° 46' 38" and S17° 49' 33", E178° 46' 44"

Area (km²): 0.02

Division: Central

Unique *iQoliqoli* ID number: Tailevu_MAP_14_FOL71

TABLE 87: Details of Site Rating EVT2

Criteria	Details	Rating (out of 3)
Biophysical Justification	Limestone islets, seabird including red footed boobies, and sea snake nesting site and black mangroves.	2
Geographic Explicitness	Two small islands and surrounding reefs.	2
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice available or report.	3
Obligations (See Appendix C)	Relevant taxa: <i>Sula</i> spp; <i>Bruguiera gymnorrhiza</i> , <i>Rhizophora</i> spp; <i>Laticauda</i> spp.	3
Overall Rating (Out of 12)		10

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a high overall rating of 10 (Table 87) and includes Mabualau and Toberua Islands (Map 39), which are two very small upraised limestone islets about 5 km from one another, one lying on a shallow reef shoal, the other on the barrier reef east of the Suva Peninsula and the Rewa Delta. Toberua Island is the site of a small resort, which occupies the entire island, while Mabualau is uninhabited.

Both islands are resting and breeding areas for large numbers of sea snakes, the banded krait, *Laticauda colubrina* (Shetty and Shine, 2002a), with the largest number on Mabualau (Shetty and Shine, 2002b).

TABLE 89: Details of Site Rating EVT3

Criteria	Details	Rating (out of 3)
Biophysical Justification	Mangroves, seagrass and algal beds, fringing and patch reefs, connectivity from river estuary to reef, migratory shorebirds and seabird nesting, endemic estuarine fish, grouper and rabbitfish spawning.	3
Geographic Explicitness	Coastline to patch reefs.	2
Source Number and Type	More than one good report and expert advice available.	2
Obligations (See Appendix C)	Relevant taxa: <i>Siganus spinus</i> ; <i>Mesopristes kneri</i> , <i>Rhizophora</i> spp; and <i>Bruguiera</i> sp	3
Overall Rating (Out of 12)		10

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a high overall rating of 10 (Table 89) and includes Tailevu mudflats and reefs (Map 40). The stretch of coastline is broken by many small river and creek estuaries, including one tributary of the Rewa River. The area is a culturally important site, containing Bau Island, the chiefly seat of the Fijian chief Cakobau, and the site of several historical ship wrecks^{90,91}.

The Rewa River Delta, as a whole, contains the largest mangrove ecosystem complex in the country (Watling, 1985). This site contains around 25–30% of that area, is the most remote from Suva City, and has high potential impacts of clearance for development. Coastal mangrove stands are connected through shallow shoals and mudflats to patch reefs (Tuiwawa et al., 2013).

The mangrove areas include intact forests, which contain a full complement of the Fijian mangrove tree and associate species, creating important juvenile habitats for many marine species, as well as coastal protection from storms and erosion (Sykes, 2016c).

The rivers bring large sediment loads down to the sea, creating areas where seagrass and macro-algae beds thrive. These are areas of high productivity, where local communities regularly fish and collect invertebrates and edible seaweed (sea grapes, *Caulerpa* spp; lumi, *Gracilaria* spp.)⁹².

Spawning aggregations of groupers occur on the patch reefs, and the seagrass beds support aggregations of spine foot rabbitfish, *Siganus spinus*, an important traditional totem fish in Fiji⁹³. An endemic fish, the orange spotted tharapon, *Mesopristes kneri*, is found in the estuaries.

Migratory shorebirds feed on the mudflats and nest on small islands nest⁹⁴. Vatulami Island (subsite), a small sandbank on a shallow reef shoal, is on the preliminary register of Sites of National Significance as a seabird nesting colony.

SITE EVT4: REWA DELTA

TABLE 90: Site description EVT4

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
EVT4	FIME CT5 FIME CF4	Rewa River Delta with subsite Nasoata Mangrove Island		12

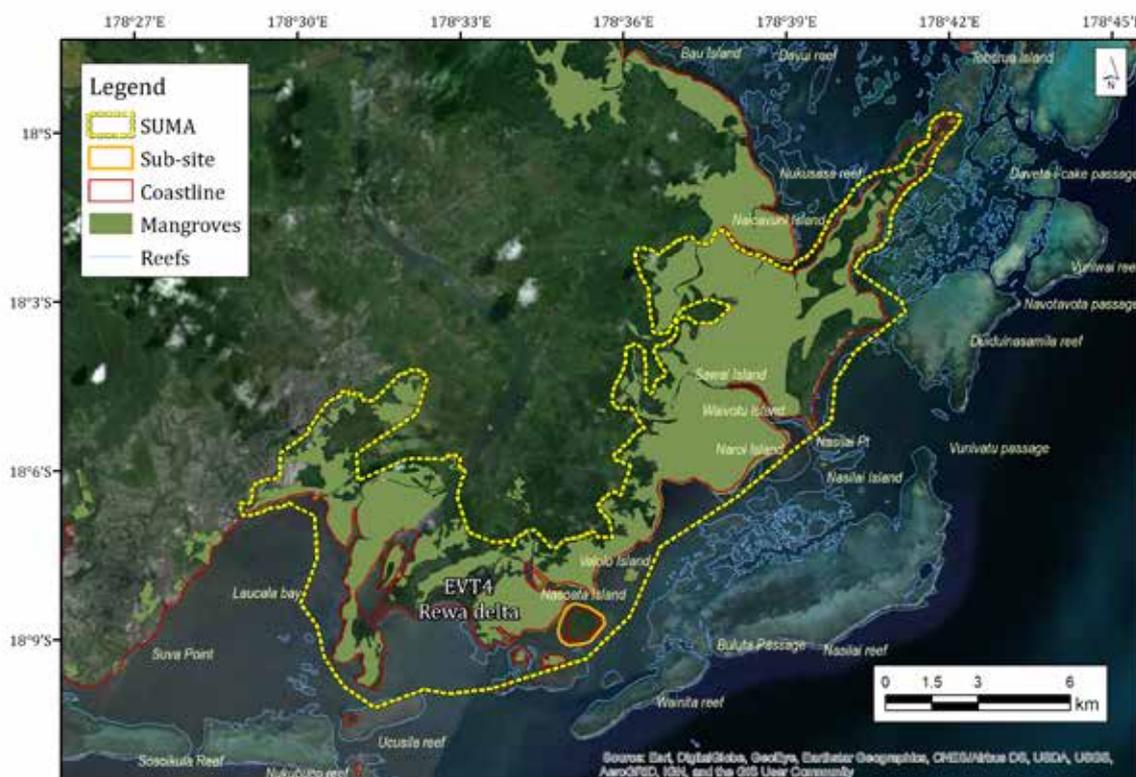
⁹⁰ A.M. Ratunabuabua, Fiji Museum, pers. comm., 19.07.2016

⁹¹ E. Erasito, National Trust of Fiji, pers. comm., 19.07.2016

⁹² M. Tuiwawa, University of the South Pacific, pers. comm., 19.07.2016

⁹³ A. Batibasaga, Fiji Ministry of Fisheries, pers. comm., 19.07.2016

⁹⁴ M. Tuiwawa, University of the South Pacific, pers. comm., 19.07.2016



MAP 41: SITE EVT4

Geographic coordinates: S18° 10' 13", E178° 29' 40" and S18° 1' 55", E178° 41' 11"

Area (km²): 112.8

Division: Central

Unique *iQoliqoli* ID number: Rewa_MAP_20_FOL 90-92

TABLE 91: Details of Site Rating EVT4

Criteria	Details	Rating (out of 3)
Biophysical Justification	Intact watershed, wetland, mangrove, seagrass connectivity, scalloped hammerhead and bull shark nurseries.	3
Geographic Explicitness	Mangrove areas along river and estuary.	3
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice available or report.	3
Obligations (See Appendix C)	Relevant taxa: <i>Carcharhinus leucas</i> ; <i>Sphyrna lewini</i> , <i>Rhizophora</i> spp; and <i>Bruguiera</i> sp.	3
Overall Rating (Out of 12)		12

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a high overall rating of 12 (Table 91) and includes the stretch of coastline covering the main estuary and delta of the Rewa River (Map 41), the largest mangrove ecosystem complex in the country. The western sections extend to Laucala Bay on the outskirts of Suva City, where the fringes of the forest are subject to frequent pressures to allow clearance for development⁹⁵.

⁹⁵ H. Sykes, pers. comm., 19.07.2016

The Rewa Delta hosts the largest and most diverse area of mangroves, including the Bonatoa Swamp, the largest swamp in Fiji (Tuiwawa et al., 2013), and Nasoata Mangrove Island (subsite), a proposed RAMSAR wetlands site⁹⁶. The delta has been recognised as the most productive mangrove community in Fiji, on which many subsistence and small scale commercial fishers rely, and has been strongly recommended for protection against felling, clearance and pollution (Watling, 1985). The Rewa delta river estuaries are pupping grounds for bull sharks, *Carcharhinus leucas* (Rasalato et al., 2010), and a critical nursery habitat for scalloped hammerhead sharks, *Sphyrna lewini* (Amandine et al., 2017).

Coastal mangrove stands are connected through shallow shoals and mudflats with seagrass beds to patch reefs. These richly productive grounds support a local subsistence and small-scale commercial fishing industry for the inhabitants of the area, and are rich feeding grounds for many indigenous and migratory birds (Watling, 2006).

SITE EVT5: NUKULAU AND MAKULUVA ISLANDS

TABLE 92: Site description EVT5

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
EVT5	NES 45 FIME CT5 FIME CF4	Nukulau and Makuluva Islands		8



MAP 42: SITE EVT5

Geographic coordinates: S18° 11' 46", E178° 30' 43" and S18° 9' 59", E178° 32' 26"

Area (km²): 5.3

Division: Central

Unique *iQoliqoli* ID number: Rewa_MAP_20_FOL91

⁹⁶ RAMSAR (2014), Nasoata mangrove island Fiji: Update on Ramsar Site nominations and development of a Pacific Mangrove Declaration, 10 April 2014 <http://www.ramsar.org/news/fiji-update-on-ramsar-site-nominations-and-development-of-a-pacific-mangrove-declaration>

TABLE 93: Details of Site Rating EVT5

Criteria	Details	Rating (out of 3)
Biophysical Justification	Watershed, connectivity to reef, scalloped hammerhead sharks, possible turtle nesting site.	2
Geographic Explicitness	Small islands on reef shoals.	2
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice.	3
Obligations (See Appendix C)	Relevant taxa: <i>Sphyrna lewini</i> .	1
Overall Rating (Out of 12)		8

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a medium overall rating of 8 (Table 93) and includes Nukulau and Makuluva Islands (Map 42). These two small sandy islands, each one less than 500 m long, lie on patch reefs at the end of the Suva Barrier Reef, on the side of the Daveta Nukulau passage. They are used for recreational purposes by the inhabitants of the area, with picnic facilities and caretakers on each island. This recreational function was recognised by the inclusion of Makuluva in the preliminary register of Nationally Significant Sites⁹⁷

The patch reefs are shallow and dominated by macro-algae, affected by storm waves, pollution and overfishing (Sykes and Morris, 2007). They are regularly used by local fishermen and as a training site for students from the local university studying marine life. Dead juvenile scalloped hammerhead sharks, *Sphyrna lewini*, were found washed up on the beach of Nukulau Island in 2013⁹⁸, indicate some connectivity between the nursery grounds of the Rewa delta and the foraging grounds of these reefs (Amandine et al., 2017).

SITE EVT6: SUVA MUDFLATS

TABLE 94: Site description EVT6

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
EVT6	NES 87 FIME CT20 FIME IE07	Suva mudflats		9

⁹⁷ Fiji National Environment Strategy (1993) Preliminary register of Sites of National Significance.

⁹⁸ Fisheries verifying dead baby sharks report, 8 January 2013, Fiji Broadcasting Corporation, <http://www.fbc.com.fj/fiji/7217/fisheries-verifying-dead-baby-sharks-report> -



MAP 43: SITE EVT6

Geographic coordinates: S18° 9' 3", E178° 24' 39" and S18° 10' 9", E178° 27' 12"

Area (km²): 3.7

Division: Central

Unique *iQoliqoli* ID number: Rewa_MAP_19_FOL34

TABLE 95: Details of Site Rating EVT6

Criteria	Details	Rating (out of 3)
Biophysical Justification	Important shorebirds foraging grounds, invertebrate life, seagrass.	3
Geographic Explicitness	Mudflats off Suva point.	2
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice.	3
Obligations (See Appendix C)	Relevant taxa: <i>Limosa lapponica</i>	1
Overall Rating (Out of 12)		9

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a medium overall rating of 9 (Table 95) and is inside the barrier reef, and includes the tidal mudflats off Suva Point (Map 43), with some seagrass beds (McKenzie and Yoshida, 2007). These areas are dry at low tide and are very important wintering feeding grounds for a number of migratory shorebirds (Watling, 2006), including bar-tailed gotwit, *Limosa lapponica*, the highest density of wandering tattlers, *Tringa incanus*, in the world. This site also represents the only globally important area for shorebirds in Fiji⁹⁹.

There are public health concerns about the level of pollutants found in the marine organisms in this area (Morrison et al., 2001).

⁹⁹ O'Brien M, pers. comm., 19.14.2016

SITE EVT7: SUVA BARRIER REEF

TABLE 96: Site description EVT7

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
EVT7	NES 38 FIME IE07	Suva barrier reef		7



MAP 44: SITE EVT7

Geographic coordinates: S18° 11' 13", E178° 23' 53" and S18° 9' 11", E178° 27' 10"

Area (km²): 10.2

Division: Central

Unique *iQoliqoli* ID number: Rewa_MAP_19_FOL34

TABLE 97: Details of Site Rating EVT7

Criteria	Details	Rating (out of 3)
Biophysical Justification	Barrier reef, back reef, patch reef, and passage.	2
Geographic Explicitness	Barrier reef between two passages.	2
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice.	3
Obligations (See Appendix C)	No obligations registered.	0
Overall Rating (Out of 12)		7

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a medium overall rating of 7 (Table 97) and includes the Suva barrier reef (Map 44), which lies within 2 km of Suva City, the largest city in the South Pacific Islands and an active commercial port. The barrier reef itself encloses the city peninsula and neighbouring Laucala Bay, and drops steeply into water more than 300 m deep.

Suva City and its suburbs are heavily populated, and this, along with the large amount of shipping in the harbour, poses multiple pollution problems for the marine ecosystem (Sykes and Morris, 2007). The back and patch reefs are contaminated by heavy metals and trace elements (Morrison et al., 2001), and invertebrates collected here are sometimes contaminated (Davis et al., 1998).

The back reef is frequently used as a training ground for students from the University of the South Pacific, so there is good data on coral health and reef populations, and the reefs are considered structurally sound and in moderate health. The local community regularly fish the back reefs for recreational and subsistence purposes, which led to the site's inclusion in the preliminary register of Nationally Significant Sites¹⁰⁰. However, these practices have led to over-collection of many species.

SITE EVT8: NAMUKA BAY

TABLE 98: Site description EVT8

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
EVT8	New Site	Namuka Bay		10



MAP 45: SITE EVT8

¹⁰⁰ Fiji National Environment Strategy (1993) Preliminary register of Sites of National Significance.

Geographic coordinates: S18° 7' 7", E178° 18' 53" and S18° 10' 9", E178° 22' 56"

Area (km²): 21.8

Division: Central

Unique *iQoliqoli* ID number: Rewa_MAP_19_FOL36

TABLE 99: Details of Site Rating EVT8

Criteria	Details	Rating (out of 3)
Biophysical Justification	Coastal mangroves, patch reefs, passage, barrier reef connectivity. Local marine protection, restored biodiversity.	3
Geographic Explicitness	From mangroves in bay to outer reaches of barrier reef	2
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice.	3
Obligations (See Appendix C)	Relevant taxa: <i>Rhizophora</i> spp; and <i>Bruguiera</i> sp.	2
Overall Rating (Out of 12)		10

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a high overall rating of 10 (Table 99) and includes Namuka Bay (Map 45), which lies about 7 km west of Suva City, and is a populated area with local villages, and other residential settlements along the Queens Highway. There are narrow strips of, *Rhizophora* spp. red mangrove, along the coastline (Watling, 1986), and shallow patch reefs within the lagoon connecting to the barrier reef. A large passage leads into the naval base at Togalevu.

Invertebrate numbers in the mangroves are high, and species such as the three-spot swimming crab, *Portunus sanguinolentus*, and the youthful Venus clam shell, *Periglypta puerpera*, (kaidamu) were observed. These species, once common, are much reduced in many areas of Fiji¹⁰¹. The community started a Locally-Managed Marine area on the shallow reef top in 2002 (IUCN, 2009), which has resulted in the recovery of marine biodiversity and the return of species not seen in the area for many years¹⁰².

4.7 VATU-I-RA PASSAGE

One of the most ecologically significant areas in Fiji, this open-water passage lies between the two large islands of Viti Levu and Vanua Levu (Jupiter et al., 2012). It contains deep water features such as abyssal basins, slopes, escarpment, and only one very small uninhabited island, which is an important seabird nesting habitat.

There are extensive barrier and patch reefs, and several pinnacle reefs rising as steep-sided towers out of deep water, which provide foci along migratory routes for pelagic and migratory species, such as scalloped hammerhead sharks, *Sphyrna lewini*, humpback whales, *Megaptera novaeangliae*, short-finned pilot whales, *Globicephala macrorhynchus*, and spinner dolphins, *Stenella longirostris* (Miller et al., 2016).

There is a large community-managed protected area (110.5 km²), which includes one of the barrier reefs and the bird-nesting island Vatu-i-Ra (WCS, 2017, Sykes et al., 2018). This island and the surrounding foraging grounds are recognised as Important Bird and Biodiversity Area (IBA) for black noddies, *Anous minutus*, red footed boobies, *Sula* spp; and lesser frigate birds, *Fregata ariel*¹⁰³. Spinner dolphins, *Stenella longirostris*, forage throughout the area and rest and calve in the sheltered waters of Moon Reef. This reef is an offshore pinnacle to the south of the area, forming the focus of a small tourism operation and a marine protected area (Cribb et al., 2012).

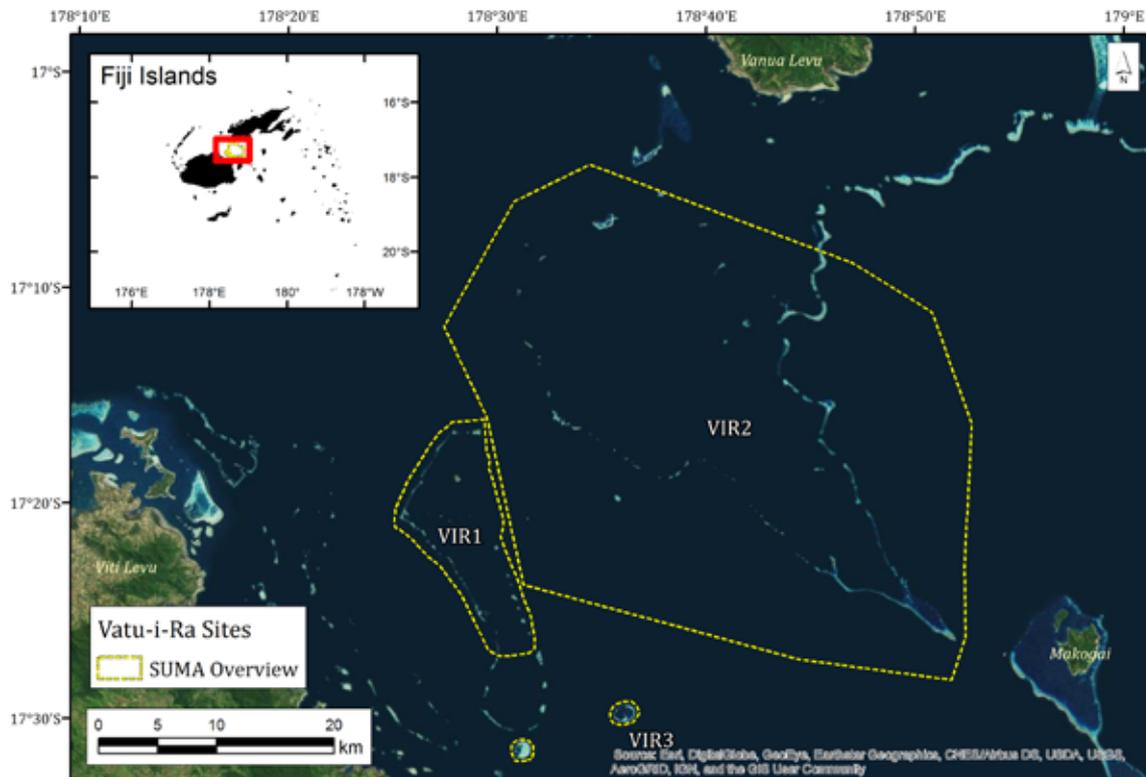
¹⁰¹ R. Dautei, University of the South Pacific, in prep

¹⁰² Thaman, R.R., Balawa, A., Fong, T., Bukarau S. (2014), Voices from the Lagoon: A Retrospective Taxonomic Assessment of the Recovery of a Managed Fishery– A Case Study of the Vanua Navakavu, Fiji Islands, Technical briefing on Data-poor Fisheries Management Approach: Cross Hotel Conference Room, Suva, Fiji, 16th October 2014

¹⁰³ BirdLife International (2017) Important Bird Areas factsheet: Vatu-i-Ra. <http://www.birdlife.org> on 10/03/2017

Hawksbill turtles, *Eretmochelys imbricata*, frequent and feed in the area, which is also a migratory route for green turtles, *Chelonia mydas*. The area is world-famous amongst tourism SCUBA divers for abundant marine life, and extensive and varied stands of soft corals of the *Dendronephthya*, *Chironephthya*, and *Siphonogorgia species* (Lovell and Sykes, 2008), and several land-based and ship-based dive operators run trips into the passage.

There are three Special, Unique Marine Areas (SUMAs) in the Vatu-i-Ra Passage (Map 46, Table 100). These are shown and described in more detail below.



MAP 46: VATU-I-RA SITES

TABLE 100: VATU-I-RA SITES

SUMA codes	Linked report codes	Name	Biophysical Justification	Rating
VIR1	IBA FJ05 IBA FJ17 NES 35 FIME CT11 FIME CR7 FIME CF20 FIME CF25	Vatu-i-Ra Island and reef	Small island, resident seabirds, turtle nesting site, barrier reef, fish abundance, and soft corals.	12
VIR2	IBA FJ17 FIME CR7 FIME CF20 FIME SSC1	Vatu-i-Ra passage	Deep channel, barrier and patch reefs, upwelling, pinnacles, whales, dolphins, sharks, apex predators, turtles, seabirds, and high fish and coral diversity.	11
VIR3	EBSA 14	Moon Reef and Cakau Davui	Offshore pinnacle reefs, whales, and spinner dolphin resting and calving area.	12

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a high overall rating of 12 (Table 102) and includes Vatu-i-Ra Island and reef (Map 47). The Vatu-i-Ra reef is a large offshore barrier reef on the edge of a deep water passage between the two main islands, with a small volcanic island enclosed by the northern section.

Vatu-i-Ra Island was included on the Preliminary Register of Sites of National Significance as a seabird nesting colony. It is uninhabited and approximately 300 m long, and is a nesting site for many species of seabirds, including black noddies, *Anous minutus*, red footed boobies, *Sula* spp., and lesser frigate birds, *Fregata ariel*, for which it is recognised as a globally IBA¹⁰⁴. A rat eradication programme to help with nest protection was completed in 2007 (Saunders et al., 2007).

The reef system includes fringing reef around the island, the lagoon, reef flats and slopes of the barrier reef, and small pinnacle reefs outside the north end of the barrier reef (Obura and Mangubhai, 2002). The pinnacles have large amounts of *Dendronephthya*, soft corals, and high hard coral cover, attracting SCUBA diving tourists to the area. A portion of the reef and waters was established as a locally managed protected area by the community in 2011. The area was extended in 2016 to include 110.5 km² of reefs, waters and Vatu-i-Ra Island, through a partnership supported by local government, NGOs and the tourism industry (WCS, 2017, Sykes et al., 2018). Divers see hawksbill turtles, *Eretmochelys imbricata*, and green turtles, *Chelonia mydas*, in the waters, and the local community report that dolphins and whales are regularly seen.

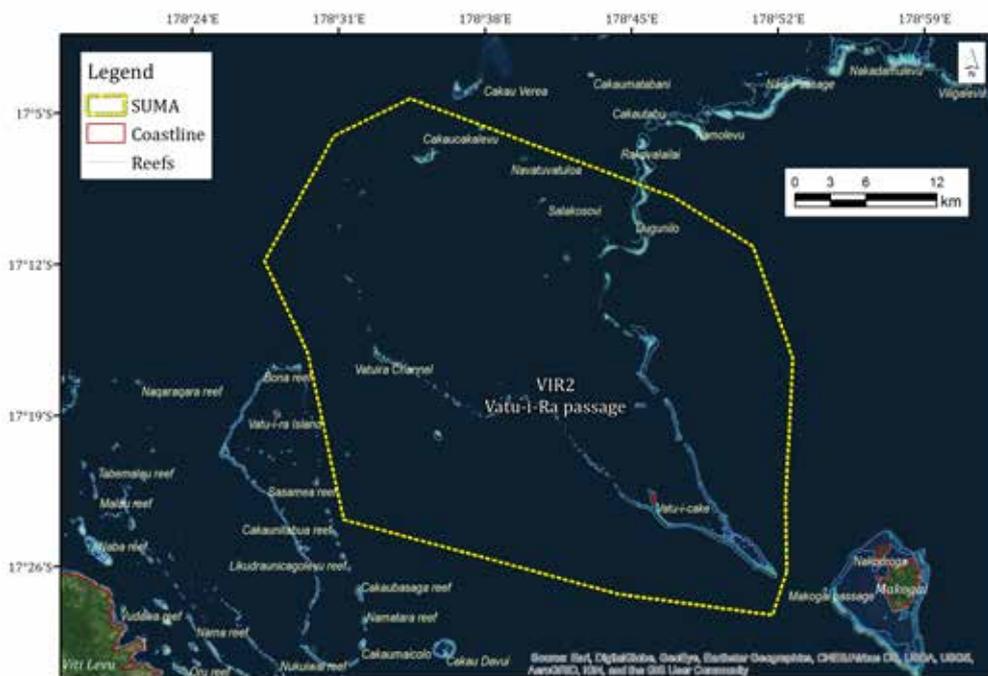
The hard corals have survived coral bleaching and cyclone damage over multiple years, and have shown a fast recovery rate, which attests to their resilience in the face of climate change (Lovell and Sykes, 2008). The reefs towards the north of the proposed protected area survived Cyclone Winston that passed through Fiji in February, 2016 (Mangubhai, 2016) and continue to be popular with international divers.

SITE VIR2: VATU-I-RA PASSAGE

TABLE 103: Site description VIR2

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
VIR2	IBA FJ17 FIME CR7 FIME CF20 FIME SSC1	Vatu-i-Ra passage		11

¹⁰⁴ BirdLife International (2017) Important Bird Areas factsheet: Vatu-i-Ra. <http://www.birdlife.org> on 10/03/2017.



MAP 48: SITE VIR2

Geographic coordinates: S17° 4' 21", E178° 27' 25" and S17° 28' 16", E178° 52' 43")

Area (km²): 1,410.6

Division: Western

Unique *iQoliqoli* ID number: Ra_MAP22_FOL27, and BUA_MAP41_FOL06

TABLE 104: Details of Site Rating VIR2

Criteria	Details	Rating (out of 3)
Biophysical Justification	Deep channel, barrier and patch reefs, upwelling, pinnacles, whales, dolphins, sharks, apex predators, turtles, seabirds, high fish and coral diversity.	3
Geographic Explicitness	Channel between main islands, encompassing barrier reef.	2
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice.	3
Obligations (See Appendix C)	Relevant taxa: <i>Anous minutus</i> ; <i>Fregata ariel</i> ; <i>Megaptera novaeangliae</i> ; <i>Balaenoptera acutorostrata</i> ; <i>Globicephala macrorhynchus</i> ; <i>Stenella longirostris</i> ; <i>Tursiops truncatus</i> ; <i>Chelonia mydas</i> ; <i>Eretmochelys imbricata</i> ; <i>Sphyrna lewini</i> ; <i>Sula</i> spp.	3
Overall Rating (Out of 12)		11

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a high overall rating of 11 (Table 104). It includes the Vatu-i-Ra passage (Map 48), a deep channel between the two main islands, containing a barrier and several pinnacle reefs. The seas and reefs are foraging grounds for many species of seabirds, including black noddies, *Anous minutus*, red footed boobies, *Sula* spp., and lesser frigate birds, *Fregata ariel*, for which it is recognised as a globally IBA¹⁰⁵.

The passage is deep water (over 600 m), and has high currents and upwelling, that brings rich nutrient to the shallower areas. The pinnacles are biodiversity hotspots, and are feeding, spawning, and nursery grounds for deep water and pelagic fish such as, tuna, deep water snapper, sharks, and rays (WCS, 2017b). Scalloped hammerhead sharks, *Sphyrna lewini*, are seen on the sides of the pinnacles¹⁰⁶.

¹⁰⁵ BirdLife International (2017) Important Bird Areas factsheet: Vatu-i-Ra. Downloaded from <http://www.birdlife.org> on 10/03/2017.

¹⁰⁶ H. Sykes, and Nai'a cruises, pers. comm., 19.07.2016

TABLE 106: Details of Site Rating VIR3

Criteria	Details	Rating (out of 3)
Biophysical Justification	Offshore pinnacle reefs, whales, spinner dolphin resting and calving area.	3
Geographic Explicitness	Two discreet pinnacle reefs.	3
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice.	3
Obligations (See Appendix C)	Relevant taxa: <i>Megaptera novaeangliae</i> ; <i>Balaenoptera acutorostrata</i> ; <i>Physeter macrocephalus</i> ; <i>Globicephala macrorhynchus</i> ; <i>Stenella longirostris</i> .	3
Overall Rating (Out of 12)		12

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a high overall rating of 12 (Table 106) and includes Malakati Reef and Cakau Davui (Map 49). These are two small pinnacle reefs immediately south of the Vatu-i-Ra reef system, one 6 km and the other 15 km from the eastern coast of Viti Levu.

Humpback whales, *Megaptera novaeangliae*, minke whales, *Balaenoptera acutorostrata*, sperm whales, *Physeter macrocephalus*, short-finned pilot whales, *Globicephala macrorhynchus*, and spinner dolphins, *Stenella longirostris*, have been sighted in the area (Miller et al., 2016). A resident pod of spinner dolphins, *Stenella longirostris*, forage on fish and squid in the Vatu-i-Ra passage north of these pinnacles in the evenings, and during the day they return to the sheltered bay inside Moon Reef to rest, and to calve. This day-time resting activity is critical for their survival, and they do not use other reefs in the area (Cribb et al., 2012).

Malakati (Moon) Reef falls within the Dawasamu community fishing grounds. Between 2006 and 2008, the Dawasamu community established five Locally-Managed Marine areas (LMMA) with the objective of managing their fishing resources, and in 2011 formed another protected area around Moon Reef (Bonito et al., 2012, Sykes et al., 2018). A small-scale tourism operation concentrates on visiting these dolphins, giving Moon Reef an economic value (Kastl and Gow, 2014).

4.8 LOMAIVITI

Lomaiviti is a deep oceanic area between the large islands of Viti Levu and Vanua Levu, south of the Vatu-i-Ra passage. The sea bed is in excess of 600 m deep, with submarine canyons, deep water channels and seamounts. There are several remote, medium and small-sized volcanic islands with steeply dropping barrier reefs, lagoons, fringing reefs, and channels. The larger islands have villages, a resort operates on Wakaya Island, and Makogai Island has a Ministry of Fisheries research station. Ovalau Island has a town and a tuna canning factory with an active port.

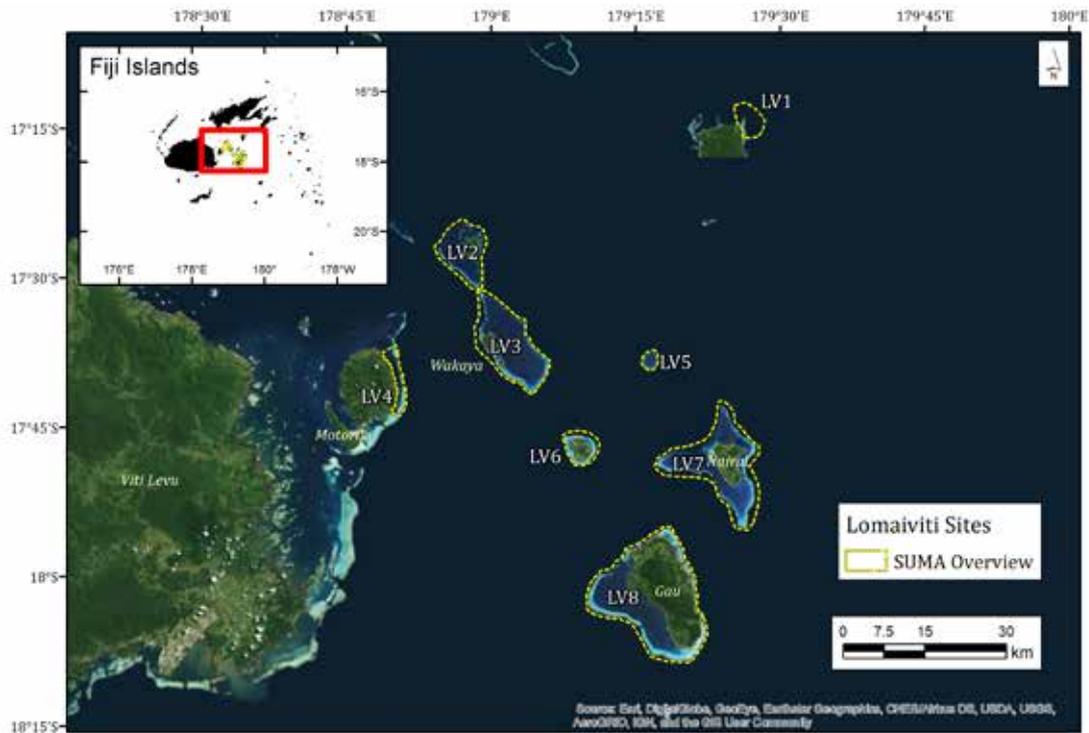
The area has multiple sites of importance: it is part of an EBSA (SCBD, 2014), it was identified in the FIME report as being of global importance (Nair et al., 2003), and includes multiple globally Important Bird and Biodiversity Areas (IBAs) (Masibalavu et al., 2006), and Sites of National Significance under the National Environment Strategy (NES) ¹⁰⁸.

The deep water topography creates upwelling, bringing nutrients from the deep to the surface waters, creating rich marine life diversity (Obura and Mangubhai, 2002), and attracting species such as deep water snapper and other pelagic fish (Marchese, 2015). It is a migratory route for whales, including humpback whales, *Megaptera novaeangliae*, minke whales, *Balaenoptera acutorostrata*, and short-finned pilot whales, *Globicephala macrorhynchus* (Miller et al., 2016).

On the outer walls and passages of the islands' barrier reefs, manta rays, *Manta alfredi*, frequent cleaning sites and courting areas, and resident female grey reef sharks, *Carcharhinus amblyrhynchos*, mate and give birth. Scalloped hammerhead sharks, *Sphyrna lewini*, are frequently seen, and migrate between nursery grounds in the Rewa Delta of Viti Levu and an aggregation site south of Vanua Levu (Sykes, 2015a). Hawksbill turtles nest on many of the islands (Laveti et al., 2011). Giant clam, *Tridacna* spp., cultivation, and hawksbill turtle, *Eretmochelys imbricata*, rehabilitation and release programmes occur at the Makogai research station.

There are eight Special, Unique Marine Areas (SUMAs) in Lomaiviti (Map 50, Table 107). These are shown and described in more detail below.

¹⁰⁸ The National Environment Strategy Fiji (1993), Preliminary register of Sites of National Significance. Government of Fiji.



MAP 50: LOMAIVITI SITES

TABLE 107: LOMAIVITI SITES

SUMA codes	Linked report codes	Name	Biophysical Justification	Rating
LV1	EBSA 14 FIME CR5 FIME CF22	Koro Island	Green turtles frequent the reefs, and hawksbill nest of the island.	8
LV2	EBSA 14 NES 83 FIME CR5 FIME CF20	Makogai Island	Turtle nesting, giant clam restoration project, grouper, sharks, whales, dolphins	12
LV3	EBSA 14 NES 85 FIME CR5 FIME CF20 FIME CF23	Wakaya Island	Fringing and barrier reef, channels, deep wall, high reef fish diversity, scalloped hammerheads, manta rays, and whales and dolphins migratory route.	12
LV4	EBSA 14 FIME CF20	Ovalau Island	Fringing reef, whales, and dolphins.	7
LV5	EBSA 14 NES 84 FIME CR5 FIME CF20	Cakau Momo seamount	Seamount, area of high biological productivity, whales, deep-water snapper, barracuda, and trevally.	12
LV6	EBSA 14 FIME CR5 FIME CF20	Batiki Island	Fringing reef with lagoon system, whales, and nesting site for Hawksbill turtle.	10
LV7	EBSA 14 FIME CR5 FIME CF20	Nairai Island	Barrier reef, lagoon system, whales, and turtles.	8
LV8	EBSA 14 NES 72 FIME CT4 FIME CR5 FIME CF20 FIME 21 FIME IE04	Gau Island	Barrier and fringing reef system, passages, whales, manta rays, turtles, sea snakes, shark breeding site, hard and soft coral diversity, and seabird nesting site including collared and Fiji petrels.	11

SITE LV1: KORO ISLAND EAST CORNER

TABLE 108: Site description LV1

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
LV1	EBSA 14 FIME CR5 FIME CF22	Koro Island east corner		8



MAP 51: SITE LV1

Geographic coordinates: S17° 15' 57", E179° 25' 7" and S17° 12' 14", E179° 28' 52"

Area (km²): 25.6

Division: Eastern

Unique *iQoliqoli* ID number: Lomaiviti_MAP35_FOL110

TABLE 109: Details of Site Rating LV1

Criteria	Details	Rating (out of 3)
Biophysical Justification	Green turtles frequent the reefs, and hawksbill nest of the island. Hard and soft corals in poor condition.	2
Geographic Explicitness	Fringing reef system.	1
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice.	3
Obligations (See Appendix C)	Relevant taxa: <i>Chelonia mydas</i> ; <i>Eretmochelys imbricata</i> .	2
Overall Rating (Out of 12)		8

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a medium overall rating of 8 (Table 109) and includes the east side of Koro Island (Map 51). Koro Island is a steep-sided volcanic island with several villages, a small resort and some residential developments mostly owned by overseas investors.

Recent studies in 2017, after cyclone Winston indicate that coral reef is in poor condition, with limited habitat diversity¹⁰⁹.

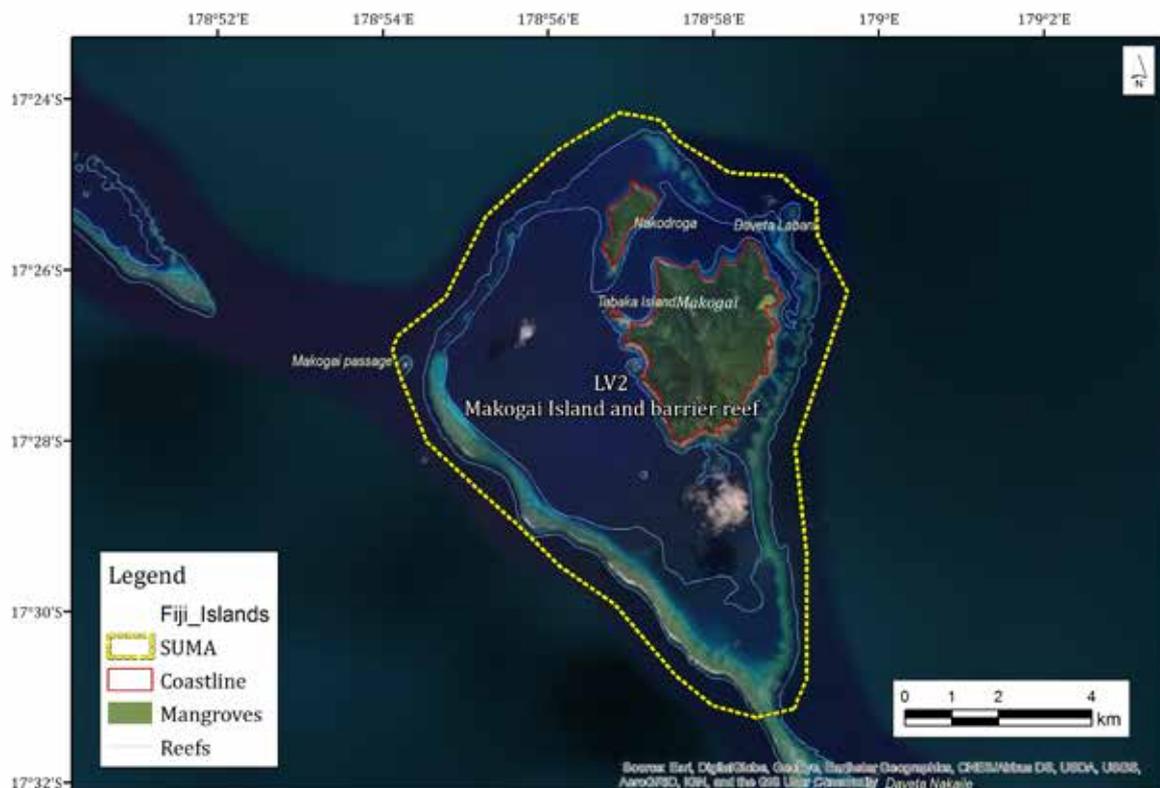
These steep reef walls have diverse, hard and soft corals, and schools of semi-pelagic fish, such as, barracuda, *Sphyraena* spp., humpback unicorn fish, *Naso brachycentron*, and bigeye trevallies, *Caranx sexfasciatus*¹¹⁰.

Green turtles, *Chelonia mydas*, frequent the reefs and hawksbill turtles, *Eretmochelys imbricata*, nest on the island (Laveti et al., 2011).

SITE LV2: MAKOGAI ISLAND AND BARRIER REEF

TABLE 110: Site description LV2

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
LV2	EBSA 14 NES 83 FIME CR5 FIME CF20	Makogai Island and barrier reef		12



MAP 52: SITE LV2

¹⁰⁹ S. Mangubhai, pers. comm., 19.11.2017

¹¹⁰ H. Sykes, pers. comm., 19.07.2016

Geographic coordinates: S17° 23' 59", E178° 54' 5" and S17° 31' 13", E178° 59' 37"

Area (km²): 78.7

Division: Eastern

Unique *iQoliqoli* ID number: Lomaiviti_MAP10_FOL03 and 04

TABLE 111: Details of Site Rating LV2

Criteria	Details	Rating (out of 3)
Biophysical Justification	Turtle nesting, giant clam restoration project, grouper, sharks, whales, dolphins.	3
Geographic Explicitness	Barrier reef and confines.	3
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice.	3
Obligations (See Appendix C)	Relevant taxa: <i>Megaptera novaeangliae</i> ; <i>Globicephala macrorhynchus</i> ; <i>Physeter macrocephalus</i> ; <i>Balaenoptera acutorostrata</i> ; <i>Stenella longirostris</i> ; <i>Tursiops truncatus</i> ; and <i>Eretmochelys imbricata</i> ; <i>Tridacna</i> spp and <i>Pinctada</i> spp.	3
Overall Rating (Out of 12)		12

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a high overall rating of 12 (Table 111). It includes Makogai Island (Map 52), a small volcanic island with a Ministry of Fisheries research station and a village. It was an historic leper colony site, and has a colony of endemic Fijian banded iguanas, *Brachylophus bulabula*. The barrier reef surrounds a lagoon with numerous small patch reefs. The barrier reef is connected to the Wakaya barrier reef to the immediate south.

In the deeper waters many cetaceans are seen: humpback whales, *Megaptera novaeangliae*, short-finned pilot whales, *Globicephala macrorhynchus*, sperm whales, *Physeter macrocephalus*, minke whales, *Balaenoptera acutorostrata*, spinner dolphins, *Stenella longirostris*, and bottlenose dolphin, *Tursiops truncates* (Miller et al., 2016). The reefs, passage and lagoon are hawksbill turtle, *Eretmochelys imbricata*, nesting and foraging grounds (Laveti et al., 2011), a shark nursery, and a grouper breeding aggregation site.

Currently the Fisheries Research Station is engaged in a hawksbill turtle rehabilitation and release programme, and is engaged in giant clam, *Tridacna* spp., (Ledua, 1993), and pearl oyster, *Pinctada* spp., spat collection and rearing, for supply to aquaculture and conservation programmes.

It was included in the Preliminary Register of Sites of National Significance for its terrestrial vegetation (beach forest, cycad dominated) and for its coastal/marine ecosystem.

SITE LV3: WAKAYA ISLAND AND BARRIER REEF

TABLE 112: Site description LV3

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
LV3	EBSA 14 NES 85 FIME CR5 FIME CF20 FIME CF23	Wakaya Island and barrier reef		12



MAP 53: SITE LV3

Geographic coordinates: S17° 38' 59", E178° 58' 17" and S17° 31' 14", E179° 2' 27"

Area (km²): 142.5

Division: Eastern

Unique *iQoliqoli* ID number: Lomaiviti_MAP10_FOL03 and 04

TABLE 113: Details of Site Rating LV3

Criteria	Details	Rating (out of 3)
Biophysical Justification	Fringing and barrier reef, channels, deep walls, high reef fish diversity, scalloped hammerheads, manta rays, whale and dolphin migratory route.	3
Geographic Explicitness	Barrier reef and confines.	3
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice.	3
Obligations (See Appendix C)	Relevant taxa: <i>Rhinomuraena quaesita</i> ; <i>Taenianotus triacanthus</i> ; <i>Sphyrna lewini</i> ; <i>Manta alfredi</i> ; <i>Megaptera novaeangliae</i> ; <i>Globicephala macrorhynchus</i> ; <i>Physeter macrocephalus</i> ; <i>Balaenoptera acutorostrata</i> ; <i>Stenella longirostris</i> ; <i>Tursiops truncatus</i> .	3
Overall Rating (Out of 12)		12

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a high overall rating of 12 (Table 113). It includes Wakaya Island (Map 53), a small volcanic island sitting on the west side of an extensive barrier reef and lagoon system. To the north, the reef connects to the Makogai barrier reef. The island is privately owned with a boutique resort, several private residences, and an organic farm.

The steep outer walls and large passages surround a lagoon with numerous small coral heads (bommies). The corals have survived multiple severe stress events such as, coral bleaching, crown-of-thorns starfish predation, and cyclone damage, and have returned to high coral cover, indicating a resilient coral population resistant to climate change

impacts (Sykes and Morris, 2007). The walls and passages have high reef fish density (Obura and Mangubhai, 2002), and many small uncommon coral reef animals such as, blue ribbon eels, *Rhinomuraena quaesita*, leaf scorpionfish, *Taenianotus triacanthus*, and a host of deep water and pelagic fish species. They are also a foraging ground for scalloped hammerhead sharks, *Sphyrna lewini*, and have cleaner stations used by reef manta rays, *Manta alfredi* (Sykes, 2015a)¹¹¹.

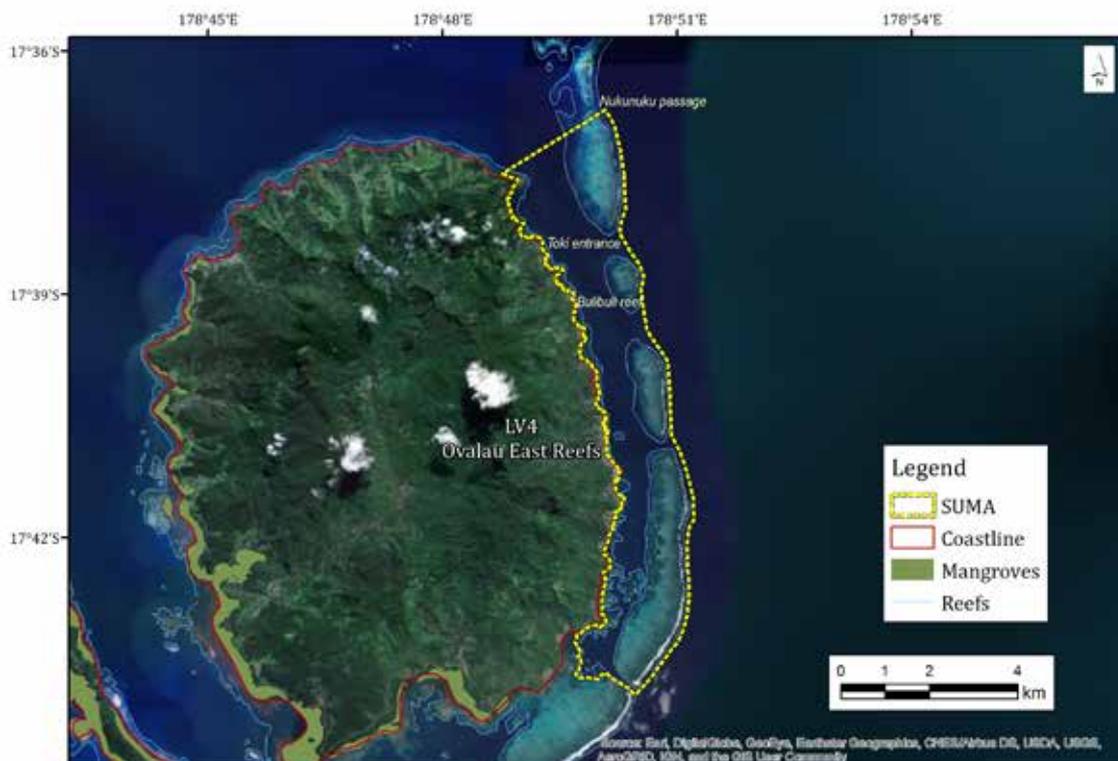
Cetaceans sighted in the deeper waters, off the reef, include humpback whales, *Megaptera novaeangliae*, short-finned pilot whales, *Globicephala macrorhynchus*, sperm whales, *Physeter macrocephalus*, minke whales, *Balaenoptera acutorostrata*, spinner dolphins, *Stenella longirostris*, and bottlenose dolphin, *Tursiops truncatus* (Miller et al., 2016).

A legally recognised marine protected area (Wakaya Marine Reserve, 2015) around the island on the west side of the reef was gazetted in 2015¹¹². The reefs are a tourist SCUBA diver attraction, both for the resort guests and for ship-based visitors. It was included in the Preliminary Register of Sites of National Significance for its coastal/marine ecosystem.

SITE LV4: OVALAU EAST REEFS

TABLE 114: Site description LV4

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
LV4	EBSA 14 FIME CF20	Ovalau East Reefs		7



MAP 54: SITE LV4

¹¹¹ H. Sykes, and Nai'a Cruises, pers. comm., 19.07.2016

¹¹² Fisheries Wakaya Marine Reserve Regulations 2015, Legal Notice No. 40, Government of Fiji Gazette Supplement No. 6, pp 32-34.

Geographic coordinates: S17° 43' 55", E178° 48' 46" and S17° 36' 43", E178° 51' 12"

Area (km²): 23.4

Division: Eastern

Unique *iQoliqoli* ID number: Lomaiviti_MAP10_FOL01 and 02

TABLE 115: Details of Site Rating LV4

Criteria	Details	Rating (out of 3)
Biophysical Justification	Fringing reef, whales, and dolphins.	1
Geographic Explicitness	Eastern side of island.	2
Source Number and Type	More than one good report and expert advice.	2
Obligations (See Appendix C)	Relevant taxa: <i>Stenella longirostris</i> ; <i>Tursiops truncatus</i> ; <i>Stenella attenuata</i>	2
Overall Rating (Out of 12)		7

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a medium overall rating of 7 (Table 115) and includes Ovalau Island (Map 54). The island has fringing reefs and a lagoon system running along the east coast, and the port of Levuka.

Pollution from the port, fish cannery, and wrecked ships means that reef health is poor on nearshore reefs and in the lagoon. A survey of fringing reef flats in 2007 indicated moderate hard coral and high macro algal cover¹¹³. There are reports of large shark populations, which are probably related to waste from the fish cannery¹¹⁴.

Inshore, spinner dolphins, *Stenella longirostris*, bottlenose dolphin, *Tursiops truncatus* and pantropical spotted dolphin, *Stenella attenuate* have been observed.

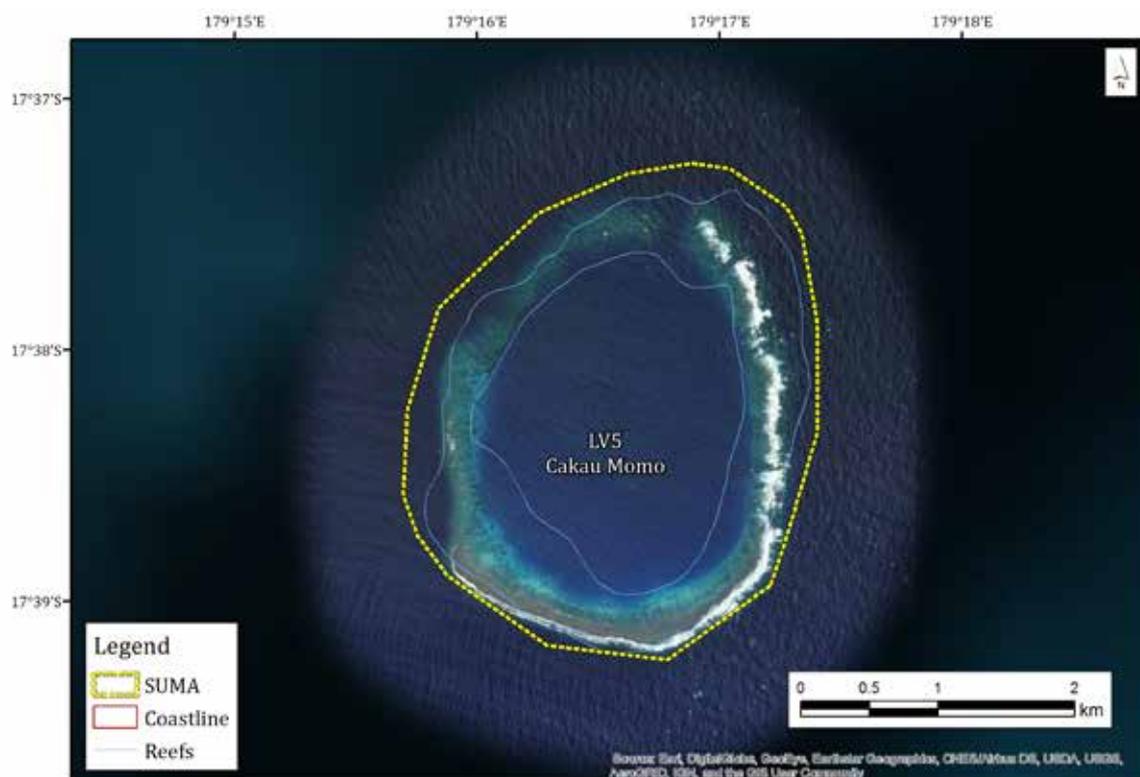
SITE LV5: CAKAU MOMO SEAMOUNT

TABLE 116: Site description LV5

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
LV5	EBSA 14 NES 84 FIME CR5 FIME CF20	Cakau Momo Seamount		12

¹¹³ C. Reddy, unpublished data

¹¹⁴ E. Lovell, pers. comm., 19.07.2016



MAP 55: SITE LV5

Geographic coordinates: S17° 36' 50", E179° 15' 3" and S17° 39' 37", E179° 17' 44")

Area (km²): 8.5

Division: Eastern

Unique *iQoliqoli* ID number: Lomaiviti_MAP34_FOL91

TABLE 117: Details of Site Rating LV5

Criteria	Details	Rating (out of 3)
Biophysical Justification	Seamount, area of high biological productivity, whales, deep-water snapper, barracuda, and trevally.	3
Geographic Explicitness	Sides and top of seamount.	3
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice.	3
Obligations (See Appendix C)	Relevant taxa: <i>Aphareus rutilans</i> ; <i>Pristipomoides filamentosus</i> ; <i>Etelis coruscans</i> ; <i>E. carbunculus</i> ; <i>Megaptera novaeangliae</i> ; <i>Epinephelus</i> spp; and <i>Wattsia</i> spp.	3
Overall Rating (Out of 12)		12

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a high overall rating of 12 (Table 117) and includes Cakau Momo (Map 55), a seamount rising from the seafloor (over 1000 m deep) to the ocean surface. It lays 20 km north-west of Nairai Island and 25 km east of Wakaya Island.

Seamounts have steep slopes which cause the upward movement of nutrients from the deep ocean and create focuses of biodiversity, attracting deep water and pelagic species such as tuna, deep-water snapper, sharks, whales and dolphins (Morato and Clark, 2007). Seamounts often host uncommon forms of marine life and are accordingly very delicate habitats, vulnerable to over-exploitation. The deep water communities have a high level of endemism (species not found elsewhere), and they are likely to have different fauna on the lee and luff sides (Marchese, 2015).

There are 18 fish species recorded as caught in the deep-water areas of Fiji, including Cakau Momo. These include, *Epinephelus*, *Etelis*, *Pristipomoides*, *Paracaesio*, *Aphareus*, *Wattsia* and *Seriola species*. The species specifically targeted by deep-sea fishers include Lehi, *Aphareus rutilans*, opakapaka, *Pristipomoides filamentosus*, onaga, *Etelis coruscans*, and ehu, *Etelis carbunculus*¹¹⁵.

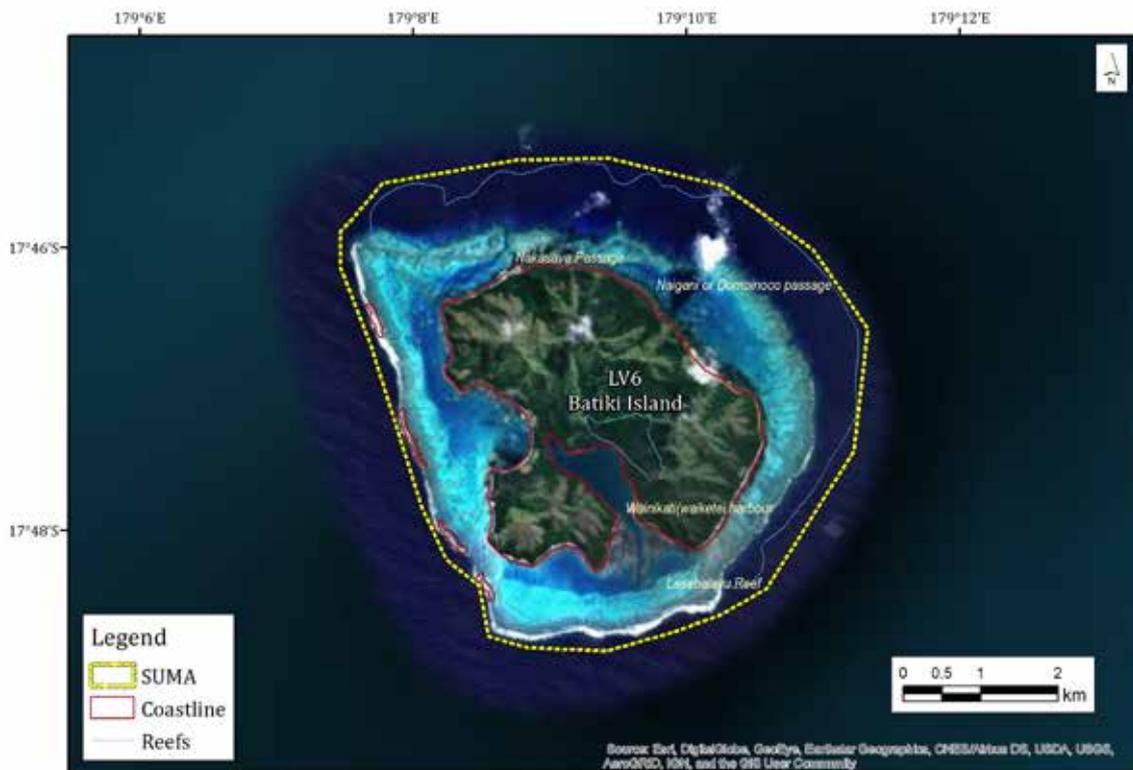
Cakau Momo is a hot spot for semi-pelagic and deep water species, and is part of the migratory route for humpback whales, *Megaptera novaeangliae* (Miller et al., 2016).

It was included in the Preliminary Register of Sites of National Significance for its marine ecosystem.

SITE LV6: BATIKI ISLAND

TABLE 118: Site description LV6

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
LV6	EBSA 14 FIME CR5 FIME CF20	Batiki Island		10



MAP 56: SITE LV6

Geographic coordinates: S17° 49' 11", E179° 6' 47" and S17° 45' 12", E179° 11' 26"

Area (km²): 32.8

Division: Eastern

Unique *iQoliqoli* ID number: Lomaiviti_MAP34_FOL97-102

¹¹⁵ Fiji Ministry of Fisheries, unpublished data

Geographic coordinates: S17° 42' 9", E179° 16' 21" and S17° 55' 35", E179° 28' 50"

Area (km²): 198.8

Division: Eastern

Unique *iQoliqoli* ID number: Lomaiviti_MAP34_FOL92

TABLE 121: Details of Site Rating LV7

Criteria	Details	Rating (out of 3)
Biophysical Justification	Barrier reef and lagoon system, whales and turtles.	2
Geographic Explicitness	Barrier reef, lagoon and offshore waters.	2
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice.	3
Obligations (See Appendix C)	Relevant taxa: <i>Megaptera novaeangliae</i> ; Cheloniidae spp.	1
Overall Rating (Out of 12)		8

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a medium overall rating of 8 (Table 121). It includes Nairai Island (Map 57), a small volcanic island, 6 km across, with a few small traditional villages, and a small resort. The barrier reef, lagoon and fringing reefs are surrounded by deep water. The island is on the migratory route for many cetaceans, including humpback whales, *Megaptera novaeangliae*, which sometimes enter the lagoons at the open northern end (Miller et al., 2016).

SITE LV8: GAU ISLAND

TABLE 122: Site description LV8

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
LV8	EBSA 14 NES 72 FIME CT4 FIME CR5 FIME CF20 & CF21 FIME IE04	Gau Island with subsite Nagali Passage		11



MAP 58: SITE LV8

Geographic coordinates: S18° 8' 30", E179° 9' 46" and S17° 56' 53", E179° 20' 40"

Area (km²): 338

Division: Eastern

Unique *iQoliqoli* ID number: Lomaiviti_MAP34_FOL95

TABLE 123: Details of Site Rating LV8

Criteria	Details	Rating (out of 3)
Biophysical Justification	Barrier and fringing reef system, passages, whales, manta rays, turtles, sea snakes, shark breeding site, banded sea kraits, hard and soft coral diversity, seabird nesting, collared petrel.	3
Geographic Explicitness	Barrier surrounding the entire Island.	2
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice.	3
Obligations (See Appendix C)	Relevant taxa: <i>Pterodroma brevipes</i> ; <i>Pseudobulweria macgillivrayi</i> ; <i>Megaptera novaeangliae</i> ; <i>Eretmochelys imbricata</i> ; <i>Laticauda</i> spp; <i>Manta alfredi</i> ; <i>Carcharhinus amblyrhynchos</i> ; <i>Triaenodon obesus</i> ; <i>Sphyrna lewini</i> ; <i>Epinephelus malabaricus</i> .	3
Overall Rating (Out of 12)		11

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a high overall rating of 11 (Table 123) and includes Gau (Map 58), a medium sized volcanic island, 20 km long, with a barrier reef and wide lagoon on the western side containing many small coral heads (bommies). There are two breaks in the barrier reef: Wakaciva and Cubaisa passages in the north and Nagali Passage (subsite) towards the south. Gau has several traditional villages, and a small resort built in the early 2000s¹¹⁶. The area attracts ship-based tourist SCUBA divers.

The Montane Cloud forest provides habitat for nesting seabirds: frigates, boobies, collared petrels, *Pterodroma brevipes*, and the critically endangered and endemic Fiji petrel, *Pseudobulweria macgillivrayi*, and is considered a globally Important Bird and Biodiversity Area (IBA) (Masibalavu et al., 2006), and a NES Site of National Significance. The forests are the site of a project designed to locate and conserve the nesting burrows of the latter species (NatureFiji-MareqetiViti, 2009).

Steep outer barrier reef walls drop into deep water. The large passages have strong tidal current flow, bringing rich nutrients and creating areas high in marine biodiversity (Obura and Mangubhai, 2002). The reefs and lagoon are a migratory, breeding, and calving grounds for humpback whales, *Megaptera novaeangliae*, and foraging grounds for hawksbill turtles, *Eretmochelys imbricata*, which nest on the island (Laveti et al., 2011). Wakaciva and Cubaisa Passages have small patch reefs on either side of the passage, which are rich in, *Dendronephthya*, soft corals, and where many banded krait sea snakes, *Laticauda* spp; can be found. Reef manta rays, *Manta alfredi*, are often seen in this passage and courtship trains of these rays have been observed, indicating that this is a breeding area for the species¹¹⁷.

The Nagali Pass is a breeding and juvenile site for grey reef sharks, *Carcharhinus amblyrhynchos*. A group of resident females live year-long in the passage, attracting males in the mating season. Pups are born and spend several months as juveniles in the passage¹¹⁸. White tip reef sharks, *Triaenodon obesus*, have been observed mating in the passage¹¹⁹, and juvenile scalloped hammerhead sharks, *Sphyrna lewini*, have been seen on the outer walls¹²⁰. In addition to the sharks, the Nagali Passage is home to schools of several barracuda species, big-eye trevallies, *Caranx sexfasciatus*, and some very large malabar groupers, *Epinephelus malabaricus*. The numbers of the latter have recently diminished due to fishing.

¹¹⁶ H. Sykes, pers. comm., 19.07.2016

¹¹⁷ H. Sykes, and Naia's Cruises, pers. comm., 19.07.2016

¹¹⁸ Nai'a Cruises, pers. comm., 19.07.2016

¹¹⁹ H. Sykes, pers. comm., 19.07.2016

¹²⁰ S. Gow, pers. comm., 19.07.2016

4.9 NORTH VANUA LEVU

The north coast of the large island of Vanua Levu includes two extensive habitats of conservation interest, unique within Fiji. Extensive mangrove habitat, covering 100km of coastal habitat and numerous mangrove islands and a long barrier reef known as Cakaulevu or the Great Sea Reef, covering 150 km (WWF, 2011). The Reef includes a small inhabited island, deep channels and drops off into deep oceanic waters. There are numerous villages and a large town. Bauxite mining, sugar cane and pine farming contribute to heavy reef sedimentation in some adjacent coastal areas.

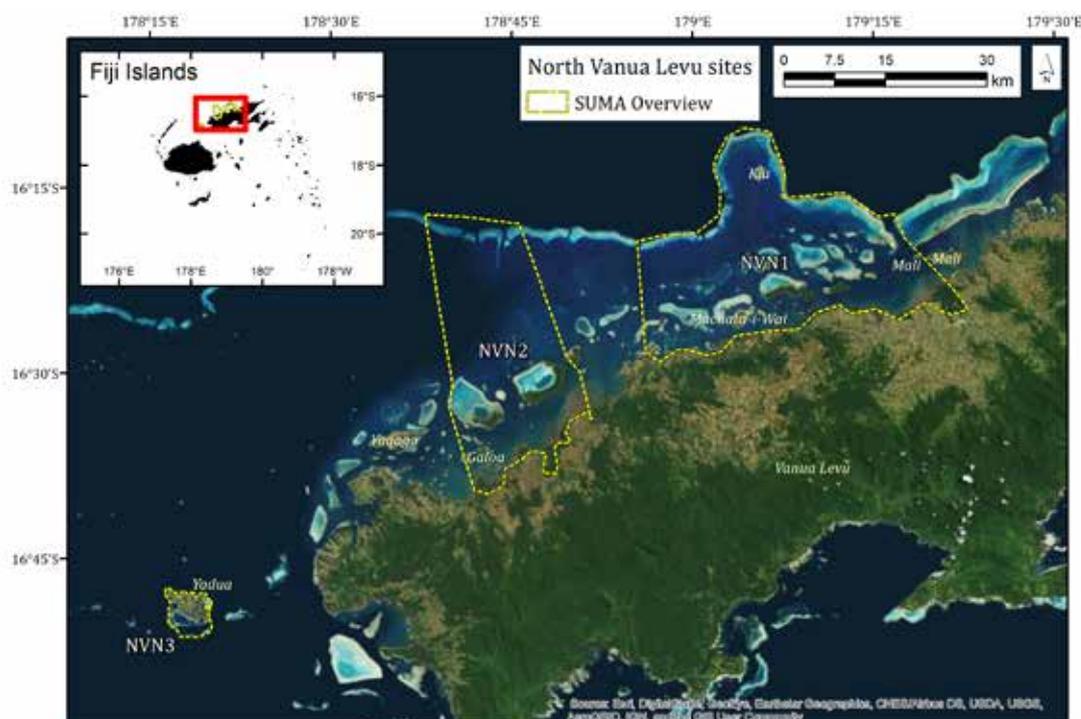
The mangrove areas are probably the most significant on Vanua Levu, although back mangroves have largely been cleared. The unusual offshore mangrove island and fringing reef habitats have high diversity and productivity, dropping into coral reefs with exceptionally shallow stands of black coral, *Antipatharia* spp., and soft corals, and a great abundance of reef fish. These highly dynamic, tidally influenced systems are “keystone habitats” of crucial importance to maintaining the ecological integrity of the entire coastline (Jenkins et al., 2004).

The diversity of marine biota on the Cakaulevu (Great Sea Reef) and its associated habitats is of high importance on global, regional, national and local scales. A 2004 scientific expedition found approximately 55% of the coral reef fishes, at least 44% of the known endemic coral reef fishes, 74% of the corals, and 40% of the marine flora known from the Fiji Islands. There are at least 12 species listed on the 2004 IUCN Red List of threatened species, including the humphead wrasse, *Cheilinus undulatus*, four species of grouper, Serranidae, three shark species, two rays, (including the reef manta ray, *Manta alfredi*), the spinner dolphin, *Stenella longirostris* (*ibid*), and the endangered green turtle, *Chelonia mydas* (Laveti et al., 2011).

The nationally endangered bumphead parrotfish, *Bolbometopon muricatum*, locally extinct in many parts of Fiji, school in the deep water channels in the barrier reef, and there are grouper breeding aggregation sites on the back reefs around the channels. Turtles forage in the seagrass beds in the lagoon, and nest on the island of Kia.

The connectivity between coastal mangroves, mangrove islands, lagoon, back reef, channels and outer barrier reef is extremely important for the lifecycles of many of the marine species living within it, and for sheer size, this mangrove to reef system is unequalled within Fiji (Watling, 1985). The entire extent of the coastline from shore to barrier reef is considered to be significant, but three areas have been identified for special consideration and are described and mapped below. However, due to the high connectivity, the health of all habitats in this entire system is essential.

There are three Special, Unique Marine Areas (SUMAs) in the north of Vanua Levu (Map 59, Table 124). These are shown and described in more detail below.



MAP 59: NORTH VANUA LEVU SITES

TABLE 124: NORTH VANUA LEVU SITES

SUMA codes	Other Codes	Name	Biophysical Justification	Rating
NVN1	FIME CF27 FIME CR2 FIME CT3 FIME IE02 FIME IE08	Cakaulevu reef and Kia Island, Macuata	Habitat connectivity, barrier and patch reefs, passages, mangroves, bumphead parrotfish, grouper aggregations, hammerhead and bull sharks, turtles, and fish and coral diversity.	11
NVN2	FIME CF27 FIME CR2 FIME CT3 FIME IE02 FIME IE08	Cakaulevu reef, Bua	Habitat connectivity, barrier and patch reefs, passages, mangroves, bumphead parrotfish, grouper aggregations, turtles, and fish and coral diversity.	11
NVN3	FIME CF18	Yadua Island	Bays, fringing reefs, patch reefs, turtle nesting site, and reef fish diversity.	9

SITE NVN1: CAKAULEVU REEF (GREAT SEA REEF) AND KIA ISLAND, MACUATA

TABLE 125: Site description NVN1

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
NVN1	FIME CF27 FIME CR2 FIME CT3 FIME IE02 FIME IE08	Cakaulevu reef and Kia Island, Macuata		11



MAP 60: SITE NVN1

Geographic coordinates: S16° 29' 5", E178° 55' 24" and S16° 9' 49", E179° 22' 53"

Area (km²): 846.5

Division: Northern

Unique *iQoliqoli* ID number: Macuata_MAP32_FOL39-41

TABLE 126: Details of Site Rating NVN1

Criteria	Details	Rating (out of 3)
Biophysical Justification	Habitat connectivity, barrier and patch reefs, passages, mangroves, bumphead parrotfish, grouper aggregations, hammerhead and bull sharks, turtles, fish and coral diversity.	3
Geographic Explicitness	Coast to outer barrier reef, to 1 km off reef edge.	2
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice.	3
Obligations (See Appendix C)	Relevant taxa: <i>Bolbometopon muricatum</i> ; <i>Chelonia mydas</i> ; <i>Stenella longirostris</i> ; <i>Sphyrna</i> spp; <i>Carcharhinus leucas</i> ; <i>Eretmochelys imbricata</i> , <i>Rhizophora</i> spp; and <i>Bruguiera</i> sp	3
Overall Rating (Out of 12)		11

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a high overall rating of 11 (Table 126) and includes Cakaulevu reef (Map 60). This section of the Cakaulevu reef includes around 45 km of mangrove forested coastline, multiple mangrove islands and reef shoals, and over 55 km of barrier reef. The eastern end includes the river-mouth mangroves (Watling, 1985) around the mouth of the Labasa River, close to the town. There are villages and settlement along the coast, and most of the coastal land has been cleared to the back of the mangroves for agriculture. There is a small ecologically-sensitive private island resort towards the west of the area.

The barrier reef is between 15 and 17 km from shore, except where it juts further out to enclose Kia island, a small volcanic island about 2 km long, with two traditional villages. There are flat coral shoals 6 to 10 km from shore, and small flat coral islands with intact mangrove systems within 6 km of the coast. The connectivity of habitats creates large ecosystems of great importance to the marine species that move between them at different point in their lifecycles. Multiple community-managed marine protected areas were selected to protect representative areas of the different habitats types, and form the basis of an ecosystem-based management plan, the first such in Fiji (MACBIO, 2016; Navuku, 2009).

The reef slopes of the mangrove islands have a high density of soft and black corals in unusually shallow water, and very high fish abundance and diversity. On the passages and back reefs, there are grouper breeding aggregation sites and one of the few schools of bumphead parrotfish, *Bolbometopon muricatum*, remaining in Fiji. At least 12 marine species, listed on the IUCN Red List of threatened species, occur, including green turtles, *Chelonia mydas*, and spinner dolphins, *Stenella longirostris* (Jenkins et al., 2004). Several new fish species have been discovered on the reefs (Allen and Randall, 2005; Greenfield et al., 2005).

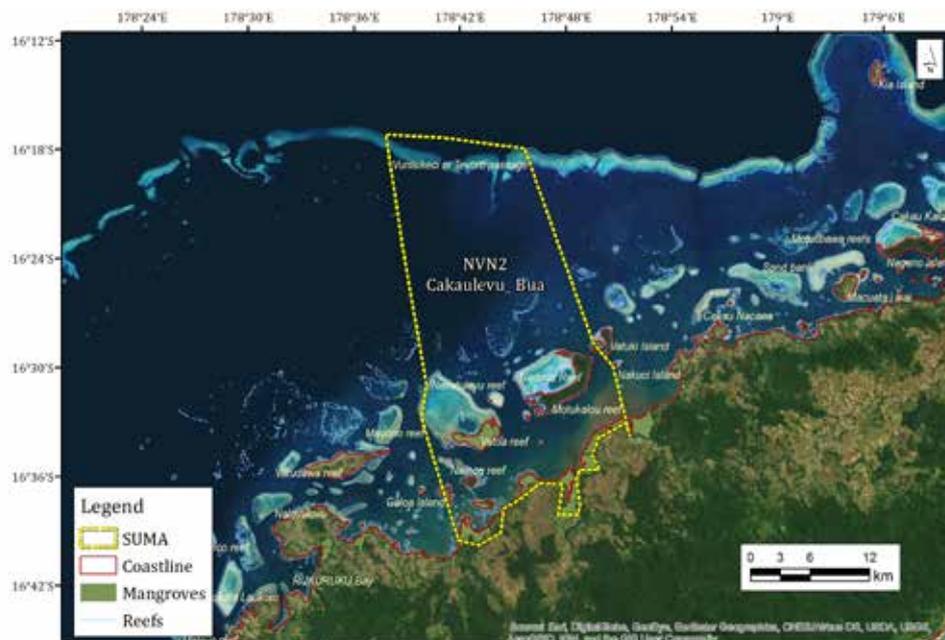
Hammerhead, *Sphyrna* spp., (species unconfirmed) and bull sharks, *Carcharhinus leucas*, have been reported around Labasa¹²¹. Hawksbill turtles, *Eretmochelys imbricata*, forage and nest around Kia Island (Laveti et al., 2011).

SITE NVN2: CAKAULEVU REEF (GREAT SEA REEF), BUA

TABLE 127: Site description NVN2

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
NVN2	FIME CF27 FIME CR2 FIME CT3 FIME IE02 FIME IE08	Cakaulevu reef, Bua		11

¹²¹ Leluvia Island Divemaster Seru, pers. comm., 19.07.2016



MAP 61: SITE NVN2

Geographic coordinates: S16° 17' 12", E178° 37' 47" and S16° 39' 48", E178° 51' 37"

Area (km²): 622.5

Division: Northern

Unique *iQoliqoli* ID number: Bua_MAP25_FOL02

TABLE 128: Details of Site Rating NVN2

Criteria	Details	Rating (out of 3)
Biophysical Justification	Habitat connectivity, barrier and patch reefs, passages, mangroves, bumphead parrotfish, grouper aggregations, turtles, fish and coral diversity.	3
Geographic Explicitness	Coast to outer barrier reef, to 1 km off reef edge.	2
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice.	3
Obligations (See Appendix C)	Relevant taxa: <i>Bolbometopon muricatum</i> ; <i>Chelonia mydas</i> ; <i>Stenella longirostris</i> ; <i>Eretmochelys imbricata</i> , <i>Rhizophora</i> spp; and <i>Bruguiera</i> sp.	3
Overall Rating (Out of 12)		11

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a high overall rating of 11 (Table 128). This section of the Cakaulevu reef (Map 61) includes around 23 km of mangrove forested coastline, multiple mangrove islands and reef shoals, and over 18 km of barrier reef. There are villages and settlement along the coast, and most of the coastal land has been cleared to the back of the mangroves for agriculture. Immediately to the west of the site coordinates, there is a wharf for the loading of bauxite ore from an open-cast mine inland (Sykes, 2009b), which has caused some environmental concerns.

The barrier reef is between 25 and 36 km from shore. There are flat coral shoals 6 to 10 km from shore, and small flat coral islands with intact mangrove systems within 6km of the coast. The connectivity of habitats creates large ecosystems of great importance to the marine species that move between them at different point in their lifecycles.

The reef slopes of the mangrove islands have a high density of soft and black corals in unusually shallow water, and very high fish abundance and diversity. On the passages and back reefs there are grouper breeding aggregation sites and one of the few schools of bumphead parrotfish, *Bolbometopon muricatum*, remaining in Fiji. At least 12 marine species are listed on the IUCN Red List of threatened species occur, including green turtles, *Chelonia mydas*, and spinner

dolphins, *Stenella longirostris* (Jenkins et al., 2004). Several new fish species have been discovered on the reefs (Allen and Randall, 2005; Greenfield et al., 2005).

Hawksbill turtles, *Eretmochelys imbricata*, forage and nest on the small islands (Laveti et al., 2011).

SITE NVN3: YADUA ISLAND

TABLE 129: Site description NVN3

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
NVN3	FIME CF18	Yadua Island		9



MAP 62: SITE NVN3

Geographic coordinates: S16° 51' 21", E178° 16' 20" and S16° 48' 28", E178° 20' 8"

Area (km²): 18.0

Division: Northern

Unique *iQoliqoli* ID number: Bua_MAP25_FOL01

TABLE 130: Details of Site Rating NVN3

Criteria	Details	Rating (out of 3)
Biophysical Justification	Bays, fringing reefs and patch reefs, turtle nesting, reef fish diversity.	2
Geographic Explicitness	Fringing reefs around island.	2
Source Number and Type	More than one good report and expert advice available.	2
Obligations (See Appendix C)	Relevant taxa: <i>Chelonia mydas</i> ; <i>Eretmochelys imbricata</i> ; <i>Caretta caretta</i> ; <i>Dermochelys coriacea</i> ; <i>Manta alfredi</i> ; <i>M. birostris</i> ; <i>Aetobatus narinari</i> ; <i>Taeniura meyeni</i> ; <i>Cheilinus undulates</i> ; <i>Bolbometopon muricatum</i> .	3
Overall Rating (Out of 12)		9

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a medium overall rating of 9 (Table 130). It includes Yadua (Map 62), a small volcanic island approximately 5 km across, with a small traditional village. There is a crested iguana, *Brachylophus vitiensis*, sanctuary on the small connected island of Yadua Taba¹²².

The island has multiple bays and inlets, with fringing and patch reefs. It is one of the few sites in Fiji where green turtles, *Chelonia mydas*, nest, as well as the more common hawksbill turtles, *Eretmochelys imbricata*. Loggerhead turtles, *Caretta caretta*, have been tracked, and leatherback turtles, *Dermochelys coriacea*, have been seen in the area (Laveti et al., 2011; WWF, 2012, 2013). There is a resident population of manta rays reported as, *Manta birostris*, but more likely to be, *Manta alfredi*, eagle rays, *Aetobatus narinari*, and the giant reef ray, *Taeniura meyeni*. The area was known for fish diversity, including humphead wrasse, *Cheilinus undulates*, and bumphead parrotfish, *Bolbometopon muricatum* (Finlay, 2004a), but these, and sea cucumbers, have been fished out in recent years (Finlay, 2004b).

4.10 SOUTH VANUA LEVU

The south coast of the large island of Vanua Levu has a variety of marine habitats, one of global significance. There are numerous villages and a town, but in general no large scale industry affecting reef health.

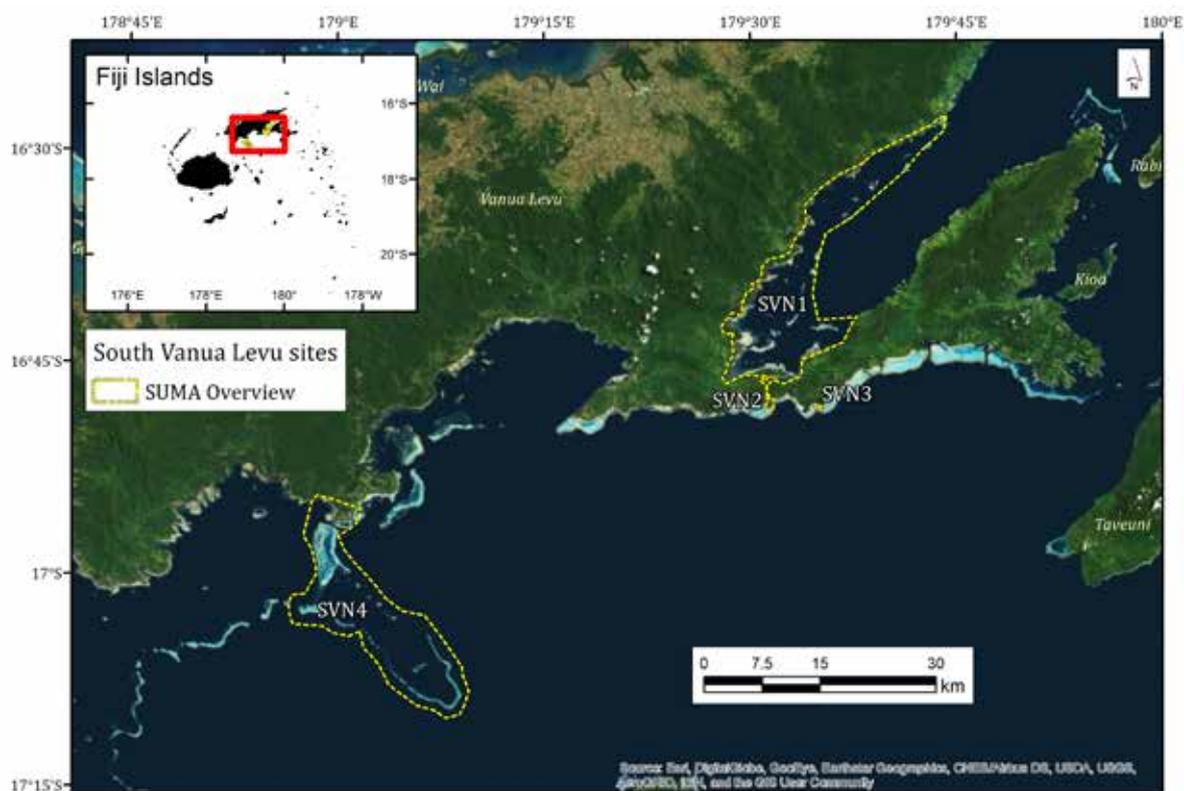
The large bay of Natewa is the most extensive bay in Fiji, with mangroves, shallow reef, and mudflats, and large pelagic fish in deeper waters, regular sightings of minke whales, *Balaenoptera acutorostrata*, and two resident pods of spinner dolphins, *Stenella longirostris*. The south coast has a narrow fringing reef extending 400 m to 1.4 km from shore into deep water, with an unusual salt water mangrove lake and a small island with endemic red prawns.

The most significant site on this coast is the Kubulau/Namena barrier reef system, a peninsula of reef extending almost 30 km from the Main Island and about 7 km wide, with a small island (Namenalala) at the seaward end within the Namena Marine Reserve, a 60 km² protected area established in 1997. This barrier reef is flanked by two deep water canyons, creating upwelling which brings rich nutrients to the shallow waters, resulting in rich marine life and high biodiversity.

The channels and outer walls are *foci* for megafauna and pelagic species (Miller et al., 2016) while the passages have numerous small pinnacles and patch reefs with diverse fish life and rich stands of soft corals. Inside the barrier reef the deep lagoons have more patch reefs and diverse fish life. Namenalala Island is a nature reserve (WCS, 2012) and a nesting site for red footed boobies, *Sula sula*, and hawksbill turtles, *Eretmochelys imbricata* (Laveti et al., 2011). This rich marine life and habitat diversity made this the site for Fiji's first large-scale marine protected reserve, initially formed in 1997, and now under ecosystem-based management (Jupiter and Egli, 2011). This reserve is supported by voluntary contributions from the tourism sector (Kastl and Gow, 2014).

There are four Special, Unique Marine Areas (SUMAs) in the south of Vanua Levu (Map 63, Table 131). These are shown and described in more detail below.

¹²² National Sites and places of Heritage Significance in Fiji, A collaborative submission by the Department of Heritage & Arts, Fiji Museum and National Trust of Fiji. <http://www.fijiembassydc.com/about-fiji/FIJIS-NATIONAL-HERITAGE-SITES.pdf>



MAP 63: SOUTH VANUA LEVU SITES

TABLE 131: SOUTH VANUA LEVU SITES

SUMA codes	Linked report codes	Name	Biophysical Justification	Rating
SVN1	FIME IE12	Natewa Bay	Extremely large and deep tidal bay, unique in Fiji, coastal mangroves, seagrass beds, sandflats, banks, patch reefs, dolphins, and whales.	10
SVN2	NES 51	Qaloqalo Salt Lake, Naweni	Salt lake, mud crabs and mangroves.	8
SVN3	FIME CT 21	Yanuyanu Island, Naweni	Saltwater lake and red prawns.	8
SVN4	EBSA 14 NES 58 NES 59 FIME CT12 FIME CR6 FIME CF20 FIME CF24 FIME SSC3	Kubulau and Namena	Diverse reef and deep water habitat, sea bird and turtle nesting, shark diversity and aggregation site, seabird nesting site, migratory route for leatherback turtles and whales.	12

SITE SVN1: NATEWA BAY

TABLE 132: Site description SVN1

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
SVN1	FIME IE12	Natewa Bay		10



MAP 64: SITE SVN1

Geographic coordinates: S16° 27' 31", E179° 27' 56" and S16° 46' 34", E179° 44' 17"

Area (km²): 265.0

Division: Northern

Unique *iQoliqoli* ID number: Cakadrove_MAP29_FOL11-21 and MAP30_FOL 28, 29

TABLE 133: Details of Site Rating SVN1

Criteria	Details	Rating (out of 3)
Biophysical Justification	Extremely large and deep tidal bay, unique in Fiji, coastal mangroves, seagrass beds, sandflats, banks, patch reefs, dolphins, and whales.	2
Geographic Explicitness	Entire Natewa bay area.	2
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice available.	3
Obligations (See Appendix C)	Relevant taxa: <i>Balaenoptera acutorostrata</i> ; <i>Stenella longirostris</i> , <i>Rhizophora</i> spp and <i>Bruguiera</i> sp.	3
Overall Rating (Out of 12)		10

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a high overall rating of 10 (Table 133). It includes Natewa Bay (Map 64), an extremely large, deep, tidal bay, the largest in Fiji at over 50 km long, 10 km wide and over 1,000 m deep (Guppy, 1903). There are multiple villages, one existing resort, and plans for at least two others.

The west tip has coastal mangroves, mangrove islands, and sand flats with seagrass and algal beds (Sykes, 2009c). These shallow habitats are important eel fishing and invertebrate collection grounds for local communities¹²³. Further out, patch reef and sand banks are sediment and overfished (Sykes, 2009d). Large pelagic fish and minke whales, *Balaenoptera acutorostrata*, or, *B. bonaerensis* (Miller et al., 2016), are seen in deeper waters, as well as two resident pods of spinner dolphins, *Stenella longirostris*¹²⁴. There is little information on the rest of the bay.

SITE SVN2: QALOQALO SALT LAKE, NAWENI

TABLE 134: Site description SVN2

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
SVN2	NES 51	Qaloqalo Salt Lake, Naweni		8



MAP 65: SITE SVN2

Geographic coordinates: S16° 48' 23", E179° 30' 50" and S16° 46' 6", E179° 31' 55"

Area (km²): 2.4

Division: Northern

Unique *iQoliqoli* ID number: Cakadrove_MAP29_FOL22

¹²³ A. Batibasaga, Ministry of Fisheries, pers. comm., 19.07.2016

¹²⁴ Dolphin trip to Natewa Bay, <http://dakuresort.com/tag/natewa-bay/> and <http://www.saltlakelodgefiji.com/thingstodo.html>

TABLE 135: Details of Site Rating SVN2

Criteria	Details	Rating (out of 3)
Biophysical Justification	Salt lake, mud crabs and mangroves.	2
Geographic Explicitness	Lake and waterway.	2
Source Number and Type	Mainly anecdotal and inferred information.	1
Obligations (See Appendix C)	Relevant taxa: <i>Scylla serrata</i> ; <i>Lutjanus argentimaculatus</i> , <i>Rhizophora</i> spp; and <i>Bruguiera</i> sp.	3
Overall Rating (Out of 12)		8

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a medium overall rating of 8 (Table 135) and includes a salt water lake (Map 65). It is the only known inland salt water lake in mainland Fiji (there are a few smaller salt lakes in the Lau islands), included in the Preliminary Register of Sites of National Significance as a unique formation.

The lake is over 1 km across, and connects to the outer reef by a narrow 2 km long mangrove-lined channel, where mud crabs, *Scylla serrata*, (qari) are collected¹²⁵. The channel emerges onto the fringing reef south of Vanua Levu, and through a passage between two limestone islands. Tourist sport fishers catch mangrove snappers, *Lutjanus argentimaculatus*, in the lake¹²⁶, but otherwise there is little information about the species living there. It is likely that the area is important to species which move between marine and freshwater habitats.

SITE SVN3: YANUYANU ISLAND, NAWENI

TABLE 136: Site description SVN3

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
SVN3	FIME CT 21	Yanuyanu Island, Naweni		8

¹²⁵ A. Batibasaga, Ministry of Fisheries, pers. comm., 19.07.2016

¹²⁶ Fishing in the Salt Lake: <http://www.saltlakelodgefiji.com/fishing.html>



MAP 66: SITE SVN3

Geographic coordinates: S16° 48' 4", E179° 35' 2" and S16° 48' 21", E179° 35' 22"

Area (km²): 0.2

Division: Northern

Unique *iQoliqoli* ID number: Cakadrove_MAP30_FOL26

TABLE 137: Details of Site Rating SVN3

Criteria	Details	Rating (out of 3)
Biophysical Justification	Saltwater lake, mangroves and red prawns.	1
Geographic Explicitness	Small limestone island on reef flat.	2
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice available.	3
Obligations (See Appendix C)	Relevant taxa: <i>Rhizophora</i> spp; and <i>Bruguiera</i> sp.	2
Overall Rating (Out of 12)		8

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a medium overall rating of 8 (Table 137) and includes Yanuyanu Island (Map 66).

Two saltwater limestone pools formed in the outer edge of a small limestone islet, fringed with mangroves, and hosting red prawns¹²⁷. Red prawns are found in few places in Fiji such as, Vatulele and Kaibu islands, and are often of great cultural importance¹²⁸.

The red prawn species in Naweni, *Antecaridina* spp., are not commonly found in Fiji, but known from the Red Sea, Indian Ocean and the Pacific Ocean (Choy, 1991). Although similar in appearance and cultural significance, they are not the endemic species found in Vatulele, which were identified as, *Liagoceradocus unciferus* (Stock and Iliffe, 1991).

¹²⁷ A. Batibasaga, and T. Vodivodi, Ministry of Fisheries, pers. comm., 19.07.2016

¹²⁸ The sacred red prawns of Naweni: <http://dakuresort.com/the-rare-red-prawns-of-naweni/>

TABLE 139: Details of Site Rating SVN4

Criteria	Details	Rating (out of 3)
Biophysical Justification	Diverse reef and deep water habitat, sea bird and turtle nesting, shark diversity and aggregation site, seabird nesting site, migratory route for leatherback turtles and whales.	3
Geographic Explicitness	Boundary follows Namena Barrier Reef, Kubulau <i>iQoliqoli</i> coordinates and shoreline.	3
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice.	3
Obligations (See Appendix C)	Relevant taxa: <i>Eretmochelys imbricata</i> ; <i>Carcharhinus amblyrhynchos</i> ; <i>Sphyrna lewini</i> ; <i>Manta alfredi</i> ; <i>Megaptera novaeangliae</i> ; <i>Globicephala macrorhynchus</i> ; <i>Physeter microcephalus</i> ; <i>Balaenoptera acutorostrata</i> ; <i>Stenella longirostris</i> ; <i>Tursiops truncata</i> ; <i>Dermochelys coriacea</i> ; <i>Sula</i> spp.	3
Overall Rating (Out of 12)		12

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site received a high overall rating of 12 (Table 139) and includes Namena and Kubulau (Map 67). Namenalala is a small volcanic island almost 2 km long and 300 m wide, 20 km off the south coast of the large island of Vanua Levu. It is surrounded by the Namena barrier reef, extending 25 km from the Vanua Levu coast, with windward and leeward reefs and deep tidal passages, affected by two different parts of the ocean. The island is privately owned with a small ecologically-sensitive resort, designated as a strict nature reserve under the resort lease (WCS, 2012), an Important Bird Area for red footed booby, *Sula sula*¹²⁹, for breeding and the hawksbill turtle, *Eretmochelys imbricata* (Laveti et al., 2011). The island is included on the Preliminary Register of Sites of National Significance as a seabird nesting colony and beach forest, and the reef as a barrier reef and marine ecosystem.

The barrier reefs and confines around the island, reaching back to the main coast of Vanua Levu, have been traditionally-declared Locally-Managed Marine protected areas for over 15 years, managed by the community, and supported by voluntary tourism contributions and conservation-based NGOs (Jupiter and Egli, 2011). The two deep passages through the centre of the barrier reef are the focuses of SCUBA diving tourism from the resort on Namenalala, resorts in Savusavu, and ship-based operations, giving the conservation of this reef an economic as well as an ecological value (Kastl and Gow, 2014).

The tidal currents bring high levels of nutrients to the shallower waters, supporting rich and diverse marine life. Small pinnacles and patch reefs in the passages have large quantities of soft coral, primarily, *Dendronephthya* spp; but with an unusual colony of *Sinularia flexibilis*, and also host many species of coral shrimp, pipefish, and splendid garden eels, *Gorgasia preclara*, not recorded elsewhere in Fiji.

The steep outer walls drop to very deep water with large pelagic marine life, including grey reef sharks, *Carcharhinus amblyrhynchos*, great hammerhead sharks, *Sphyrna mokarran*, and scalloped hammerhead sharks, *Sphyrna lewini*, dogtooth tuna, *Gymnosarda unicolor*, and reef manta rays, *Manta alfredi*. Ocean triggerfish, *Canthidermis sufflamen*, nest on one of the patch reefs in February/ March (Sykes, 2015a)¹³⁰. Cetaceans recorded include, humpback whales, *Megaptera novaeangliae*, short-finned pilot whales, *Globicephala macrorhynchus*, sperm whales, *Physeter macrocephalus*, minke whales, *Balaenoptera acutorostrata*, spinner dolphins, *Stenella longirostris*, and bottlenose dolphins, *Tursiops truncates* (Miller et al., 2016). Leatherback turtles, *Dermochelys coriacea*, have also been sighted in the area.¹³¹

¹²⁹ IBA FJ18 Namenalala Birdlife International Data Zone, <http://datazone.birdlife.org/site/factsheet/namenalala-iba-fiji/details>

¹³⁰ H. Sykes, and Nai'a Cruises, pers. comm., 19.07.2016

¹³¹ M. Greenfelder, JM Cousteau Resort Fiji, pers.comm.

4.11 TAVEUNI AND THE RINGGOLD ISLANDS

Taveuni is one of the largest “medium sized” volcanic islands in Fiji, approximately 40 km long, with a narrow fringing reef around most of the coastline, and a small barrier reef and lagoon on the south tip. The neighbouring islands of Qamea, Matagi, and Laucala are enclosed in a second barrier reef. There are villages, small resorts and one town on the island, but no large-scale industry.

Taveuni has a large area of rainforest protected as Reserved Forest¹³². Consequently most watersheds in Taveuni are still forested, and reefs minimally affected by land-based sediments. The Bouma National Heritage Park has four community managed conservation parks based in intact ecosystems, including a marine protected area. The Bouma National Heritage Park was the site of discovery of new species of estuarine and riverine fish (Jenkins and Boseto, 2005).

The Somosomo Straits are the narrowest point between the islands of Taveuni and Vanua Levu where, due to the constriction between the islands, and steep seabed slopes, currents are strong and very variable, creating areas of nutrient upwelling and rich marine life. The group of patch and barrier reefs known as the “Rainbow Reef” is a world-famous attraction for tourist SCUBA divers due to the abundance of reef fish and, *Dendronephthya* spp., soft corals (Neubauer, 2011). Sharks, reef manta rays, *Manta alfredi*, and humphead wrasse, *Cheilinus undulates*, are frequently seen on the reefs, and humpback whales, *Megaptera novaeangliae*, travel through the straits on their annual migration between feeding grounds in the Antarctic, and breeding grounds in the South Pacific (Miller et al., 2016). These reefs are fished from boats, but not usually by spear due to the dangerous currents.

The Ringgold Islands, north of Taveuni, are a cluster of small islands, and patch and atoll reefs, spread over 4,000 km² of deep ocean. Qelelevu lagoon and island along with Wailagilala lagoon and island, east of Taveuni, are the only two “true” atoll systems (a ring-shaped island formed of coral that surrounds a lagoon¹³³) found in Fiji, although three other near-atoll structures are found in the Ringgold Islands (Nanuku, Nukubasaga and Vatauu reefs) (Bryan, 1953). Likewise

The islands, particularly Cikobia Island, are the largest known nesting grounds for green turtles, *Chelonia mydas*, in Fiji, and are also known for coconut crab, *Birgus latro*¹³⁴, and seabirds¹³⁵.

Because of their small and remote character, many of these islands are uninhabited, and most of those that are inhabited support only small, traditional village communities who rely greatly on their marine resources for subsistence living. However, recent incursions of commercial seafood buyers have resulted in overexploitation in some areas. There are a few privately owned islands with residential or small boutique resort developments.

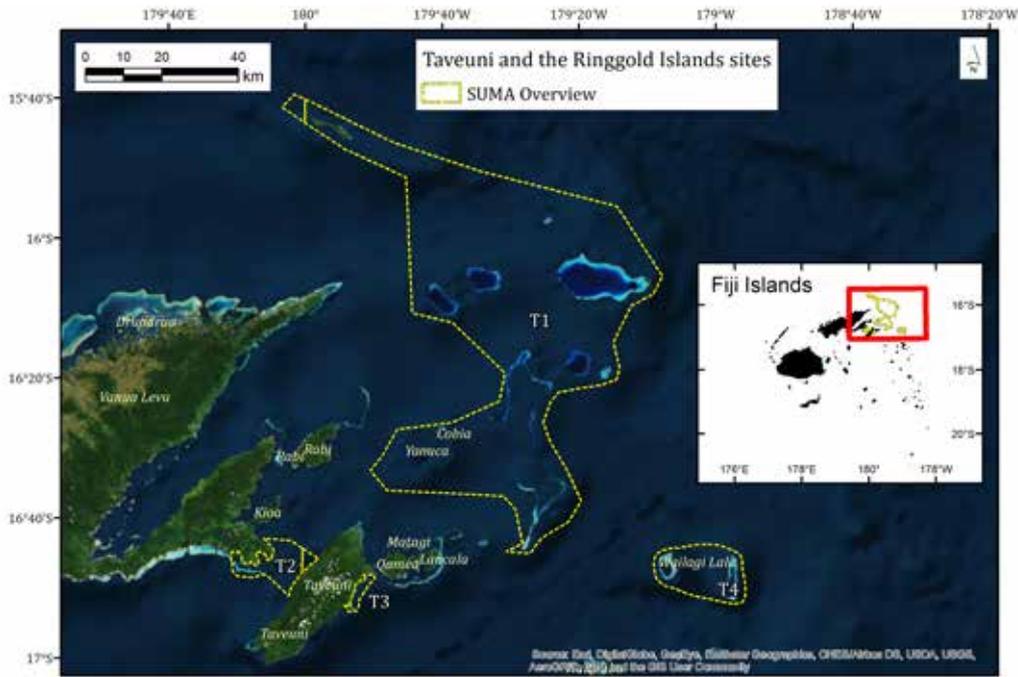
There are four Special, Unique Marine Areas (SUMAs) in the Taveuni and Ringgold Islands area (Map 68, Table 140). These are shown and described in more detail below.

¹³² National Trust of Fiji Islands, The REDD Desk, <http://theredddesk.org/countries/actors/national-trust-fiji-islands> and <https://naturefiji.org/project/taveuni-national-park-project/>

¹³³ Meaning of “Atoll” Cambridge Dictionary <http://dictionary.cambridge.org/dictionary/english/atoll>

¹³⁴ A. Batibasaga, Fiji Ministry of Fisheries, Unpublished data

¹³⁵ BirdLife International (2017) Important Bird Areas factsheet: Ringgold Islands. Downloaded from <http://www.birdlife.org> on 07/01/2017.



MAP 68: TAVEUNI AND THE RINGGOLD ISLANDS SITES

TABLE 140: TAVEUNI AND THE RINGGOLD ISLANDS SITES

SUMA codes	Linked report codes	Name	Biophysical Justification	Rating
T1	EBSA 22 NES 115 NES 137	Ringgold and Cikobia islands and reefs	Small islands, sunken caldera and atoll reefs Seabird nesting, coconut crabs, turtles, whales, bumphead parrotfish, and humphead wrasse.	11
T2	EBSA 22 FIME CR4 FIME CF26 FIME OP10 FIME SSC11	Somosomo Straits	Narrow Strait with high currents and patch reefs, 3 species of whale, sharks, soft corals, fish diversity, humphead wrasse, pelagic fish.	11
T3	EBSA 22 FIME CT8 FIME OP10	Bouma Heritage Park	Intact watershed to reef connectivity, fish with freshwater and marine stages in their lifecycle, and endemic freshwater gobies.	10
T4	NES 75, 62 IBA FJ 23	Wailagilala atoll and Cakau Gala	Two species of turtle, coconut crabs, endemic giant clams, seabird nesting, pelagic fish, humphead wrasse, sharks.	11

SITE T1: RINGGOLD AND CIKOBIA ISLANDS AND REEFS

TABLE 141: Site description T1

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
T1	EBSA 22 NES 115 & 137	Ringgold and Cikobia islands and reefs		11

The islands have large populations of coconut crabs, and are nesting areas for seabirds¹³⁷ including the brown noddy, *Anous stolidus*, red-footed boobies, *Sula* spp., lesser frigate bird, *Fregata ariel*, and black noddies, *Anous minutus* (Tarburton, 1987).

The area supports globally and regionally significant populations of marine turtles, and is the main foraging area, and Fiji's most significant nesting site, for green turtles, *Chelonia mydas*. Of particular importance for turtle nesting are the sand cays of Nukubasaga, Nukubalati, Nukusemanu, Nanukulevu, and Nanukulilai reefs, while the reefs themselves have populations of the increasingly endangered bumphead parrotfish, *Bolbometopon muricatum*, and humphead wrasse, *Cheilinus undulatus*¹³⁸.

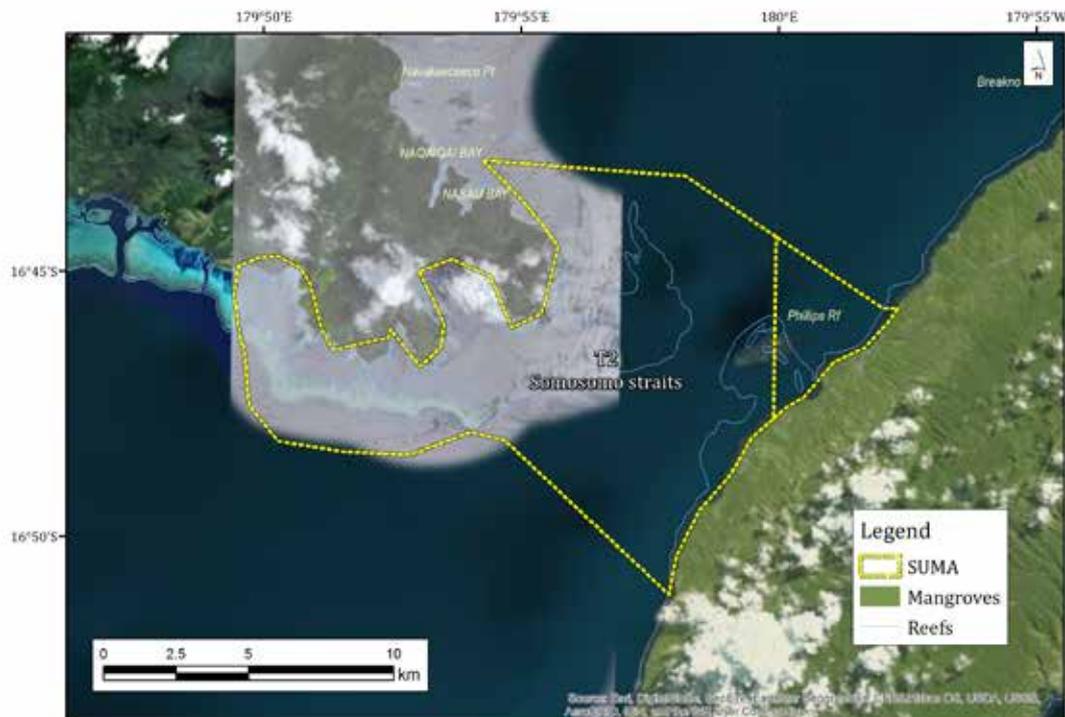
The large stretches of open ocean between the islands are locations for dolphins, *Stenella longirostris*, and minke whales, *Balaenoptera acutorostrata* or *B. bonaerensis*, and a migratory route for humpback whales, *Megaptera novaeangliae* (Miller et al., 2016).

Cikobia Island is on the preliminary register of Sites of National Significance as a seabird nesting colony, and Nuku Cikobia as a turtle nesting site and seabird nesting area.

SITE T2: SOMOSOMO STRAITS

TABLE 143: Site description T2

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
T2	EBSA 22 FIME CR4 FIME CF26 FIME OP10 FIME SSC11	Somosomo Straits		11



MAP 70: SITE T2

¹³⁷ BirdLife International (2017), Important Bird Areas factsheet: Ringgold Islands. Downloaded from <http://www.birdlife.org> on 07/01/2017.

¹³⁸ A. Batibasaga, Fiji Ministry of Fisheries, unpublished data

Geographic coordinates: S16° 50' 55", E180° 0' 0" and S16° 42' 47", E180° 0' 0"

Area (km²): 156.4

Division: Northern

Unique *iQoliqoli* ID number: Cakadrove_MAP24_FOL42 and MAP30_FOL26

TABLE 144: Details of Site Rating T2

Criteria	Details	Rating (out of 3)
Biophysical Justification	Narrow Strait with high currents and patch reefs, 3 species of whale, sharks, soft corals, fish diversity, humphead wrasse, pelagic fish.	3
Geographic Explicitness	From coastline of Vanua Levu to coastline of Taveuni, including mapped tourism dive sites.	2
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice available.	3
Obligations (See Appendix C)	Relevant taxa: <i>Carcharhinus amblyrhynchos</i> ; <i>Cheilinus undulatus</i> ; <i>Manta alfredi</i> ; <i>Galeocerdo cuvier</i> ; <i>Stenella longirostris</i> ; <i>Balaenoptera acutorostrata</i> ; <i>Megaptera novaeangliae</i> .	3
Overall Rating (Out of 12)		11

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a high overall rating of 11 (Table 144), and includes the Somosomo Straits, (Map 70) which are the narrowest point between the large island of Vanua Levu and the medium sized island of Taveuni, just over 7.5 km wide. There are very deep waters to the north east and south west of the straits, and tidal changes cause strong currents as nutrient-rich water is funnelled up through this constriction, creating an area of rich marine life.

The area is world renowned for the density of, *Dendronephthya* spp., soft corals and schooling fish found on the reef walls and patch reefs, and, known as the "Rainbow Reef", it has been the focus for SCUBA diving tourists for many years¹³⁹. At least five operations regularly offer SCUBA diving in the area, and it is one of the main attractions for resorts on Taveuni (Neubauer, 2011).

Grey reef sharks, *Carcharhinus amblyrhynchos*, and humphead wrasse, *Cheilinus undulatus*, are seen across the reefs, and there are reef manta rays, *Manta alfredi*, cleaning stations. Pelagic fish and tiger sharks, *Galeocerdo cuvier*, are known to frequent the deeper waters¹⁴⁰. Dolphins, *Stenella longirostris*, and minke whales, *Balaenoptera acutorostrata* or *B. bonaerensis*, are often seen, and the straits are on the migratory route for humpback whales, *Megaptera novaeangliae* (Miller et al., 2016).

The reef has been studied since 1999, and has gone through several stress events such as coral bleaching, crown-of-thorns starfish (COTs) outbreaks, and cyclones, but has always returned to high coral cover, and could be considered a centre for coral resilience to climate change, and a potential source of coral spawn to aid the recovery of other, less resilient reefs (Lovell and Sykes, 2008; Sykes and Morris, 2007).

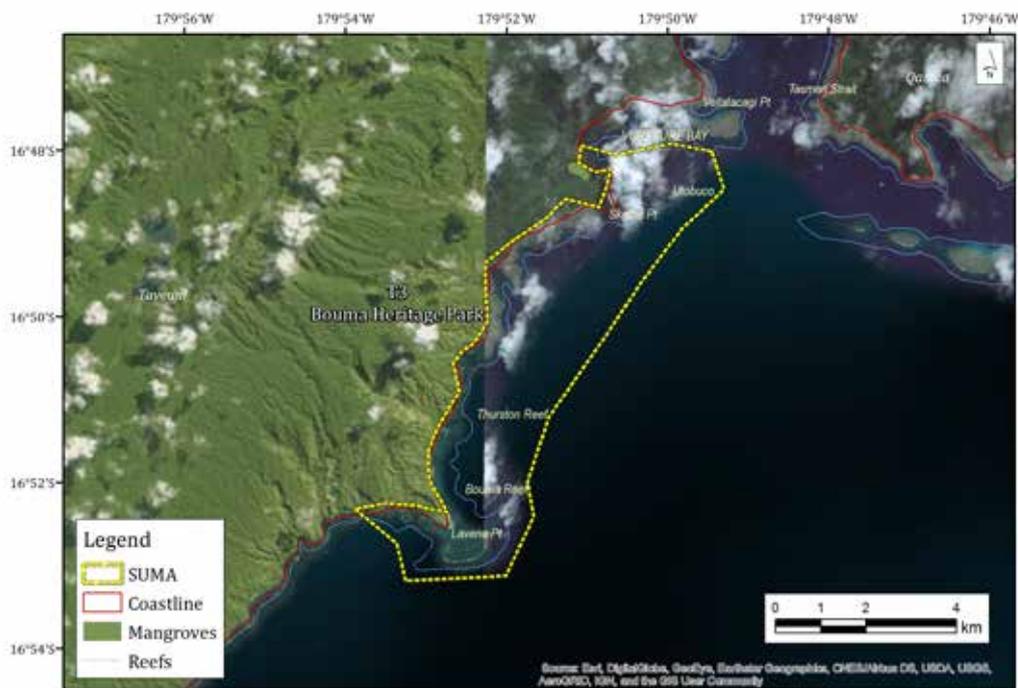
¹³⁹ Dive Somosomo, Diving in Taveuni, Dive the World <http://www.dive-the-world.com/diving-sites-fiji-taveuni.php>, and Bell, G. Rainbow Revisited, Taveuni. Sportdiving Magazine: www.oceanwideimages.com/Fiji_GaryBell.asp

¹⁴⁰ H. Sykes, pers.comm.

SITE T3: BOUMA NATIONAL HERITAGE PARK

TABLE 145: Site description T3

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
T3	EBSA 22 FIME CT8 FIME OP10	Bouma National Heritage Park		10



MAP 71: SITE T3

Geographic coordinates: S16° 47' 51", W179° 54' 3" and S16° 53' 24", W179° 49' 17"

Area (km²): 26.9

Division: Northern

Unique *iQoliqoli* ID number: Cakadrove_MAP24_FOL43 and 44

TABLE 146: Details of Site Rating T3

Criteria	Details	Rating (out of 3)
Biophysical Justification	Intact watershed to reef connectivity, fish with freshwater and marine stages in their lifecycle, endemic freshwater gobies.	3
Geographic Explicitness	Entire fringing reef from shore to 100 m off reef crest from the road bridge at Vurevure Bay to the river boundary of the Lavena <i>iQoliqoli</i> .	2
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice available.	3
Obligations (See Appendix C)	Rhizophora spp; and Bruguiera sp.	2
Overall Rating (Out of 12)		10

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a high overall rating of 10 (Table 146) and includes the Bouma National Heritage Park (Map 71). This 10km stretch of coastline along Taveuni's north eastern coast fronts a large area of conserved rainforest in the Bouma National Heritage Park. The park is protected by the National Trust of Fiji¹⁴¹, and within it there are four traditional villages and several settlements with four tourism-supported community managed protected areas, one inland, two coastal and one marine.

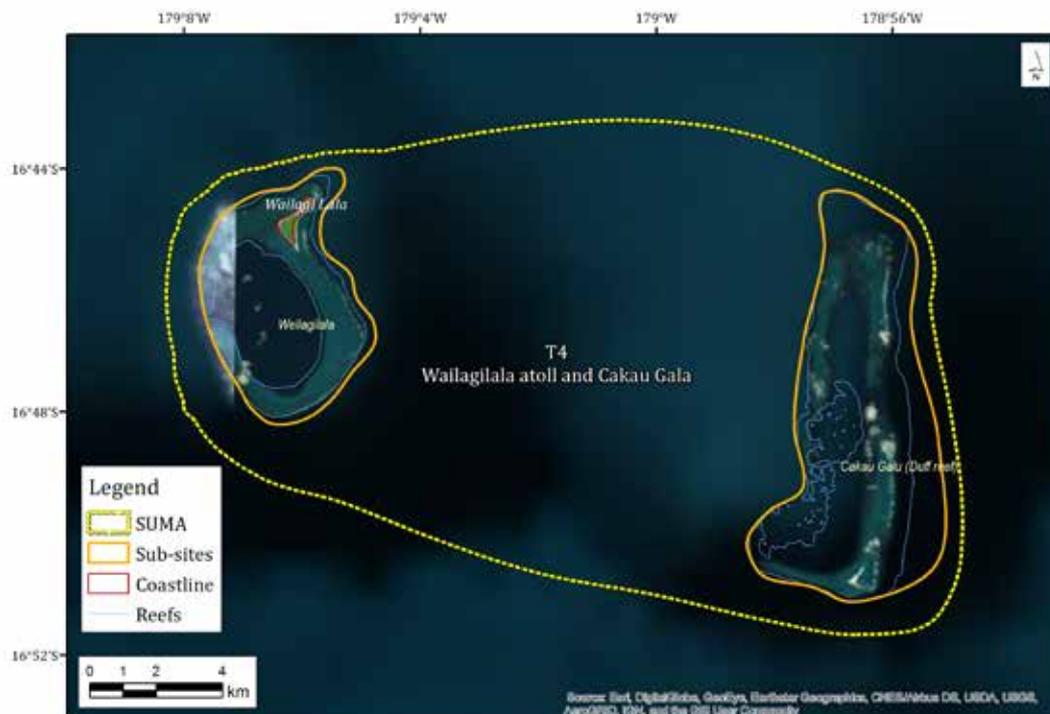
The connectivity between the conserved rainforest, intact watershed, river estuaries, mangroves and fringing reefs makes this an area important to reef species, but also to freshwater fish with a marine larval stage, and marine fish with a fresh-water portion of their lifecycle in rivers and estuaries. A new endemic freshwater goby species was identified here in 2005 (Jenkins and Boseto, 2005).

The fringing reefs are fished at a subsistence level by the local population, and are generally rubble, algae and seagrass dominated areas with reduced fish resources (Sykes, 2006), but the Waitabu Marine Park has a 900 m long area of reef, which has been protected from fishing since 1998, making it one of the oldest community-managed marine areas in Fiji, and where reef fish populations, invertebrate communities and coral cover has been restored (Sykes and Reddy, 2009).

SITE T4: WAILAGILALA ATOLL AND CAKAU GALA

TABLE 147: Site description T4

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
T4	NES 75, 62 IBA FJ 23	Wailagilala atoll and Cakau Gala		11



MAP 72: SITE T4

¹⁴¹ National Trust of Fiji Islands, The REDD Desk, <http://theredddesk.org/countries/actors/national-trust-fiji-islands> and <https://naturefiji.org/project/taveuni-national-park-project/>

Geographic coordinates: S16 41' 36", E180 52' 30" and S16 51' 52", E181 49' 35"

Area (km²): 289.5

Division: Northern

Unique *iQoliqoli* ID number: Cakaudrove_MAP46_FOL49 and Lau_MAP17_FOL61

TABLE 148: Details of Site Rating T4

Criteria	Details	Rating (out of 3)
Biophysical Justification	Two species of turtle, coconut crabs, endemic giant clams, seabird nesting, pelagic fish, humphead wrasse, sharks	3
Geographic Explicitness	Atoll barrier reef and confines	3
Source Number and Type	More than one good report and expert advice available	2
Obligations (See Appendix C)	Relevant taxa: <i>Anous stolidus</i> ; <i>Fregata ariel</i> ; <i>Phaethon lepturus</i> ; <i>Eretmochelys imbricata</i> ; <i>Chelonia mydas</i> ; <i>Gymnosarda unicolor</i> ; <i>Scomberomorus commerson</i> ; <i>Aetobatus narinari</i> ; <i>Himantura fai</i> ; <i>Alectis ciliaris</i> ; <i>Tridacna mbalavuana</i> ; <i>Sula</i> spp.	3
Overall Rating (Out of 12)		11

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a high overall rating of 11 (Table 148). It includes sub-sites Wailagilala atoll (Map 72), one of two true coral atolls in Fiji with a small limestone island on the northern edge and sub-site Cakau Gala (Duff Reef), a submerged linear reef with wave breaking crests and an islet.

Wailagilala atoll surrounds a deep lagoon, with a single passage artificially created in the 1950s. There is an old lighthouse and several derelict caretaker buildings on the island, and plans to create a boutique resort. Other than caretakers, there is no resident population on the island at time of writing.

The island is covered with littoral forest with populations of coconut crabs, *Birgus latro*, and nesting seabirds. It is part of a globally Important Biodiversity and Bird Area (IBA) for nesting red footed booby, *Sula* spp.¹⁴², and many other seabird species are found here, including the brown booby, *Sula leucogaster*, the masked booby, *Sula dactylatra*, the brown noddy, *Anous stolidus*, the lesser frigate bird, *Fregata ariel*, white tailed tropicbird, *Phaethon lepturus*, and numerous terns. Hawksbill turtles, *Eretmochelys imbricata*, and green turtles, *Chelonia mydas*, nest on the island (Sykes, 2007c).

Coral cover inside the lagoon is low, probably due to the high nutrient environment created by the bird guano. On the outer walls the coral is higher (Tuiwawa and Morrison, 2008) and in better condition, with pelagic fish such as the dogtooth tuna, *Gymnosarda unicolor*, narrow-barred king mackerel, *Scomberomorus commerson*, (walu), and spotted eagle ray, *Aetobatus narinari*, as well as the Tahitian stingray, *Himantura fai*, threadfin trevally, *Alectis ciliaris*, and the endangered humphead wrasse, *Cheilinus undulatus*. The endemic (to Lau and Tonga) giant clam, *Tridacna mbalavuana*, (previously known as *T. tevoroa*), listed as vulnerable on the IUCN Red List of Endangered Species (Wells, 1996), is found on the reef walls (Sykes, 2007d).

Wailagilala is listed on the preliminary register of Sites of National Significance as an atoll, a seabird nesting colony, and for its marine ecosystem. Duff Reef is listed on the National Environment Strategy preliminary register of Sites of National Significance as turtle nesting site, possibly on the sand spit on the south-eastern corner of the reef. The open ocean between reefs is a foraging ground for seabirds¹⁴³ and would provide a migration route for nesting sea turtles.

¹⁴² Birdlife International Datazone, IBA FJ 23 Northern Lau Marine <http://datazone.birdlife.org/site/factsheet/northern-lau-marine-iba-fiji/details>

¹⁴³ Birdlife International Datazone IBA FJ 23 Northern Lau Marine <http://datazone.birdlife.org/site/factsheet/northern-lau-marine-iba-fiji/details>

4.12 LAU

The Lau islands are a long chain of approximately 60 small limestone islands and islets separated by wide stretches of deep open ocean, arranged along a stretch of over 400 km of the Lau Ridge between Fiji and Tonga. The area has a very high variety of reef types, with most islands having fringing reefs and small lagoons, and some having barrier reefs and larger lagoons. There are areas of large ribbon and patch reefs, and several inland saltwater lakes and pools.

Its physical remoteness and position along a deep water basin makes each island in the Lau group unique in some way. The endemic giant clam, *Tridacna mbalavuana*, (previously known as *T. tevoroa*) is found in Lau and the islands of Tonga, and is listed in Appendix II of CITES and as Vulnerable in the IUCN Red List of Threatened Species (Wells, 1996). Humpback whales, *Megaptera novaeangliae*, travel through Lau on their annual migration between feeding grounds in the Antarctic, and breeding grounds in the South Pacific.

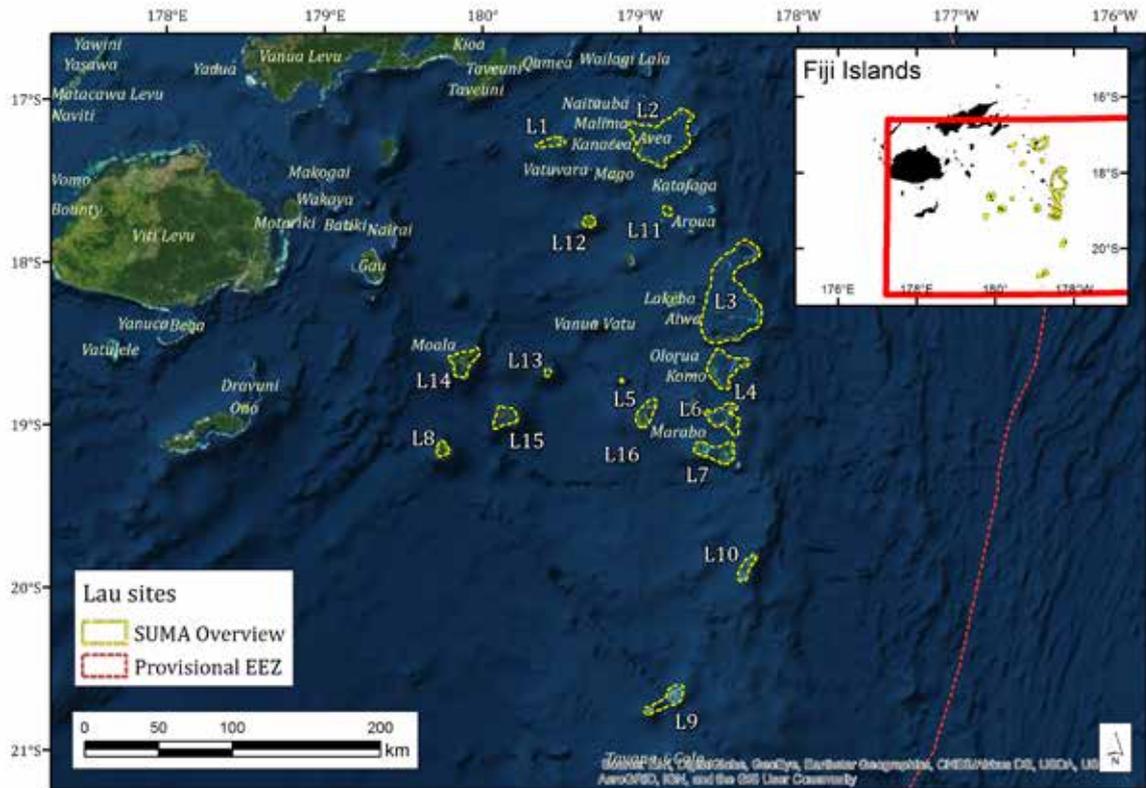
The remaining Fijian population of coconut crab, *Birgus latro*, previously listed on the IUCN Red List as a rare species (a lack of biological data caused its assessment to be amended to “data deficient” in 1996) (Eldredge, 1996) are only found in Lau, the Ringgold Islands, Taveuni and Rotuma¹⁴⁴. There are many seabird and turtle nesting sites in Lau, including hawksbill turtles, *Eretmochelys imbricata*, and green turtles, *Chelonia mydas*. A 2007 study of northern Lau recorded 333 fish species, 131 species of hard corals, and one hawksbill turtle, but commented that targeted commercial finfishes were found to be low in abundance (Tuiwawa and Morrison, 2008).

A survey carried out in the far south of Lau in 2008, described the reefs at Ono-i-Lau Island as being in good condition with very high coral cover (68.5%), and high invertebrate and fish counts with abundant and sizeable indicator species. The report comments that “the isolated oceanic conditions create a distinct range of species composition and habitats, which provide important breeding, nesting, aggregation sites for keystone species such as humphead wrasse, *Cheilinus undulatus*, green and hawksbill turtles, and the endemic clam species” (Fiu et al., 2010). Coral reef surveys in 2013 of 11 islands (Cicia, Fulaga, Kabara, Mago, Matuku, Moala, Nayau, Totoya, Tuvuca, Vanuabalavu, and Vanuavatu) in the Lau group found coral cover averaged 36%, with the highest diversity on the Vanuabalavu. The report noted that “at most sites, macroalgae cover was low (4%), and cover of crustose coralline algae was high (21.6%), signs of a healthy reef system, composed of a fair number of herbivores and plenty of prime settlement opportunities for new coral recruits” (Bruckner et al., 2016). Total mean biomass was moderately high (1126 kg/ha, range 801–1941 kg/ha).

Biodiversity and reef health surveys of 8 islands (Moala, Totoya, Navatu, Vanuavatu, Tavunasici, Olorua, Karoni, Matuku) of the southern Lau group in 2017, identified 281 species of scleractinian corals including 12 new records for Fiji and range extensions for 13 species, with the highest diversity on outer reef slopes, followed by lagoon reefs (Meo et al., in press). Reef fish diversity was high, with 531 species recorded during the 10 survey days, making a total of 725 species recorded in the Lau group (Meo et al. in press). The report highlighted 39 fish species representing new records for Fiji. Another marine rapid assessment of the southern Lau Seascape, part of Auckland War Memorial Museum’s South-West Pacific 2017 Expedition, looked at the biodiversity and reef health of 7 islands/atolls (Namuka, Ono-i-Lau, Vatoa, Ogea, Yagasa, Oneata and Late Fiji Atoll), the results of which will be added to the numbers previously mentioned (Meo et al., in press) report (Auckland War Memorial Museum, unpublished data). In addition to the southern Lau surveys, baseline surveys of five islands in the northern Lau Group in 2017 (Kaibu, Yacata, Vatuvara, Kanacea and Adavaci) looked at the health, abundance and diversity of corals, reef fish and invertebrate species (Miller et al., 2018). The survey found 47 coral genera, 293 species of fish and at least eight species listed on the IUCN Red List of threatened species (Miller et al., 2018).

There are sixteen Special, Unique Marine Areas (SUMAs) in the Lau group of islands (Map 73, Table 149). These are shown and described in more detail below.

¹⁴⁴ H. Sykes, pers. comm., 19.07.2016



MAP 73: LAU SITES

TABLE 149: LAU SITES

SUMA codes	Linked report codes	Name	Biophysical Justification	Rating
L1	NES 69	Northwest Lau Group including subsites Nukutolu, Yacata and Kaibu Island	Turtles, coconut crabs, unique coastal vegetation, sharks, giant clams, humphead wrasse, lagoon, fore reef, fringing reef, reef flat.	9
L2	NES 73 NES 74 FIME CF17 FIME CR3 FIME CT24	Vanuabalavu Island and reefs with subsites Qilaqila Bay of Islands and Masomo Bay	High diversity of reef fish and corals, turtles, sharks, tuna, dolphins, seabirds, seamounts, inland lakes, endemic giant clams, spawning aggregation site.	10
L3	EBSA 5 NES 122 NES 124	Bukatatanoa and Oneata reefs with subsites Vanua Masi, Late Reefs, Bukatatanoa Reef, Oneata Island	Whale migration route, seabird nesting colony, sharks, giant grouper, spawning aggregation.	8
L4	EBSA 5 NES 64 FIME CF13	Moce Group – with subsites Karoni Island and reef, Cakau Lekaleka, Motu and Vau Reefs	Channel, lagoon, fore reef, reef flat, patch reefs, caves, dolphins, sharks, giant sweetlips, barracuda and groupers.	9
L5	EBSA 5 NES 121 NES 140 FIME CF16	Kabara and Vuaqava Islands	Seabirds, turtles, whale migration route, sharks, lagoon, fore reef, reef flat, inland mangrove lake, possibly unusual shellfish and algal species (unconfirmed).	8
L6	New site	Yagasa Group	Small island with barrier reef, seabird and turtle nesting, sharks and whale migratory route.	10

SUMA codes	Linked report codes	Name	Biophysical Justification	Rating
L7	EBSA 5 IBA 14 NES 66 FIME CF15	Fulaga and Ogea Islands and reefs	Limestone islands, extensive reef and lagoon system, seagrass, mangroves, spawning aggregation site, manta rays, turtles.	10
L8	New site	Matuku	Extensive reef and lagoon with mangroves, large and deep channels, steep drop-off.	9
L9	New Site	Ono-i-Lau Group	Barrier reefs, fringing reefs, patch reefs, channel, lagoon, humphead wrasse, and bumphead parrotfish.	9
L10	New site	Vatoa Group	Channel, lagoon, fore reef, fringing reef, patch reef, reef flat, eagle rays, manta rays, giant clam, green turtles, sharks.	9
L11	New site	Tuvuca	Channel, lagoon, fore reef, fringing reef, patch reef, reef flat, seagrass.	8
L12	New site	Cicia	Channel, lagoon, fore reef, fringing reef, patch reef, reef flat, seagrass.	7
L13	New site	Navatu	Lagoons, reef flats, patch reefs, fore reef, fringing reef, sharks, giant clams, and wrasses.	10
L14	New site	Moala Island including Cakova Passage, Keteira Bay	Barrier reef, multiple passages, deep lagoon, mangroves, grouper spawning sites.	9
L15	New site	Totoya	Barrier reef, channel, Lagoon, fore reef, patch reef, reef flat, sharks, parrotfish, jobfish and unicorn fish	9
L16	New site	Tavunasici	Turtles, sharks, wrasses, seabirds, coconut crabs, channel, lagoon, fore reef, patch reef, fringing reef, spur and grooves, caves	10

SITE L1: NORTHWEST LAU GROUP

TABLE 150: Site description L1

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
L1	NES 69	Northwest Lau Group including subsites Nukutolu and Yacata and Kaibu Island		9



MAP 74: SITE L1

Geographic coordinates: S17 14' 38", E180 20' 23" and S17 16' 44", E180 32' 13"

Area (km²): 89.5

Division: Eastern

Unique *iQoliqoli* ID number: Cakaudrove_MAP46_FOL48

TABLE 151: Details of Site Rating L1

Criteria	Details	Rating (out of 3)
Biophysical Justification	Turtles, coconut crabs, unique coastal vegetation, sharks, giant clams, humphead wrasse, lagoon, fore reef, fringing reef, reef flat.	3
Geographic Explicitness	Reef and islands	1
Source Number and Type	More than one good report and expert advice available.	2
Obligations (See Appendix C)	Relevant taxa: <i>Birgus latro</i> ; <i>Cheilinus undulatus</i> ; <i>Tridacna derasa</i> ; <i>T. squamosa</i> ; <i>T. maxima</i> ; and <i>T. crocea</i> ; Cheloniidae spp.	3
Overall Rating (Out of 12)		9

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a medium overall rating of 9 (Table 151). It includes Nukutolu Island (subsite) with its two small sandy islands connected by a linear reef system, and Yacata and Kaibu Islands (subsites), which are in a single barrier reef system with a lagoon, fore reef, fringing reef, reef flat, and channels connected to the open ocean (Miller et al., 2018) (Map 74). Yacata has a single village of approximately 250 people and Kaibu is a private island with a resort (Miller et al., 2018).

Nukutolu Island has linear reef system and unique coastal vegetation with turtle nesting and coconut crab, *Birgus latro*, *habitat*¹⁴⁵. Yacata and Kaibu Islands have fringing reef, reef flats, lagoon and fore reef with great fish biodiversity, a turtle nesting site, a nursery area for parrotfish, coconut crabs, and four species of giant clams, *Tridacna derasa*, *T. squamosa*, *T. maxima*, and *T. crocea* (Miller et al., 2018). Surveys of Kaibu Island in 2011 also found relatively large populations of sharks (Sykes, 2011).

¹⁴⁵ M. Tuiwawa., University of the South Pacific, pers. comm., 19.07.2016

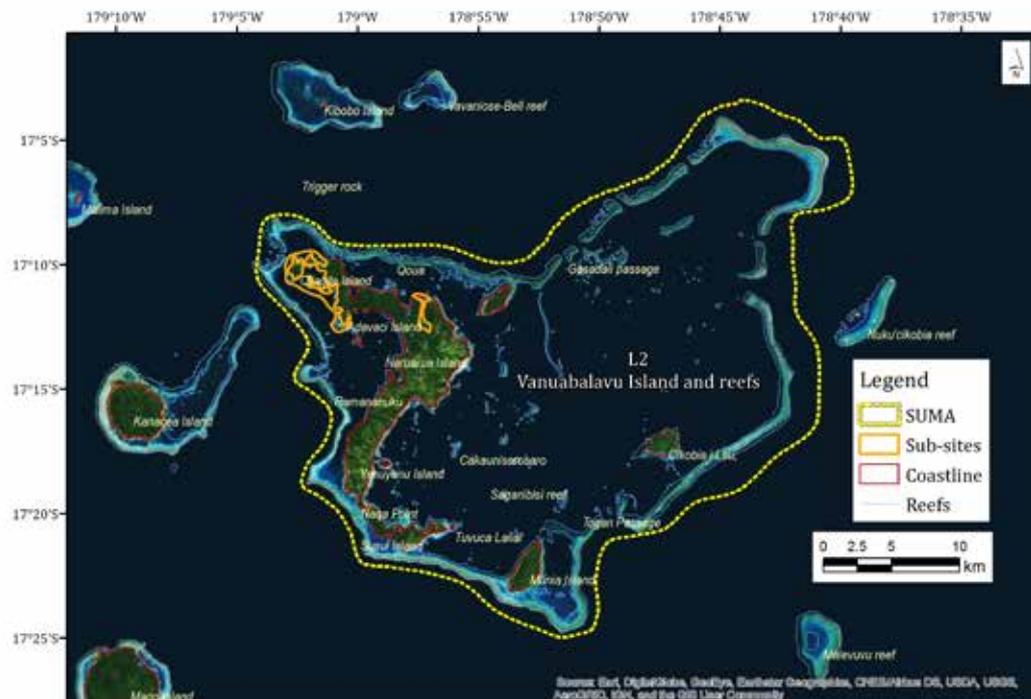
Nukutolu is listed on the preliminary register of Sites of National Significance as a turtle nesting area.

Please note that the Northwest Lau Group site is part of the Lau geographical cluster in this report, however, its provincial boundary is within Cakaudrove Province.

SITE L2: VANUABALAVU ISLAND AND REEFS

TABLE 152: Site description L2

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
L2	NES 73 & 74 FIME CF17 FIME CR3 FIME CT24	Vanuabalavu Island and reefs with subsites Qilaqila Bay of Islands and Masomo Bay		10



MAP 75: SITE L2

Geographic coordinates: S17 8' 17", E180 55' 15" and S17 20' 52", E181 24' 18"

Area (km²): 958.4

Division: Eastern

Unique *iQoliqoli* ID number: Lau_MAP16_FOL51-60

TABLE 153: Details of Site Rating L2

Criteria	Details	Rating (out of 3)
Biophysical Justification	High diversity of reef fish and corals, scenic undercut raised islets, turtles, sharks, tuna, dolphins, seabirds, seamounts, inland lakes, mangroves, endemic giant clams, spawning aggregation site.	3
Geographic Explicitness	Barrier reef and confines, associated systems.	2
Source Number and Type	More than one good report and expert advice available.	2
Obligations (See Appendix C)	Relevant taxa: <i>Stenella longirostris</i> ; <i>Carcharhinus amblyrhynchos</i> ; <i>Tridacna mbalavuana</i> ; Cheloniidae spp, <i>Rhizophora</i> spp; and <i>Bruguiera</i> sp.	3
Overall Rating (Out of 12)		10

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a high overall rating of 10 (Table 153) and includes Vanuabalavu (Map 75), the largest and highest island in the Lau group, approximately 20 km long and almost 5 km across at its widest point. There are several villages and some private residences on the island. The island has deep fjord-like bays and an extensive and complex reef system including fore reefs, fringing reefs, patch reefs, reef flats and mangroves with very high fish biodiversity (Bruckner et al., 2016; Tuiwawa and Morrison, 2008). The barrier reef system has many large passages, a large lagoon with multiple patch reefs, and coral heads.

The island has seabirds¹⁴⁶, turtle nesting and foraging sites in the deeper waters including a spawning aggregation site for fish¹⁴⁷. Spinner dolphins, *Stenella longirostris*, are seen in the lagoon, and grey reef sharks, *Carcharhinus amblyrhynchos*, in the passages. The reefs have high coral cover and the lagoon has extremely large stands of branching, *Acropora* spp., corals, which were badly affected by coral bleaching in 2000¹⁴⁸. The level of recovery from this bleaching is as yet unknown.

Deep water features offshore priority areas known for shark and tuna. Giant clams endemic to Lau and Tonga, *Tridacna mbalavuana*, (previously known as *T. tevoroa*), listed as vulnerable on the IUCN Red List of Endangered Species (Wells, 1996), are found on the reefs¹⁴⁹. Nearshore reefs are impacted by local fishing practices, and coral health and fish abundance is only moderate (Fiji Fisheries Department, 2007a, 2007b). The Qilaqila Bay of Islands (subsite) is listed on the preliminary register of Sites of National Significance for its raised coastal formation and marine ecosystem, and the Masomo Bay (subsite) for its inland saline lake, unidentified fish, cultural significance and coastal environment.

SITE L3: BUKATATANOVA AND ONEATA GROUP

TABLE 154: Site description L3

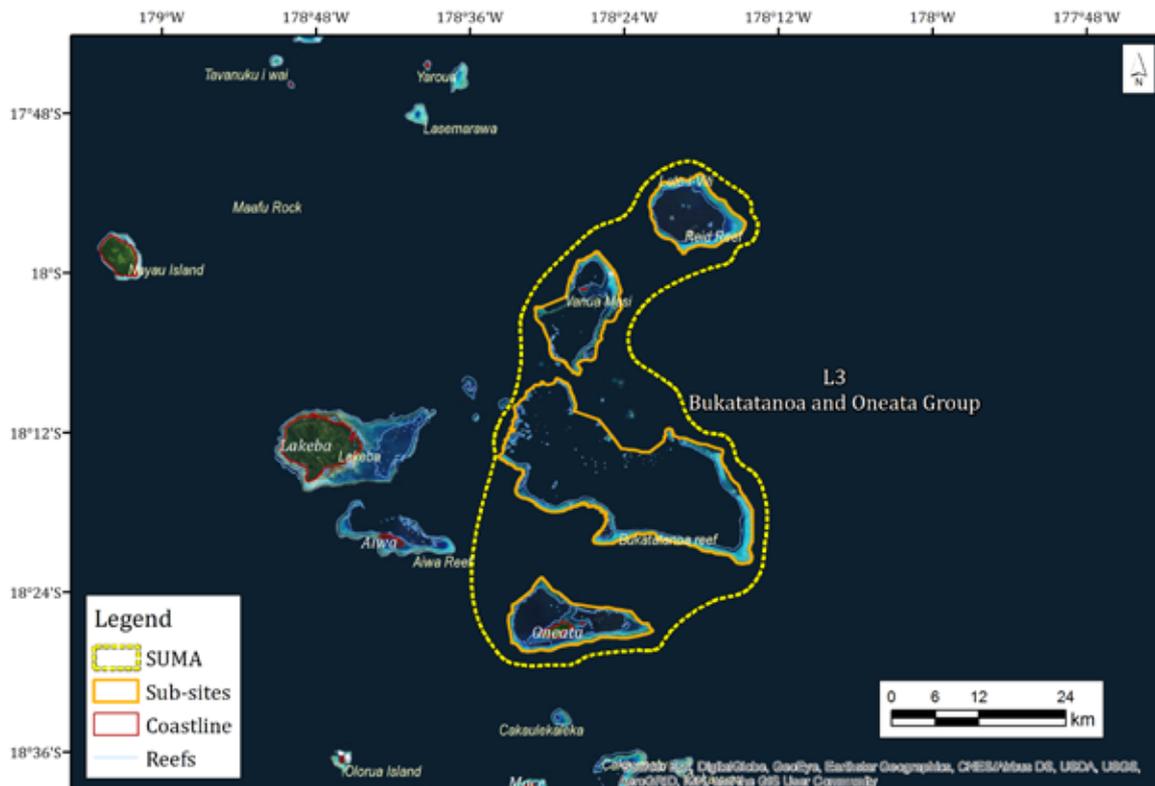
Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
L3	EBSA 5 NES 122 & 124	Bukatatanova and Oneata reefs with subsites Vanua Masi, Late Reefs, Bukatatanova Reef, Oneata Island		8

¹⁴⁶ Birdlife International Datazone, IBA FJ 23 Northern Lau Marine <http://datazone.birdlife.org/site/factsheet/northern-lau-marine-iba-fiji/details>

¹⁴⁷ S. Meo, Conservation International, pers. comm., 24.11.2017

¹⁴⁸ H. Sykes, unpublished data

¹⁴⁹ T. Vodivodi, Fiji Ministry of Fisheries, pers. comm., 19.07.2016



MAP 76: SITE L3

Geographic coordinates: S17 50' 43", E181 46' 21" and S18 29' 20", E181 25' 26"

Area (km²): 1775.9

Division: Eastern

Unique *iQoliqoli* ID number: Lau_MAP17_FOL71-72

TABLE 155: Details of Site Rating L3

Criteria	Details	Rating (out of 3)
Biophysical Justification	Whale migration route, seabird nesting colony, submerged reef, barrier reef, lagoon, deep oceanic water, sharks, giant grouper, spawning aggregation.	3
Geographic Explicitness	Loose group of reefs.	1
Source Number and Type	More than one good report and expert advice available.	2
Obligations (See Appendix C)	Relevant taxa: <i>Stenella longirostris</i> ; <i>Epinephelus lanceolatus</i> .	2
Overall Rating (Out of 12)		8

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a medium overall rating of 8 (Table 155). It includes subsites, Bukatatanoa reefs and Oneata, a small limestone island approximately 4 km long, with an extensive barrier reef and a broad lagoon system, and a scattered group of submerged complex reef systems with small uninhabited islets in a deep oceanic area (Map 76).

There is new information coming out about the marine life of this site, including spinner dolphin, *Stenella longirostris*, habitat in the area (Miller et al., 2016). The diversity of habitat and connectivity with deep water makes it potentially an area of high biodiversity¹⁵⁰. Oneata Island reef has lots of high coral cover bommies and patch reefs that descend to

¹⁵⁰ M. Tuiwawa, University of the South Pacific, pers. comm., 19.07.2016

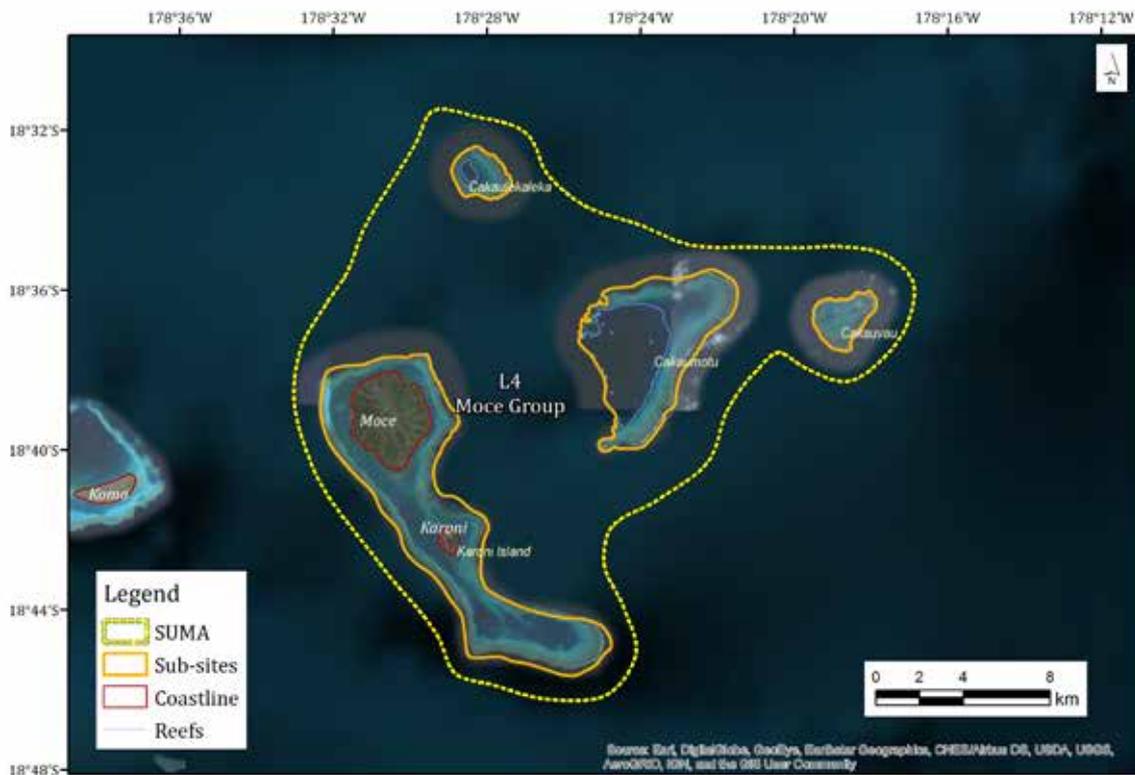
about 20 m with a fish spawning aggregation site¹⁵¹. Late Reef has a gentle grading slope on the leeward side of the atoll, numerous large bommies, and has good coral cover even at depths of 50 m¹⁵².

Sandbanks within subsites, Vanua Masi and Late Reef, were put on the National Environment Strategy preliminary register of Sites of National Significance as seabird nesting colonies. It has also been reported as having populations of sharks and giant grouper, *Epinephelus lanceolatus*, as well as being on a whale migration route¹⁵³.

SITE L4: MOCE GROUP

TABLE 156: Site description L4

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
L4	EBSA 5, NES 64 FIME CF13	Moce Group – Reef group to the east of Moce Island with subsites Karoni Island and reef, Cakau Lekaleka, Motu and Vau Reefs		9



MAP 77: SITE L4

Geographic coordinates: S18 41' 36", E181 24' 42" and S18 35' 29", E181 43' 40"

Area (km²): 402.0

Division: Eastern

Unique *iQoliqoli* ID number: Lau_MAP18_FOL76

¹⁵¹ Auckland War Memorial Museum, unpublished data

¹⁵² ibid

¹⁵³ T. Vodivodi, Fiji Ministry of Fisheries, pers. comm., 19.07.2016

TABLE 157: Details of Site Rating L4

Criteria	Details	Rating (out of 3)
Biophysical Justification	Channel pass, lagoon, fore reef, reef flat, patch reefs, submerged reefs, caves, dolphins, sharks, giant sweetlips, barracuda and groupers, seabirds, diverse marine ecosystem.	3
Geographic Explicitness	Barrier reef and confines, associated patch reefs.	1
Source Number and Type	More than one good report and expert advice available.	2
Obligations (See Appendix C)	Relevant taxa: <i>Stenella longirostris</i> ; <i>Chelonia mydas</i> ; <i>Eretmochelys imbricata</i> , <i>Cheilinus undulatus</i> and <i>Bolbometopon muricatum</i> .	3
Overall Rating (Out of 12)		9

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a medium overall rating of 9 (Table 157). It includes subsites, Cakau Lekaleka, Cakau Motu, Cakau Vau, and Karoni Island and reef (Map 77); with submerged reefs and deep oceanic waters. Karoni reef and lagoon is scattered with bommies and patch reefs at varying depths (Meo et al., in press). Cakau Motu and Vau have rugose reef topography with significant caves, large grooves and isolated spurs in the upper reef with a sandy slope to at least 60 m, scattered with small bommies (Meo et al., in press).

This reefs at this site boast very high fish biodiversity (Meo et al., in press), and spinner dolphin, *Stenella longirostris*, habitat (Miller et al., 2016). The diversity of habitat and connectivity with deep water makes it potentially an area of high overall biodiversity¹⁵⁴.

Cakau Lekaleka Reef was put on the National Environment Strategy preliminary register of Sites of National Significance for its marine ecosystem, known for sharks, aggregations of giant sweetlips, barracuda and groupers¹⁵⁵.

Fisheries surveys in 2010 recorded populations of numbers of humphead wrasse, *Cheilinus undulatus* and bumphead parrotfish, *Bolbometopon muricatum*, in the general area, but also noted that these are in decline due to fishing pressures. Similarly hawksbill turtles and green turtles are seen in the areas and known to nest on nearby islands, but their numbers have been decreasing over the past 30 years (Fiji Fisheries Department, 2008).

SITE L5: KABARA AND VUAQAVA ISLANDS

TABLE 158: Site description L5

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
L5	EBSA 5, NES 121 & 140 FIME CF16	Kabara and Vuaqava islands		8

¹⁵⁴ M. Tuiwawa, University of the South Pacific, pers. comm., 19.07.2016

¹⁵⁵ A. Batibasaga, Fiji Ministry of Fisheries, pers. comm., 19.07.2016



MAP 78: SITE L5

Geographic coordinates: S18 59' 22", E180 58' 55" and S18 50' 38", E181 8' 26"

Area (km²): 160.7

Division: Eastern

Unique *iQoliqoli* ID number: Lau_MAP18_FOL81 and 83

TABLE 159: Details of Site Rating L5

Criteria	Details	Rating (out of 3)
Biophysical Justification	Seabirds, turtles, whale migration route, sharks, lagoon, fore reef, reef flat, inland mangrove lake, possibly unusual shellfish and algal species (unconfirmed).	3
Geographic Explicitness	Islands with fringing reef system and lagoons.	1
Source Number and Type	More than one good report and expert advice available.	2
Obligations (See Appendix C)	Relevant taxa: <i>Rhizophora</i> spp; <i>Bruguiera</i> sp; and Cheloniidae spp.	2
Overall Rating (Out of 12)		8

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a medium overall rating of 8 (Table 159), and includes the Kabara and Vuaqava Islands subsites (Map 78), two upraised limestone islands on the edge of a deep oceanic passage. The islands have a fringing and barrier reefs with a traditional village on Kabara Island.

There is little but new information coming out about the marine life of this site. The diversity of habitat and connectivity with deep water makes it potentially an area of high biodiversity. The islands are on a migratory route for whales travelling between Vuaqava and Kabara islands¹⁵⁶. Kabara Island has a lagoon, fore reef and reef flat with good fish diversity and moderate levels of coral cover (Bruckner et al., 2016). Vuaqava Island has an unusual salt lake located in the interior of the island, used by Kabara islanders as a turtle pen. The mangrove, algae, shellfish, and fish of the lake are believed to be of interest, but have not yet been researched¹⁵⁷.

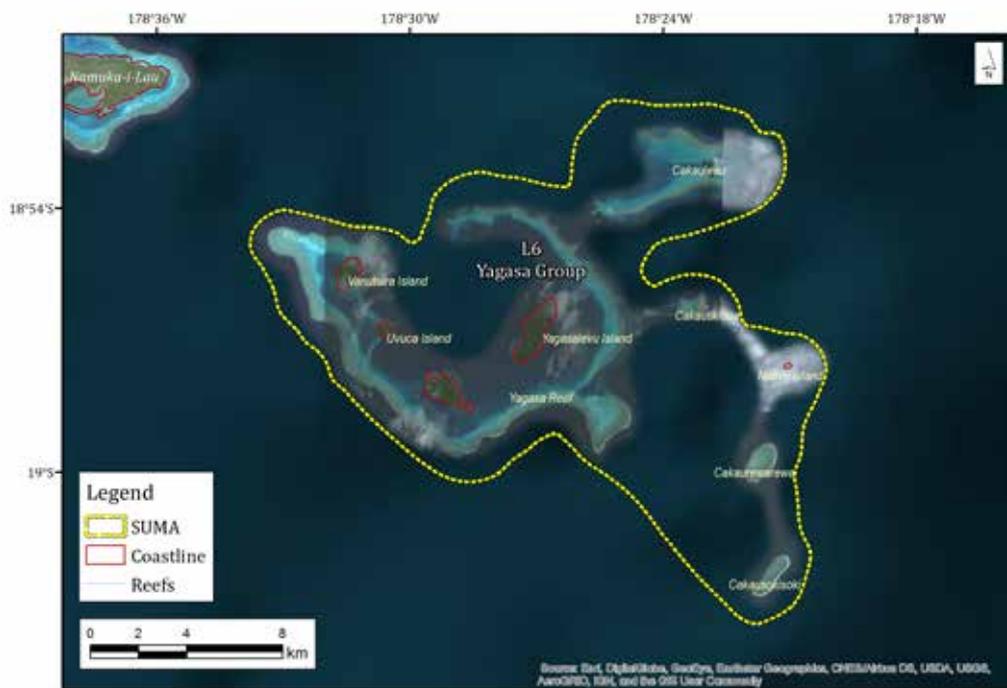
¹⁵⁶ Batibasaga, A., Fiji Ministry of Fisheries, pers. comm., 19.07.2016

¹⁵⁷ Tuiwawa, M., University of the South Pacific, pers. comm., 19.07.2016

SITE L6: YAGASA GROUP

TABLE 160: Site description L6

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
L6	New site	Yagasa Group		10



MAP 79: SITE L6

Geographic coordinates: S18 54' 15", E181 26' 56" and S19 1' 59", E181 42' 59"

Area (km²): 272.2

Division: Eastern

Unique *iQoliqoli* ID number: Lau_MAP18_FOL75

TABLE 161: Details of Site Rating L6

Criteria	Details	Rating (out of 3)
Biophysical Justification	Small island with barrier reef, seabird and turtle nesting, sharks and whale migratory route.	3
Geographic Explicitness	Small island with barrier reef and three islets to the south east.	2
Source Number and Type	More than one good report (unpublished data) and expert advice available.	2
Obligations (See Appendix C)	Relevant taxa: <i>Carcharhinus albimarginatus</i> ; <i>Galeocerdo cuvier</i> ; <i>Nebrius ferrugineus</i> ; <i>Triacodon obesus</i> ; <i>Carcharhinus amblyrhynchos</i> and <i>Carcharhinus melanopterus</i> ; <i>Sula</i> spp.	3
Overall Rating (Out of 12)		10

DETAILED DESCRIPTION OF HABITAT / FEATURE

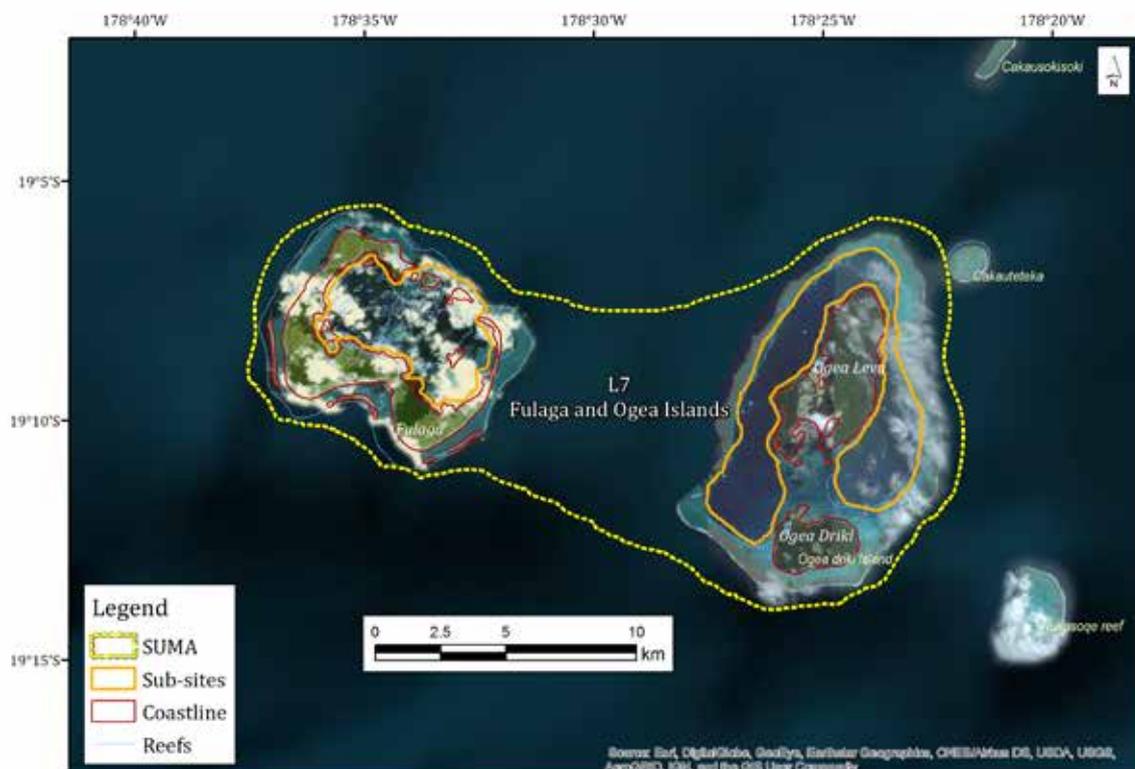
This site has a high overall rating of 10 (Table 161), and it includes Yagasa Island and islets to the south-east (Map 79). Yagasa Island is a huge atoll with barrier reef, extensive reef systems with several islands and a horseshoe reef off the northeast, and has a sizeable lagoon with exaggerated spurs and groove formations on the western channel¹⁵⁸.

Yagasa Island cluster has very high fish biodiversity, is part of a whale migration route, has a large numbers of boobies nesting on the main island, high biomass of fishes, especially herbivores, great diversity of sharks in the lagoon (tiger, silvertip, nurse, whitetip, grey, blacktip), and unique large patch reefs rising out of deep water in the lagoon with unique coral assemblages¹⁵⁹. The spurs are covered with 30–40% live coral cover¹⁶⁰. Naibobo (Naevo) Island and the uninhabited raised limestone islets in the Yagasa cluster were put on the National Environment Strategy preliminary register of Sites of National Significance as seabird nesting colonies.

SITE L7: FULAGA AND OGEA ISLANDS

TABLE 162: Site description L7

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
L7	EBSA 5 IBA 14 NES 66 FIME CF15	Fulaga and Ogea Islands and reefs		10



MAP 80: SITE L7

¹⁵⁸ Auckland War Memorial Museum, unpublished data

¹⁵⁹ ibid

¹⁶⁰ ibid

Geographic coordinates: S19 5' 23", E181 22' 35" and S19 13' 45", E181 38' 9"

Area (km²): 267.3

Division: Eastern

Unique *iQoliqoli* ID number: Lau_MAP18_FOL79 and 80

TABLE 163: Details of Site Rating L7

Criteria	Details	Rating (out of 3)
Biophysical Justification	Limestone islands, extensive reef and lagoon system, seagrass, mangroves, spawning aggregation site, manta rays, turtles.	3
Geographic Explicitness	Two barrier reefs and confines.	2
Source Number and Type	More than one good report and expert advice available.	2
Obligations (See Appendix C)	Relevant taxa: <i>Epinephelus fuscoguttatus</i> ; Cheloniidae spp; <i>Rhizophora</i> spp; and <i>Bruguiera</i> sp.	3
Overall Rating (Out of 12)		10

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a high overall rating of 10 (Table 163) and it includes Fulaga, Ogea and Ogea Driti (Map 80), three limestone islands between 3 and 7 km long. There are traditional villages on Fulaga and Ogea. The islands are seabird nesting sites, have marine caves in their coastline, and are enclosed within two large fringing and barrier reefs (Bruckner et al., 2016), with lagoons which have important seagrass beds (*Halodule* species)¹⁶¹, and are probably foraging grounds for green turtles¹⁶². Ogea outer channel reef is a sandy bench with scattered bommies at about 15-25m depth, then gradually slopes down with bommies and lots of sea whips and soft corals¹⁶³. Ogea Island has very high fish biodiversity, good coral cover, presence of manta rays in channel passes, and potentially a spawning aggregation site for grouper, *Epinephelus fuscoguttatus*¹⁶⁴.

Fulaga was put on the National Environment Strategy preliminary register of Sites of National Significance for its spectacular lagoon and geological formations. Ogea Island is home to the endemic terrestrial bird the Ogea monarch, *Mayrornis versicolor*, and is classed as an Important Bird Area (IBA FJ14) (Masibalavu et al., 2006).

¹⁶¹ M. Tuiwawa., University of the South Pacific, pers. comm., 19.07.2016

¹⁶² A. Batibasaga, Fiji Ministry of Fisheries, pers. comm., 19.07.2016

¹⁶³ Auckland War Memorial Museum, unpublished data

¹⁶⁴ ibid

SITE L8: MATUKU

TABLE 164: Site description L8

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
L8	New site	Matuku Island		9



MAP 81: SITE L8

Geographic coordinates: S19 5' 37", E179 46' 9" and S19 12' 50", E179 44' 16"

Area (km²): 66.3

Division: Eastern

Unique *iQoliqoli* ID number: Lau_MAP18_FOL88

TABLE 165: Details of Site Rating L8

Criteria	Details	Rating (out of 3)
Biophysical Justification	Extensive reef, lagoon lined with mangroves, large and deep channels, steep drop-off.	3
Geographic Explicitness	Reef, channels and island.	2
Source Number and Type	More than one good report (unpublished data) and expert advice available.	2
Obligations (See Appendix C)	Relevant taxa: <i>Rhizophora</i> spp; and <i>Bruguiera</i> sp.	2
Overall Rating (Out of 12)		9

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a medium overall rating of 9 (Table 165) and contains Matuku Island (Map 81) with its lagoon, mangroves, channels, fore reef, fringing reef and reef flat (Bruckner et al., 2016; Meo et al., in press). While this large island has a significant human population density, it also has some unique habitats including mangrove-lined bays and some very large and deep channels from the outer reef in to the island and some interesting corals¹⁶⁵. The lagoon to the west has live coral cover on a gradual slope to 15 m and scattered coral colonies on a gradual slope to 28 m (Meo et al., in press). The channel to the east has a wave-swept crest, a wide coral ridge from 25 m then a steep drop-off to 80 m or more (Meo et al., in press). It has very high fish biodiversity because of this habitat diversity, and it also has surprisingly high fish biomass for a relatively densely-populated island (Meo et al., in press).

SITE L9: ONO-I-LAU GROUP

TABLE 166: Site description L9

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
L9	New site	Ono-i-Lau Group		9



MAP 82: SITE L9

Geographic coordinates: S20 43' 51", E181 38' 21" and S20 39' 6", E181 21' 59"

Area (km²): 208.4

Division: Eastern

Unique *iQoliqoli* ID number: Lau_MAP18_FOL86

¹⁶⁵ Auckland War Memorial Museum, unpublished data

TABLE 167: Details of Site Rating L9

Criteria	Details	Rating (out of 3)
Biophysical Justification	Barrier reef, fringing reefs, patches reefs, channel, lagoon, humphead wrasse, and bumphead parrotfish.	3
Geographic Explicitness	Barrier reef, atoll and confines.	2
Source Number and Type	More than one good report (unpublished data) and expert advice available.	2
Obligations (See Appendix C)	Relevant taxa: <i>Bolbometopon muricatum</i> ; <i>Cheilinus undulatus</i> .	2
Overall Rating (Out of 12)		9

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a medium overall rating of 9 (Table 167) and contains Ono-i-Lau Island and Vuata Ono (Map 82), and includes small channels, a lagoon, fore reefs, patch reefs and reef flats¹⁶⁶ (Fiu et al., 2010). Ono-i-Lau has a reef with numerous and large patch reefs/pinnacles with very high fish biodiversity, excellent fish biomass including lots of herbivores and high coral cover (Meo et al., in press). There have also been records of the endangered humphead wrasse, *Cheilinus undulatus*, and the vulnerable bumphead parrotfish, *Bolbometopon muricatum*, (Fiu et al., 2010). Vuata Ono is a large submerged atoll with the southern edge having a very healthy reef crest, small coral colonies, and good coralline algae and halimeda algae cover¹⁶⁷.

SITE L10: VATOA GROUP

TABLE 168: Site description L10

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
L10	New site	Vatua Group		9

¹⁶⁶ Auckland War Memorial Museum, unpublished data

¹⁶⁷ ibid



MAP 83: SITE L10

Geographic coordinates: S19 55' 40", E181 39' 14" and S19 47' 29", E181 47' 56"

Area (km²): 106.3

Division: Eastern

Unique *iQoliqoli* ID number: Lau_MAP18_FOL85

TABLE 169: Details of Site Rating L10

Criteria	Details	Rating (out of 3)
Biophysical Justification	Channel, lagoon, fore reef, fringing reef, patch reef, reef flat, eagle rays, manta rays, giant clam, green turtles, sharks.	3
Geographic Explicitness	Reef, submerged reef and island.	2
Source Number and Type	Single report, expert advice, unpublished data.	2
Obligations (See Appendix C)	Relevant taxa: <i>Chelonia mydas</i> ; <i>Tridacna tevoroa</i> and <i>Bolbometopon muricatum</i> .	2
Overall Rating (Out of 12)		9

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a medium overall rating of 9 (Table 169) and contains Vatoa Island and Vuata Vatoa submerged reef (Map 83). Vatoa Island is an inhabited island with a village Marine Protected Area (MPA) in the lagoon just west of the village¹⁶⁸. The lagoon is relatively shallow and has scattered bommies with coral in good health¹⁶⁹. The island has a typical outer fringing reef ecosystem with spur and grooves in the shallows and a gradual slope to over 80 m (Meo et al., in press)). The outer reef slope of Vuata Vatoa is steep, has coralline algal cover with quite a bit of soft coral and sea whips deeper down and is recommended as a great candidate MPA site with no human inhabitants¹⁷⁰. The site has high fish biodiversity, high fish biomass, good coral cover and very healthy coralline algal cover, lots of green turtles and mantas in the lagoon, and numerous sharks (Meo et al., in press).

¹⁶⁸ Auckland War Memorial Museum, unpublished data

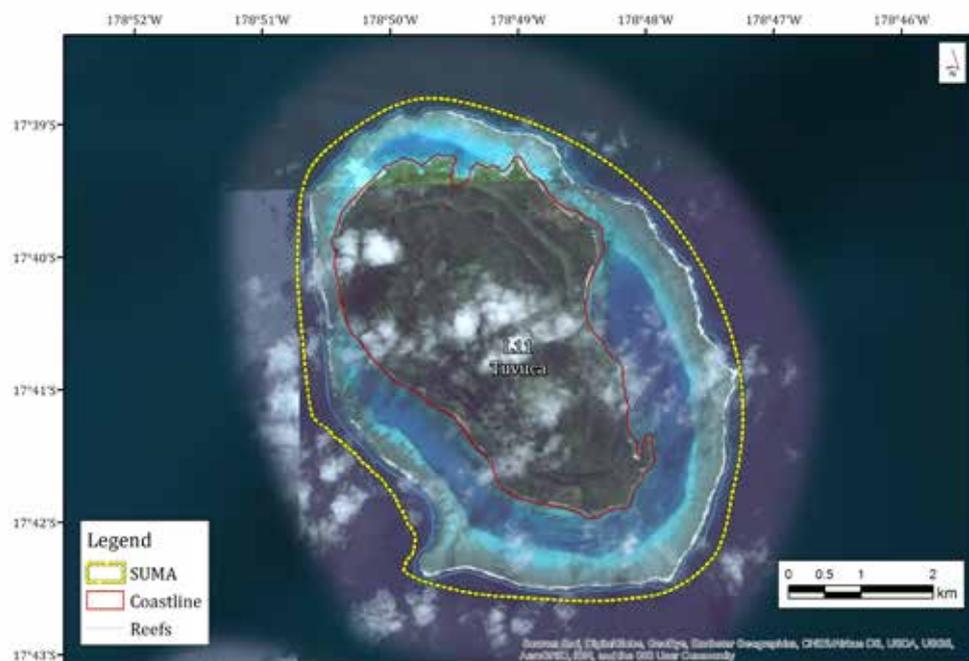
¹⁶⁹ Auckland War Memorial Museum, unpublished data

¹⁷⁰ ibid

SITE L11: TUVUCA

TABLE 170: Site description L11

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
L11	New site	Tuvuca		8



MAP 84: SITE L11

Geographic coordinates: S17 42' 30", E181 9' 15" and S17 38' 48", E181 12' 50"

Area (km²): 33.5

Division: Eastern

Unique *iQoliqoli* ID number: Lau_MAP17_FOL65

TABLE 171: Details of Site Rating L11

Criteria	Details	Rating (out of 3)
Biophysical Justification	Channel, lagoon, fore reef, fringing reef, patch reef, reef flat, seagrass.	3
Geographic Explicitness	Barrier reef and island.	2
Source Number and Type	More than one good report and expert advice.	2
Obligations (See Appendix C)	Relevant taxa: Cheloniidae spp.	1
Overall Rating (Out of 12)		8

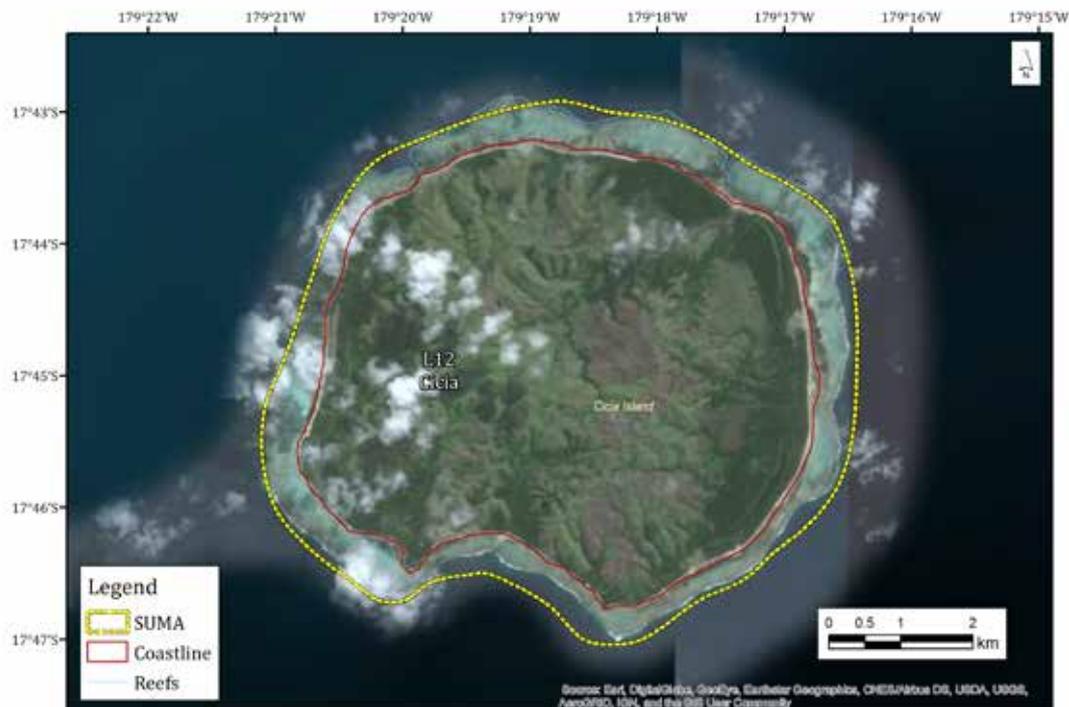
DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a medium overall rating of 8 (Table 171) and contains Tuvuca Island (Map 84). Tuvuca Island has one village and complex habitat types including a narrow fringing reef, shallow channels, a lagoon with dense patches of seagrass beds, fore reef, patch reefs and reef flat (Bruckner et al., 2016; Tuiwawa and Morrison, 2008). The sub-site has good fish biodiversity and good coral cover (Bruckner et al., 2016) and boasts mega pelagic species and turtle nesting grounds¹⁷¹.

SITE L12: CICIA

TABLE 172: Site description L12

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
L12	New site	Cicia		7



MAP 85: SITE L12

Geographic coordinates: S17 42' 32", E180 39' 25" and S17 47' 17", E180 43' 13"

Area (km²): 47.9

Division: Eastern

Unique *iQoliqoli* ID number: Lau_MAP017_FOL66

¹⁷¹ S. Meo, Conservation International, pers. comm. 11/04/2018

TABLE 173: Details of Site Rating L12

Criteria	Details	Rating (out of 3)
Biophysical Justification	Channel, lagoon, fore reef, fringing reef, patch reef, reef flat, seagrass.	3
Geographic Explicitness	Barrier reef and island.	2
Source Number and Type	More than one good report and expert advice.	2
Obligations (See Appendix C)	No obligations registered.	0
Overall Rating (Out of 12)		7

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a medium over rating of 7 (Table 173) and contains Cicia Island (Map 85).

Cicia Island has five villages with approximately 1047 people and a barrier reef length of 25.8 km (Bruckner et al., 2016). The site has a fore reef, fringing reef, reef flat, dense seagrass meadows around most of the island, high fish diversity, and high levels of live coral cover, exceeding 45% (Bruckner et al., 2016).

SITE L12: NAVATU

TABLE 174: Site description L13

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
L13	New site	Navatu		10



MAP 86: SITE L13

Geographic coordinates: S18 41' 48", E180 24' 26" and S18 39' 35", E180 27' 31"

Area (km²): 18.3

Division: Eastern

Unique *iQoliqoli* ID number: Lau_MAP18_FOL90

TABLE 175: Details of Site Rating L13

Criteria	Details	Rating (out of 3)
Biophysical Justification	Lagoons, reef flats, patch reefs, fore reef, fringing reef, sharks, giant clams, and wrasses.	3
Geographic Explicitness	Barrier reef and islands.	2
Source Number and Type	More than one good report and expert advice.	2
Obligations (See Appendix C)	Relevant taxa: <i>Carcharhinus amblyrhynchos</i> ; <i>Triaenodon obesus</i> ; <i>Carcharhinus melanopterus</i> ; <i>Tridacna</i> spp.	3
Overall Rating (Out of 12)		10

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a high overall rating of 10 (Table 175) and contains Navatu atoll (Map 86). Navatu has a channel, lagoon, fore reef, a few isolated patch reefs and a reef flat with some spur and groove formations (Meo et al., in press). The atoll has excellent coral condition, very high fish biomass, high fish diversity, and a number of threatened species, including sharks, giant clams (one of the few places they seemed in abundance) and Napoleon wrasse (Meo et al., in press). Navatu is culturally significant as well, and is now declared as a Marine Protected Area by traditional leaders¹⁷².

SITE L14: MOALA ISLAND INCLUDING CAKOVA PASSAGE, KETEIRA BAY

TABLE 176: Site description L14

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
L14	New site	Moala Island including Cakova Passage, Keteira Bay		9

¹⁷² M. Erdmann, Auckland War Memorial Museum, pers. comm., 23.11.2017



MAP 87: SITE L14

Geographic coordinates: S18 35' 28", E179 47' 37" and S18 44' 9", E179 50' 38"

Area (km²): 224.1

Division: Eastern

Unique *iQoliqoli* ID number: Lau_MAP18_FOL87

TABLE 177: Details of Site Rating L14

Criteria	Details	Rating (out of 3)
Biophysical Justification	Barrier reef, multiple passages, deep lagoon, mangroves, grouper spawning sites.	3
Geographic Explicitness	Barrier reef, lagoon and island.	2
Source Number and Type	More than one good report and expert advice.	2
Obligations (See Appendix C)	Relevant taxa: <i>Cheilinus undulatus</i> ; <i>Eretmochelys imbricata</i> and <i>Scomberomorus commerson</i> .	2
Overall Rating (Out of 12)		9

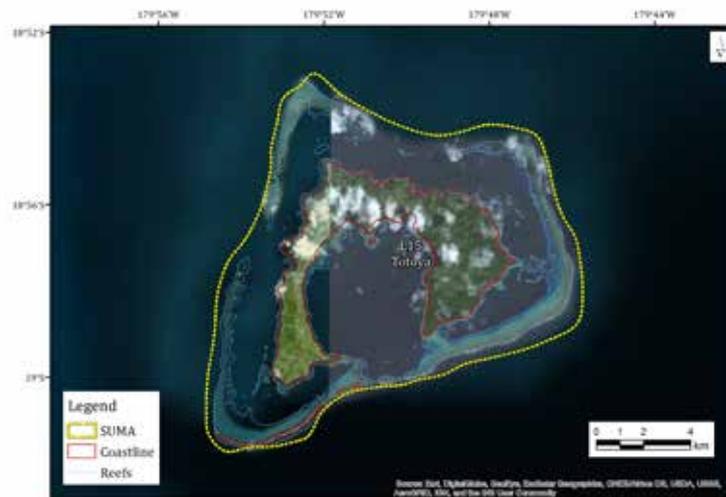
DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a medium overall rating of 9 (Table 177) and contains Moala Island (Map 87) with its extensive barrier reef. Moala Island has an extensive barrier with few passages, deep and shallow lagoon areas, protected reef pinnacles, steep drop offs around patch reefs, reef flat and a typical outer reef ecosystem with some spur and groove formations (Meo et al., in press; Bruckner et. al, 2016). The island has scattered bommies, high fish diversity and high coral cover (Meo et al., in press) however the fish biomass is disturbed by human activity. The site has a grouper spawning area in Cakova reef with Napoleon wrasses, large Spanish mackerels and hawksbill turtles (Meo et al., in press).

SITE L15: TOTOYA

TABLE 178: Site description L15

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
L15	New site	Totoya		9



MAP 88: SITE L15

Geographic coordinates: S18 54' 52", E180 27' 26" and S18 58' 30", E180 14' 52"

Area (km²): 164.8

Division: Eastern

Unique *iQoliqoli* ID number: Lau_MAP18_FOL89

TABLE 179: Details of Site Rating L15

Criteria	Details	Rating (out of 3)
Biophysical Justification	Barrier reef, channel, Lagoon, fore reef, patch reef, reef flat, sharks, parrotfish, and jobfish and unicorn fish.	3
Geographic Explicitness	Barrier reef, lagoon and island.	2
Source Number and Type	More than one good report and expert advice.	2
Obligations (See Appendix C)	Relevant taxa: <i>Carcharhinus amblyrhynchos</i> , <i>Triaenodon obesus</i> and <i>Carcharhinus melanopterus</i> .	2
Overall Rating (Out of 12)		9

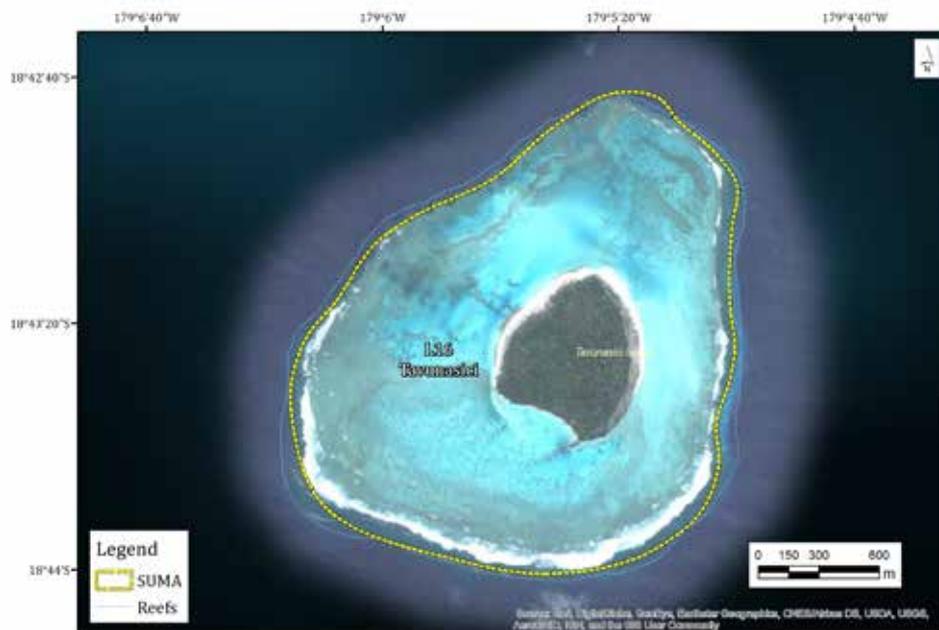
DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a medium overall rating of 9 (Table 179) and contains Totoya Island (Map 88). Totoya Island has an extensive barrier reef system, a wide spread back reef, coral bommies, patch reefs, deep lagoon areas, channel, reef flat and an exaggerated spur and groove formation on the southern side of the western channel at the inner fringing reef (Meo et al., in press; Bruckner et al., 2016). Three species of sharks, *Carcharhinus amblyrhynchos*, *Triaenodon obesus* and *Carcharhinus melanopterus*, large parrotfish, jobfish and unicorn fish have been found on this island (Bruckner et al., 2016), which has high fish diversity, and good coral cover (Meo et al., in press).

SITE L16: TAVUNASICI

TABLE 180: Site description L16

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
L16	New site	Tavunasici		10



MAP 89: SITE L16

Geographic coordinates: S18 43' 53", E180 53' 41" and S18 42' 44", E180 55' 54"

Area (km²): 3.9

Division: Eastern

Unique *iQoliqoli* ID number: Lau_MAP18_FOL82

TABLE 181: Details of Site Rating L16

Criteria	Details	Rating (out of 3)
Biophysical Justification	Turtles, sharks, wrasses, seabirds, coconut crabs, channel, lagoon, fore reef, patch reef, fringing reef, spur and grooves, caves	3
Geographic Explicitness	Barrier reef and island	2
Source Number and Type	One good report, expert advice and unpublished data	2
Obligations (See Appendix C)	Relevant taxa: <i>Cheilinus undulatus</i> and <i>Birgus latro</i> ; Cheloniidae spp.	3
Overall Rating (Out of 12)		10

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a high overall rating of 10 (Table 181) and contains Tavunasici Island (Map 89). Tavunasici has a fringing reef, with extended reef slope in the front reef, an extensive sand beach, channel, lagoon, fore reef, and patch reefs (Meo et al., in press). The outer reef has a steep grade to 15 m with a narrow sloping plateau to 25 m where it then becomes almost wall-like with a steep plunge to a deep abyss (Meo et al., in press). The channel has a big sand chute to 25 m with spur and grooves on both sides, numerous caves, and large bommies (Meo et al., in press). This site has high fish biomass, good fish biodiversity, good numbers of threatened species including turtles, Napoleon wrasse, sharks, and seabirds (Meo et al., in press), with turtle nesting sites and coconut crabs recorded on land¹⁷³.

4.13 REMOTE OFFSHORE ISLANDS

There are two small islands that lie far offshore, remote from the main islands of Fiji (Map 90, Table 182). Rotuma is around 470 km northwest of the north coast of Vanua Levu, and Ceva-i-Ra (Conway Island) is approximately 300 km south west of the south coast of Viti Levu.

These remote offshore islands mark the northern and southern extents of Fiji's Exclusive Economic Zone (EEZ), and have informal protection by virtue of their remoteness from the main islands. They are both adjacent to deep-water features that cause upwelling of nutrient-rich waters, which provide ideal marine life habitat. Their remoteness makes it very likely that there are endemic or rare species not yet documented. Rotuma Island is an inhabited medium sized island, (13 km long), with multiple smaller islands and islets within its fringing and barrier reef system. There are submarine banks, 18–64 m deep, to the north of the island (Allen et al., 2001), part of the North Fiji Plateau EBSA.

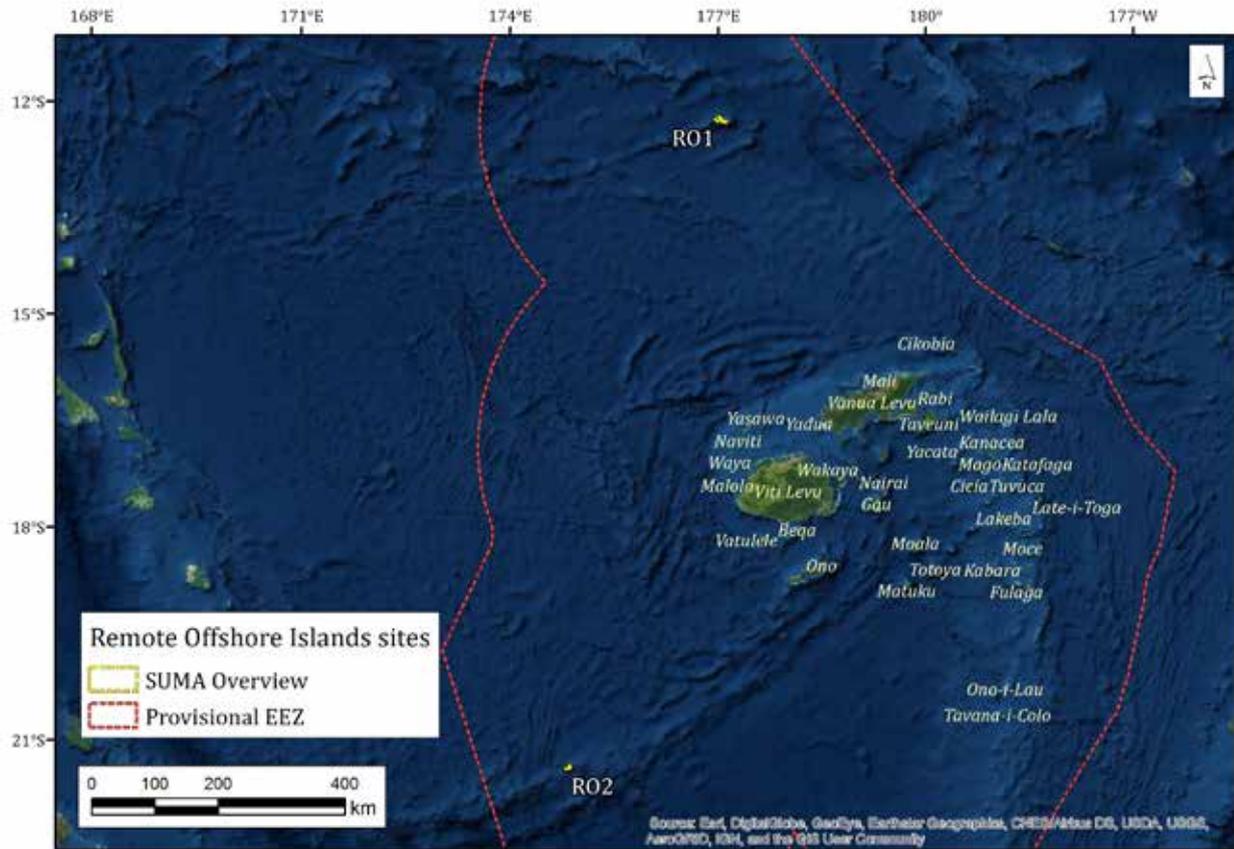
Conway Island is a very small uninhabited and largely unvisited sand cay rising from the Ceva-i-Ra Reef^{174,175} atop submarine ridges within extremely deep ocean, part of the South Fiji Basin EBSA. The area is a focus for tuna fishing (Amoe, 2007).

Both Islands have been identified as Special, Unique Marine Areas (SUMAs) are shown and described in more detail below.

¹⁷³ M. Erdmann, Auckland War Memorial Museum, pers. comm., 23.11.2017

¹⁷⁴ Conway Reef Expedition (2012) http://www.yt1ad.info/3d2c/about_3d2c.html

¹⁷⁵ Fiji Conway Reef, <http://www.qsl.net/ah6hy/fiji.html>



MAP 90: REMOTE OFFSHORE ISLANDS SITES

TABLE 182: REMOTE OFFSHORE ISLANDS SITES

SUMA codes	Linked report codes	Name	Biophysical Justification	Rating
RO1	EBSA 13 NES 128 FIME CT16 FIME IE01 FIME OP1	Rotuma Island	Seagrass beds, turtle foraging and breeding grounds, blue coral, sharks, humphead wrasse, and seabirds.	11
RO2	New Site	Ceva-i-Ra (Conway Island)	Sandy cay surrounded by very deep water, isolated coral reef atoll, seabird nesting, whales, tuna.	10

SITE RO1: ROTUMA ISLAND

TABLE 183: Site description RO1

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
RO1	EBSA 13 IBA FJ01 NES 128 FIME CT16 FIME IE01 FIME OP1	Rotuma Island		11



MAP 91: SITE RO1

Geographic coordinates: S12° 32' 19", E176° 56' 55" and S12° 27' 14", E177° 8' 9"

Area (km²): 79.2

Division: Rotuma

TABLE 184: Details of Site Rating RO1

Criteria	Details	Rating (out of 3)
Biophysical Justification	Seagrass beds, turtle foraging and breeding grounds, blue coral, sharks, humphead wrasse, seabirds.	3
Geographic Explicitness	Reefs and lagoons around islands to deep drop off	2
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice available.	3
Obligations (See Appendix C)	Relevant taxa: <i>Chelonia mydas</i> ; <i>Eretmochelys imbricata</i> ; <i>Cheilinus undulatus</i> ; <i>Heliopora coerulea</i> ; Lutjanidae spp.	3
Overall Rating (Out of 12)		11

DETAILED DESCRIPTION OF HABITAT/FEATURE

This site has a high overall rating of 11 (Table 184). It includes Rotuma Island (Map 91), 13 km long, with a fringing reef and lagoon system that also encloses five small islets. Another six small islands lie 3-6 km west of the main island, and the continental shelf to the north west. Approximately 2,000 inhabitants live in traditional villages along the coastline¹⁷⁶, and rely on fishing and collection of marine life from the reef system. The fringing reef flats are less than 400 m wide, dropping steeply to deep oceanic waters, with a shallow lagoon on the northern coast. The submarine banks, 18 – 64 m deep, are a productive ground for snapper, *Lutjanidae* spp., and emperor, *Lethrinidae* spp. (Allen et al., 2001).

Rotuma has important seagrass beds where green turtles, *Chelonia mydas*, forage, particularly in Maka Bay, and hawksbill turtles, *Eretmochelys imbricata*, nesting sites on the small islands of Hatana, Hofliua and Uea (LājeRotuma Initiative, 2007; Laveti et al., 2011). There are unusual and possibly endemic marine algae in the lagoons (N'Yeurt, 1996). 425 species of fish have been recorded from Rotuma's reefs (Zug et al., 1988), including the humphead wrasse, *Cheilinus undulatus*, and many sharks. It is also the only site in Fiji where blue coral, *Heliopora coerulea*, is found (Tuxson, 2006).

Several seabirds use the islands as rookeries. There is a terrestrial endemic bird, the Rotuman Myzomela (Honeyeater).

¹⁷⁶ <http://www.statsfiji.gov.fj/index.php/2007-census-of-population> Accessed 05/04/17

SITE RO2: CEVA-I-RA (CONWAY ISLAND)

TABLE 185: Site description RO2

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
RO2	New site	Ceva-i-Ra (Conway Island)		10



MAP 92: SITE RO2

Geographic coordinates: S21° 47' 8", E174° 34' 19" and S21° 44' 12", E174° 39' 22"

Area (km²): 24.0

TABLE 186: Details of Site Rating RO2

Criteria	Details	Rating (out of 3)
Biophysical Justification	Sandy cay surrounded by very deep water, isolated coral reef atoll, seabird nesting, whales, tuna. Predicted high benthic and pelagic species richness, high probability of cold water corals, tuna.	2
Geographic Explicitness	Plateau, coral islet with deep drop off.	3
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice.	2
Obligations (See Appendix C)	Relevant taxa: <i>Sula leucogaster</i> ; <i>S. dactylatra</i> ; <i>S. Sula</i> spp; <i>Megaptera novaeangliae</i> .	3
Overall Rating (Out of 12)		10

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a high overall rating of 10 (Table 186). It includes Conway Reef (Map 92), a coral reef surrounded by extremely deep water, with an uninhabited small sandy cay about 300 m long, rising only 1.8 m above sea level. At the last report there were two shipwrecks on the surrounding reef¹⁷⁷.

This area includes a section of plateau rising from the very deep abyss at the eastern end of the New Hebrides Trench, immediately north of the southwest trench seamounts (site OS4)¹⁷⁸. The plateau peaks in a small uninhabited sandy cay islet, more than 250 km from the nearest island of Kadavu.¹⁷⁹

The island is sometimes vegetated and sometimes stripped by storms. It is a nesting site for at least three species of seabirds, the brown booby, *Sula leucogaster*, the masked booby, *Sula dactylatra*, and the red-footed booby, *Sula spp*¹⁸⁰. There is very little information on the marine life of Ceva-i-Ra reef, but it is on the migratory route of the humpback whales, *Megaptera novaeangliae*, between New Zealand and Tonga, and is a focus for tuna fishing (Amoe, 2007), so it is likely to attract other larger pelagic species.

Global habitat suitability modelling indicates that there is a high probability of finding cold water corals at this site (Yesson et al., 2012).

Predictions of relative probability of species occurrence indicate that this site would have high benthic and pelagic species richness (Kaschner et al., 2016).

4.14 DEEP WATER (OPEN OCEAN)

Deepwater and offshore marine ecosystems are not as well understood as coastal ecosystems, and are under-represented in most marine management and protection plans. However, they are vital components of the marine ecosystem, and in many cases provide the basic elements from which the more visible marine populations and ecosystems are built. Protecting deepwater habitats is an essential and urgent part of marine management.

The underwater landscape in Fiji boasts a wide variety of geomorphological features including seamounts, canyons, ridges, trenches and hydrothermal vents. Geomorphological features function to concentrate ocean currents and upwelling; delivering nutrients to shallower waters and increasing productivity. This increase in productivity creates biodiversity hot spots where smaller animals and plants, that form the bottom of the food chain, can multiply, and larger species, in turn, can flourish.

These deep water areas are also migratory routes, and spawning and breeding grounds, for many types of marine fauna, including whales, dolphins (Miller, 2007), turtles, sharks, rays, tuna (Morato and Clark, 2007), billfish, deep water snappers and many other pelagic and semi-pelagic species (Gillett, 2011).

To the north, west and south of the Fiji islands, the abyssal plain rises from depths of over 4,000 metres to abyssal hills and mountains with peaks 300–1,000 m above the seafloor (Harris et al., 2014). These mountainous areas are also known as seamounts, guyots and ridges, according to their size and shape. To the south-west of the Fiji Islands, the abyssal plain is split by the Hunter Fracture Zone, creating a spiral-shaped ridge reaching up to the island of Kadavu. To the east of the Fiji islands, an area known as the Lau Ridge, forms a spreading ridge along the shallower area between Fiji and Tonga. The Continental Shelf, adjacent to the islands, is relatively narrow and is generally less than 200 m deep¹⁸¹. The edge of the Continental Shelf deepens steeply at the Continental Slope, which often features canyons, faults, rift valleys, terraces and basins¹⁸².

¹⁷⁷ Conway Reef Expedition (2012) http://www.yt1ad.info/3d2c/about_3d2c.html

¹⁷⁸ ArcGIS Global Seafloor Geomorphic Features Map. <http://www.arcgis.com/home/webmap/viewer.html?webmap=342d8cbfac074a53afa5e49bd0c53773>

¹⁷⁹ Conway Reef Expedition (2012) http://www.yt1ad.info/3d2c/about_3d2c.html

¹⁸⁰ Fiji Conway Reef <http://www.qsl.net/ah6hy/fiji.html>

¹⁸¹ Continental Shelf – Blue Habitats, http://www.bluehabitats.org/?page_id=1660

¹⁸² Continental Slope – Blue Habitats, http://www.bluehabitats.org/?page_id=1662

Definitions of seafloor geomorphology features commonly found in Fijian waters (IHO, 2008) (Map 93) include:

- **Basins** – depressions in the sea floor, usually bounded by slopes and ridges.
- **Canyons** – V-profiled, steep walled valleys, cutting at least 100 metres deep into the slope, and descending to 1,000 metres or more (Harris and Whiteway, 2011)¹⁸³“container-title”:“Marine Geology”,“page”:“69-86”,“volume”:“285”,“issue”:“1–4”,“abstract”:“The aim of this study is to assess the global occurrence of large submarine canyons to provide context and guidance for discussions regarding canyon occurrence, distribution, geological and oceanographic significance and conservation. Based on an analysis of the ETOPO1 data set, this study has compiled the first inventory of 5849 separate large submarine canyons in the world ocean. Active continental margins contain 15% more canyons (2586, equal to 44.2% of all canyons.
- **Guyots (Tablemounts)** – seamounts with smooth flat tops.
- **Hydrothermal vents** – volcanically active fissures in the deep seabed (average 2 Km), which issue geothermally heated water¹⁸³.
- **Plateaus** – elevated, flat-topped areas of sea floor with steep sides.
- **Ridges** – elongated and have steep sides, often separating basins.
- **Rift Valleys** – elongate, local depressions flanked generally on both sides by spreading ridges (Macdonald, 2001).
- **Seamounts** – conical steep-sided mountains rising more than 1,000 metres from the sea floor.
- **Spreading Ridges** – active systems of ridges and valleys where seafloor spreading occurs.
- **Trenches** – extreme deep water features, (6–10 km), forming V-shaped steep-sided depressions in the sea floor.

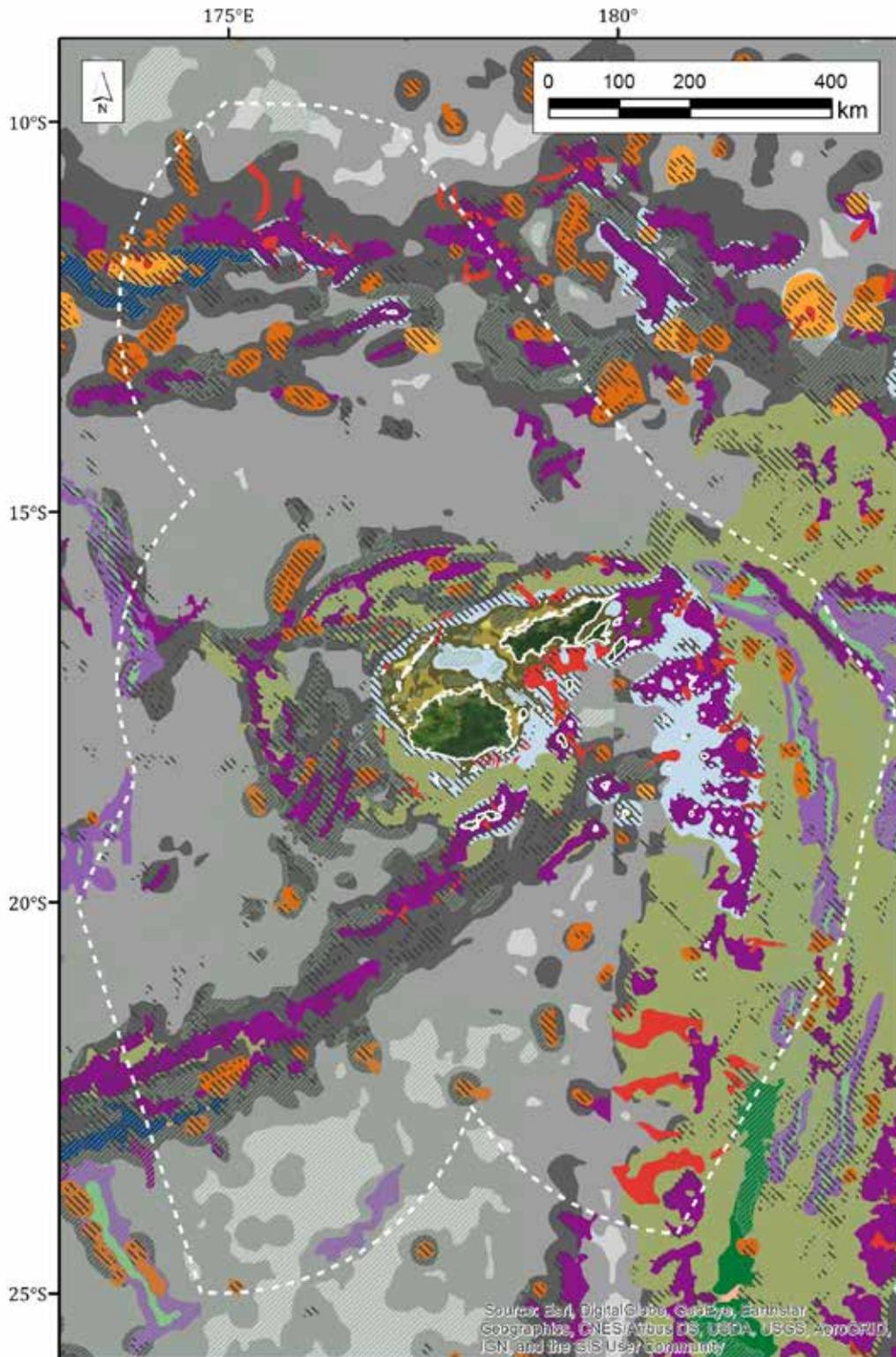
Four global Ecologically or Biologically Significant Marine Areas (EBSAs) (SCBD, 2014)¹⁸⁴, have been identified partly or wholly within Fiji's marine estate, including in the South Fiji Basin (north of New Zealand), the plateau in the north (and south of Tuvalu/ Wallis and Fortuna), and the Kadavu/ Southern Lau, Vatu-i-Ra/ Lomaviti and Taveuni and Ringgold Island regions.

The South Fiji Basin is predominantly deep water (an average of 3,973 m), with several seamounts. The northeastern plateau has a number of distinct topographical features such as seamounts, knolls, large submarine canyons, trenches, basins, plateaus, ridges, volcanic islands and fringing reefs. The Kadavu/ Southern Lau region also includes seamounts, deep upwelling slopes, submarine canyons and the Lau Ridge. Vatu-i-Ra/ Lomaiviti contains a diverse geomorphology, including channels, submarine canyons and seamounts, while the Taveuni and Ringgold Islands areas encompass deep water areas and a productive channel.

While all geomorphological features impact biological diversity and productivity, seamounts, canyons and hydrothermal vents are more widely known as hot spots of productivity and biodiversity. For this reason more information is provided below about these features. Further information is also provided for deep water corals as a number of the Special, Unique Marine Areas identified in Fiji were found to have a high probability of cold water corals (Yesson et al., 2012).

¹⁸³ What is a hydrothermal vent? NOAA, 2016 <http://oceanservice.noaa.gov/facts/vents.html>

¹⁸⁴ ESBA 5: Kadavu and the Southern Lau Region, ESBA 13: South of Tuvalu/ Wallis and Futuna/ North of Fiji Plateau, ESBA 14: Vatu-i-Ra/ Lomaiviti, ESBA 21: Northern New Zealand/ South Fiji Basin, ESBA 22: Taveuni and Ringgold Islands



- | | | | |
|------------------------|------------|-----------------|---------|
| Shelf - high profile | Hadal | shelf valley | rise |
| Shelf - medium profile | canyon | rift valley | terrace |
| Shelf - low profile | guyot | glacial trough | trench |
| Slope | seamount | trough | plateau |
| Abyss - mountains | bridge | ridge | |
| Abyss - hills | sill | spreading ridge | |
| Abyss - plains | escarpment | fan/apron | |

MAP 93: DEEP WATER (OPEN OCEAN) BATHYMETRY¹⁸⁵

¹⁸⁵ ArcGIS Global Seafloor Geomorphic Features Map. <http://www.arcgis.com/home/item.html?id=342d8cbfac074a53afa5e49bd0c53773>

SEAMOUNTS

Seamounts have steep slopes which cause the upward movement of nutrients (upwelling) from the deep ocean and create focuses of biodiversity, attracting deep water and pelagic species such as tuna, deep-water snapper, sharks, whales and dolphins (Morato and Clark, 2007). Other species living on seamounts can include biogenic habitat-forming cold water corals and sponges, anemones, crabs, sea stars, sea urchins, brittle stars, sea cucumbers and feather stars (Baker and Beaudoin, 2013; Clark et al., 2011; CSIRO, 2008).

Seamounts are not all the same; they differ in form, size, depth, and location in the sea. Each of these differences affects the local environmental and biogeographical conditions and in turn the biodiversity found on each seamount (Clarke et al, 2010).

Technically, seamounts and ridges are subsets of abyssal mountains (Harris et al., 2014). Fiji has 61 seamounts in total (Map 93). The seamounts in Fiji have been classified: there are 22 seamounts described as intermediate, small, moderately tall and shallowest; 14 small with deep peak, short with moderately deep peak; 7 large and tall with shallow peaks; 5 small with deep peak; 4 intermediate size, largest basal area and deepest peak depth; 4 small and short with very deep peaks; 2 intermediate size, large tall and deep; 1 large and tall with shallow peak; 1 small with deep peak and 1 small and short with deep peak.

Seamounts of particular importance for fisheries, migratory species and primary production are those that fall within the epipelagic and mesopelagic zone. Seamounts with shallow peaks that protrude into the epipelagic zone (from the sea surface to 200 meters) allow for enhanced growth or aggregations of light-dependent organisms. Nine of the 61 Seamounts in Fiji protrude into the epipelagic zone. While seamounts that protrude into the mesopelagic zone (200 to 1000m of the surface) within the depth range of the deep scattering layer (DSL), are characterised by a mix of zooplankton (such as shrimps, euphausiids, and copepods), mesopelagic fish (such as lantern fish) and small squid that migrate vertically upwards at night and down during the day. Where the DSL makes contact with the seamount summit and upper slopes, there is a zone of interaction between pelagic and benthic ecosystems (Ceccarelli, 2017). Twenty of the 61 Seamounts in Fiji protrude into the mesopelagic zone.

Seamounts are also thought to be important aggregation areas for other highly migratory species such as tuna, billfish, oceanic sharks (Morato and Clark, 2007) and whales (Garrigue et al., 2015). Telemetry studies have shown high levels of individual fidelity to specific sites, such as seamounts, by highly migratory marine species, and basin-wide movements can be directed towards these locations (Luschi, 2013).

The deep water seamount communities often have a high level of endemism, and are likely to have different fauna on the leeward and windward sides (Marchese, 2014; Stone et al., 2004). Species may be restricted to a chain of seamounts, to a few adjacent seamounts or even to a single seamount (Stone et al., 2004). Rates of endemism vary, from a low of 5–9% up to 52% (Stone et al., 2004). Richer de Forges et al. (2000) found that adjacent seamounts in New Caledonia shared only 21% of species; and seamounts approximately 1,000km apart shared only 4% of species. However, seamounts and seamount-like features (e.g. ridges) don't have to be isolated or large to support high levels of endemism. Work by Koslow et al. (2001) and Rowden et al. (2002) (both in Stone et al. (2004)) showed that even relatively small underwater hills (100 to 400m above the seafloor) had rates of endemism of 15 to 35%.

How biodiversity, including endemism, varies on seamounts, ridges and hills with parameters such as depth, surface productivity, temperature, substrate composition, organic flux to the seafloor, currents, oxygen level, latitude and other factors is unknown and unpredictable (Baker and Beaudoin, 2013; Stone et al., 2004). Species new to science continue to be discovered each time seamounts are sampled and, due to the longevity of many of those species, they may provide valuable information regarding the workings of the ocean and the source of some parts of life on Earth (CSIRO, 2008; Stone et al., 2004).

Of the species on seamounts that are not endemic to that seamount, research has shown genetic connectivity in animals (e.g. tuna and other fish) between seamounts, and between seamounts and nearby non-seamount areas (Stone et al., 2004). This indicates that some populations of animals found on seamounts are unlikely to be self-sustaining.

The area around the centre of seamounts identified as important is generally circular, with a diameter of some 25–35km. This diameter is biologically important due to the connectivity discussed above and the variation, with depth and related parameters, of the biodiversity living on the flanks of seamounts and the surrounding area (Baker and Beaudoin, 2013).

Seamounts often host uncommon forms of marine life which, like many deep water species, are very slow-growing and long-lived (Stone et al., 2004). Combined with highly variable recruitment due to isolation and intermittent dispersal from other seamounts (if the species are not endemic to that seamount), this results in very delicate habitats vulnerable to over-exploitation and with poor recovery potential (Baker and Beaudoin, 2013; Stone et al., 2004).

See a video on seamounts here: <https://www.youtube.com/watch?v=0NUaxdxt2sE>

See pictures from seamounts here: <http://ngm.nationalgeographic.com/2012/09/seamounts/interactive-g>

CANYONS

Canyons often have strong currents and a lot of water movement up and down the depth range, moving sediments, nutrients and small organisms. The combination of steep rocky slopes, strong currents and enhanced access to food makes submarine canyons places of special ecological significance (Harris et al., 2014). Strong currents, movement of sediment, combined with steep rocky slopes creates ideal conditions for feeding and spawning, so canyons like seamount, become hot spots of high biomass and biodiversity in both pelagic and benthic habitats (De Leo et al., 2010). Canyons are often associated with whales, dolphins, sea birds and top-level marine predators such as sharks and tuna (Ceccarelli, 2017), and are also corridors of connectivity between deep and shallow habitats (Environment Australia 2003).

Submarine canyons are defined as “steep-walled, sinuous valleys with V-shaped cross sections, axes sloping outward as continuously as river-cut land canyons and relief comparable to even the largest of land canyons” (Shephard, 1964). Fiji has 97 sub marine canyons in total (Map 93). There are two main types of canyons in Fiji; blind canyons (72): those which have heads that are wholly confined to the slope, below the depth of the shelf break; and shelf-incising (25): have heads that cut across the shelf break, and in which there are landward-deflected isobaths on the continental shelf.

Thirty-six submersible dives delivered video and photographic evidence of higher abundances of highly mobile fishes and invertebrates compared with nearby slopes at the same depth, supporting the concept that canyons may be important sources of larvae for surrounding habitats (Vetter et al., 2010).

Typical canyon-related processes, including locally enhanced internal tides and focussed downslope organic carbon transport, provide favourable environmental conditions (current regime, food input) to sustain deep water azooxanthellate, coral communities (Huvenne et al., 2011). In this way, canyons can form natural refuges for faunal communities sensitive to anthropogenic disturbance, and have the potential to fulfil the crucial role of larval sources for the recolonisation of damaged sites elsewhere (Huvenne et al., 2011).

HYDROTHERMAL VENTS

Hydrothermal vents are the result of seawater percolating down through fissures in the ocean crust in the vicinity of spreading centres or subduction zones (places on Earth where two tectonic plates move away or towards one another) (NOAA, 2016). The cold seawater is heated by hot magma and re-emerges to form the vents (NOAA, 2016).

Fiji has 13 hydrothermal vents, including 3 active and confirmed 6 active and inferred, 4 inactive ones (Map 93). Seawater in hydrothermal vents may reach temperatures of over 370° C (NOAA, 2016). Hydrothermal vents have unique ecosystems which derive energy from volcanic gases rather than sunlight¹⁸⁶. These areas are very productive although small in spatial extent and relatively ephemeral— perhaps lasting some decades (Vrijenhoek, 1997). The size of the vent communities is small due to reliance upon the reach of the energy release from the volcanic activity (Vrijenhoek, 1997). Their ephemeral nature is inherent due to the reliance upon that volcanic activity, which moves as the tectonic plates of the earth move (Vrijenhoek, 1997). Whilst exact locations of extant hydrothermal vents may move, they will always be located at spreading centres or subduction zones— where magma meets the sea. Biomass is high, but as most of the animals are unique to the vent environments, and endemic to the specific area, they are confined to small areas around the vents (Little and Vrijenhoek, 2003; Vrijenhoek, 1997).

Different hydrothermal vents have also been shown to host different meio- and macro faunal communities depending upon the specific environmental parameters (e.g. temperature, metal concentrations, concentrations of reduced chemicals, oxygen concentration, as well as level of variation in all of these parameters space and time) (Gollner et al., 2015). Also, whilst macro faunal species occur primarily at vents and are generally restricted to this habitat, meio faunal species are distributed more widely and evenly across proximate and distant basalt habitats and are less restricted only to extent vent habitats (Gollner et al., 2015).

New work shows the ecological linkage between inactive hydrothermal vents and the adjacent environment— indicating potential connectivity between these and other deep sea habitats (Klose et al., 2015). Hydrothermal vents have recently also been found to act as a recycling and decomposition systems for dissolved organic carbon (DOC), an important constituent of the global carbon pool (Hawkes et al., 2015). If the vents are disturbed, entire ecosystems can be destroyed very quickly. Experiments carried out in both the Peru basin and the Clarion Clipperton Zone show that even though mobile species may return after disturbance, sessile species do not recover (Bluhm, 2001; ISA, 1999; Kaneko et al., 1997; Thiel et al., 2001).

¹⁸⁶ <https://www.cbd.int/doc/meetings/mar/ebaws-2014-01/other/ebaws-2014-01-azores-brochure-en.pdf> Accessed 3 May 2016.

A video from a Pacific hydrothermal vent (albeit the eastern Pacific) is available here: <https://ocean.si.edu/ocean-videos/hydrothermal-vent-creatures>

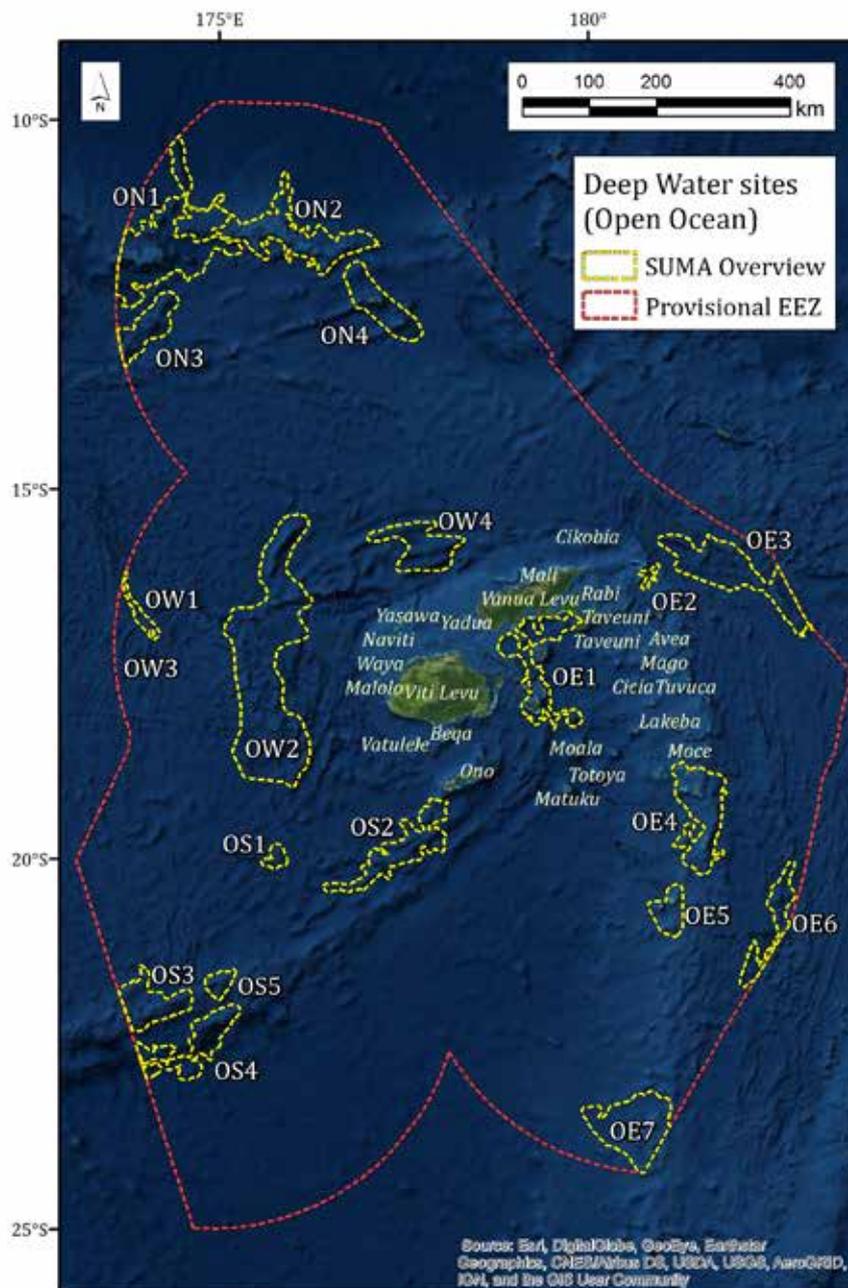
Photos of hydrothermal vent animals are available here:

http://deepseaphotography.com/downloads/category/hydrothermal_vent_animals

DEEP WATER CORALS

Deep water corals are those that inhabit the deep waters of continental shelves, seamounts and canyons, up to 6,000 m below the ocean's surface¹⁸⁷. They lack zooxanthellae and may build reef-like structures covering up to several kilometres or occur solitarily.

Cold-water corals are arguably one of the most three-dimensionally complex habitats in the deep sea and like their warm-water counterparts, deep-sea coral communities support a large number of other marine species, such as bristle worms, crustaceans, molluscs, starfish, sea urchins and fish (Roberts et al., 2006).



MAP 94: DEEP WATER (OPEN OCEAN) SITES

¹⁸⁷ (<https://ocean.si.edu/ecosystems/coral-reefs/deep-sea-corals> Accessed 07 June 2018)

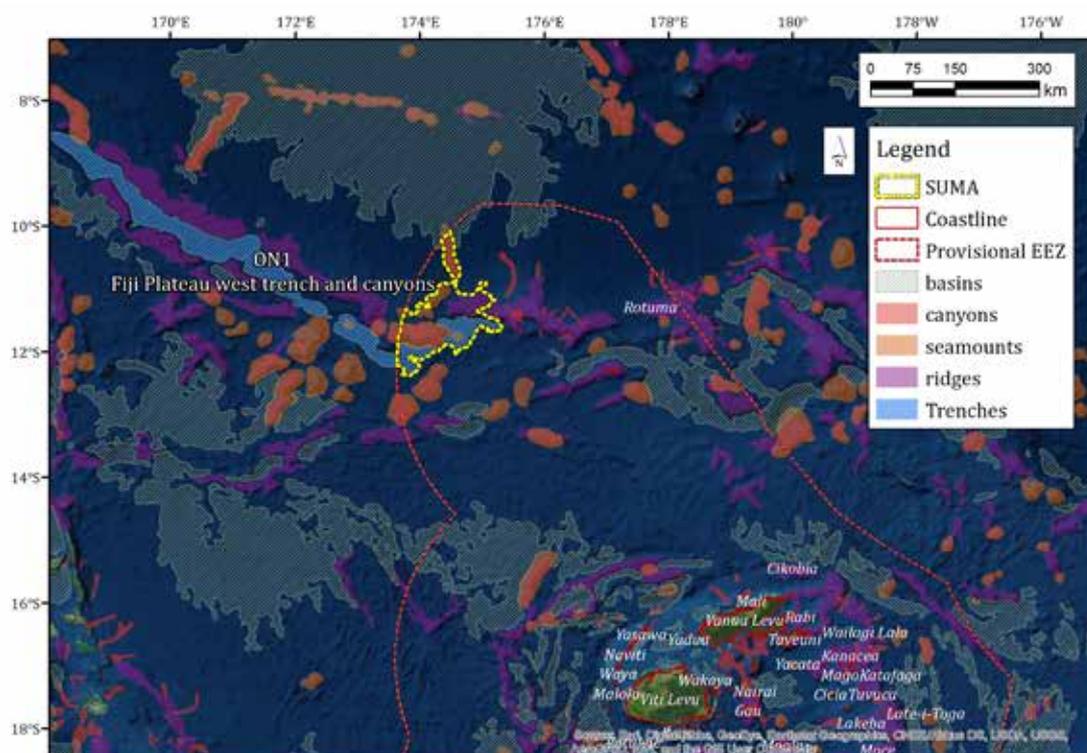
TABLE 187: DEEP WATER (OPEN OCEAN) SITES

SUMA codes	Linked report codes	Name	Biophysical Justification	Rating
North of Fiji				
ON1	EBSA 13	Fiji Plateau west trench & canyons	Migratory pelagic including, whales, dolphins, billfish, tuna, turtles, high probability of cold water corals and benthic species richness.	12
ON2	EBSA 13	Fiji Plateau ridge and canyons	Migratory pelagic including, whales, dolphins, billfish, tuna, turtles, high probability of cold water corals and high benthic species richness	12
ON3	EBSA 13	Seamounts	Migratory pelagic including, whales, dolphins, billfish, tuna, turtles, high probability of cold water corals and benthic species richness.	11
ON4	FIME OP1 EBSA 13	Rotuma archipelago	High marine species richness, sharks, sea cucumbers, humphead wrasse, bumphead parrot fish, turtle nesting, high probability of cold water corals, high benthic species richness	12
West of Fiji				
OW1	New Site	Western Rift Valley	Very productive tuna fishing grounds, probable deep water endemic species, probability of high pelagic species richness	8
OW2	FIME OP2	West Yasawa Plateau	Very productive tuna fishing grounds, hydrothermal vent, predicted deep water corals and high pelagic species diversity	9
OW3	New Site	Western Hydro-thermal vents	Predicted high benthic and pelagic species richness, very productive tuna fishing grounds high probability of cold water corals	9
OW4	FIME OP5	North Fiji Plateau	Predicted high benthic and pelagic species richness, very productive tuna fishing grounds high probability of cold water corals and sharks.	8
South of Fiji				
OS1	New Site	Southwest Seamount	Predicted high benthic and pelagic species richness, high probability of cold water corals, very productive tuna fishing grounds and possible tuna aggregating area.	8
OS2	FIME OP3 EBSA 5	South Kadavu Ridge	Marlin, sailfish, sharks, other pelagic fish, whale sharks, whales, high probability of deep water corals, predicted high benthic and pelagic species richness.	11
OS3	New Site	Southwest Ridge	Tuna, predicted high benthic and pelagic species richness, high probability of cold water corals.	7
OS4	New Site	Southwest Trench / Conway Reef	High tuna productivity, predicted high pelagic and benthic species richness, probable cold water corals.	8
OS5	New Site	Ceva-i-Ra Reef / Conway Island	Predicted high benthic and pelagic species richness, high probability of cold water corals, tuna and seabird nesting site.	10
East of Fiji				
OE1	FIME OP 9 FIME OP 10 FIME OP 11 EBSA 14 EBSA 22	Central Viti Canyons	Strong habitat connectivity, whales, dolphins, sharks, turtles, seabirds, soft corals, predicted high benthic and pelagic species richness, high probability of cold water corals.	11
OE2	FIME OP 4_B EBSA 22	Nanuku Canyon	Predicted high benthic and pelagic species richness, high probability of cold water corals, whales, turtles, seabirds.	9
OE3	FIME OP 14	Northeast Rift Valley	Predicted high benthic and pelagic species richness, high probability of cold water corals, upwelling, high biodiversity, whales, and turtles.	11
OE4	FIME OP 13 EBSA 5	Central Lau Ridge	Predicted high benthic and pelagic species richness, high probability of cold water corals, upwelling, high biodiversity, deep sea squid and pelagic fish, whales, turtles, seabirds.	11
OE5	FIME OP 12 EBSA 5	Central Lau Seamount	Predicted high benthic and pelagic species richness, high probability of cold water corals, upwelling, high biodiversity, deep sea squid and pelagic fish, whales, dolphins, turtles, seabirds.	10
OE6	FIME OP 6_A	Southeast Lau Seamounts	Seamounts, upwelling, predicted high pelagic species richness.	8
OE7	FIME OP 6_B EBSA 5	Minerva Reef	Seamount to reef connectivity, potentially high biodiversity, likely to have high diversity of benthic species, and a strong likelihood of deep water corals.	9

SITE ON1: FIJI PLATEAU WEST TRENCH AND CANYONS

TABLE 188: Site description ON1

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
ON1	EBSA 13	Fiji Plateau west trench and canyons		12



MAP 95: SITE ON1

Geographic coordinates: S10°13'54", E173°32'19" and S12°32'59", E175°16'18"

Area (km²): 17,451.3

TABLE 189: Details of Site Rating ON1

Criteria	Details	Rating (out of 3)
Biophysical Justification	Migratory pelagic including, whales, dolphins, billfish, tuna, turtles, high probability of cold water corals and benthic species richness.	3
Geomorphic Features	Diverse geomorphology, deep water trench and ridge large seamounts and canyons.	3
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice available.	3
Obligations (See Appendix C)	Relevant taxa: <i>Eretmochelys imbricata</i> ; <i>Chelonia mydas</i> ; <i>Dermochelys coriacea</i> ; <i>Caretta caretta</i> ; <i>Megaptera novaeangliae</i> .	3
Overall Rating		12

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a high overall rating of 12 (Table 189) and includes canyons, seamounts, and ridges (Map 95). The North Fiji Plateau EBSA partially sits along the Wallis and Fortuna Plateau, with a deep-water trench ranging from 3,000 to more than 5,500 metres deep, ridges and a high density of seamounts, including one large seamount with canyons¹⁸⁸.

This area is one of the most productive tuna areas in the world (Gillett, 2011), and a migratory route for many pelagic species such as tuna (Amoe, 2007), turtles including, hawksbill, *Eretmochelys imbricata*, green, *Chelonia mydas*, loggerhead, *Caretta caretta*, and leatherback, *Dermochelys coriacea*, humpback whales, *Megaptera novaeangliae*, other whales and dolphins (Miller, 2007), blue marlin, *Makaira nigricans* (Collette et al., 2011) and black marlin, *Istiompax indica*, as well as many species of seabirds.

Global habitat suitability modelling indicates that there is a high probability of finding cold water corals at this site (Yesson et al., 2012).

Sites ON1 includes a number of relatively small blind and shelf incising canyons¹⁸⁹ and is therefore likely to be an area of high biomass and biodiversity (Section 6.14).

Modelling of species richness (www.aquamaps.org) indicates the area is likely to have a relative high benthic species richness compared to that of the surrounding environment (Kaschner et al., 2016).

The site also feature seamounts of differing morphological types including one large shallow peak seamount that protrudes into the euphotic or epipelagic zone (<200 m), making it particularly important for biodiversity¹⁹⁰ (Section 6.14).

SITE ON2: FIJI PLATEAU RIDGE AND CANYONS

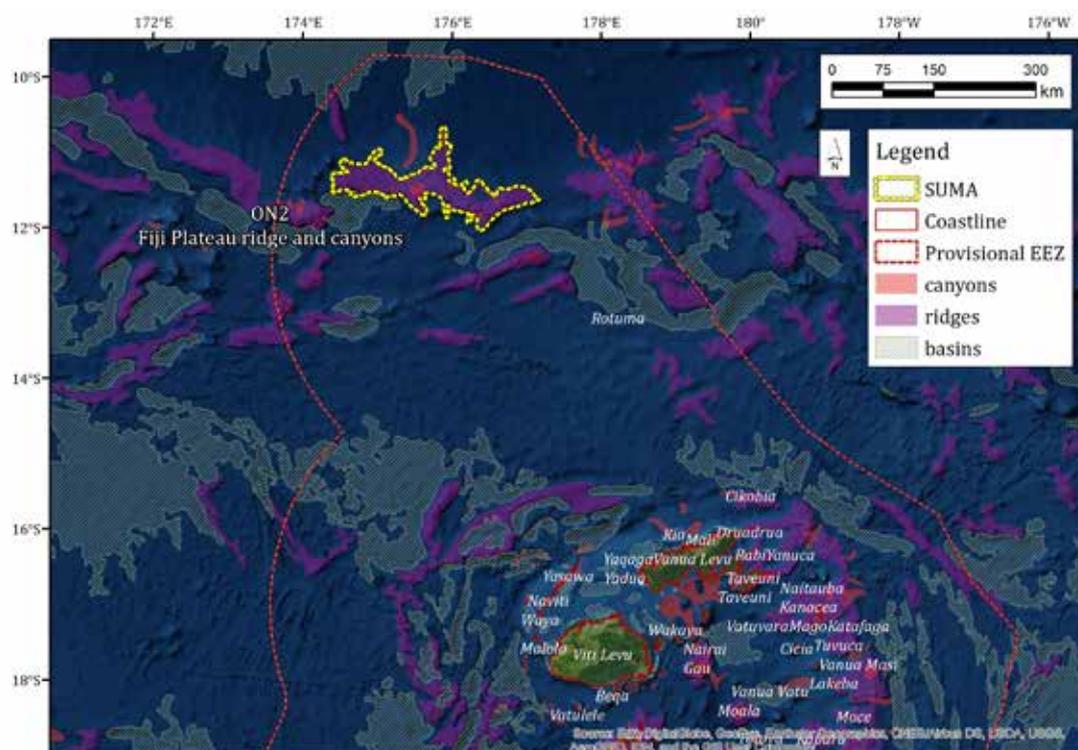
TABLE 190: Site description ON2

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
ON2	EBSA 13	Fiji Plateau ridge and canyons		12

¹⁸⁸ ArcGIS Global Seafloor Geomorphic Features Map. <http://www.arcgis.com/home/webmap/viewer.html?webmap=342d8cbfac074a53afa5e49bd0c53773>

¹⁸⁹ ArcGIS Global Seafloor Geomorphic Features Map. <http://www.arcgis.com/home/webmap/viewer.html?webmap=342d8cbfac074a53afa5e49bd0c53773>

¹⁹⁰ ArcGIS Global Seafloor Geomorphic Features Map. <http://www.arcgis.com/home/webmap/viewer.html?webmap=342d8cbfac074a53afa5e49bd0c53773>



MAP 96: SITE ON2

Geographic coordinates: S10°45'1", E174°52'7" and S12°9'1", E177°9'11"

Area (km²): 10,221.4

TABLE 191: Details of Site Rating ON2

Criteria	Details	Rating (out of 3)
Biophysical Justification	Migratory pelagic including, whales, dolphins, billfish, tuna, turtles, high probability of cold water corals and high benthic species richness.	3
Geomorphic Features	Ridge with multiple large canyons.	3
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice available.	3
Obligations (See Appendix C)	Relevant taxa: <i>Eretmochelys imbricata</i> ; <i>Dermochelys coriacea</i> ; <i>Caretta caretta</i> ; <i>Megaptera novaeangliae</i> ; <i>Makaira nigricans</i> .	3
Overall Rating		12

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a high overall rating of 12 (Table 191) and includes canyons and ridges (Map 96). This ridge in the North Fiji Plateau EBSA has multiple large canyons¹⁹¹. This area is likely to have ideal conditions for feeding and spawning, and hot spots of high biomass and biodiversity.

The general area is one of the most productive tuna areas in the world (Gillett, 2011), and a migratory route for many pelagic species such as tuna (Amoe, 2007), turtles of the hawksbill, *Eretmochelys imbricata*, green, *Chelonia mydas*, loggerhead, *Caretta caretta*, and leatherback, *Dermochelys coriacea*, species, humpback whales, *Megaptera novaeangliae*, other whales and dolphins (Miller, 2007), blue marlin, *Makaira nigricans* (Collette et al., 2011) and black marlin, *Istiompax indica*, as well as many species of seabirds.

¹⁹¹ ArcGIS Global Seafloor Geomorphic Features Map. <http://www.arcgis.com/home/webmap/viewer.html?webmap=342d8cbfac074a53afa5e49bd0c53773>

Site ON2 includes multiple blind and shelf incising canyons and is therefore likely to be an area of high biomass and biodiversity (6.14).

Sites ON2 is wholly located within within the North Fiji Plateau EBSA 13¹⁹² (SCBD, 2014). The Area was identified as having high biological productivity, wide ranging migratory species (including fish, turtles and cetaceans) as well as a occurrences of of canyons.

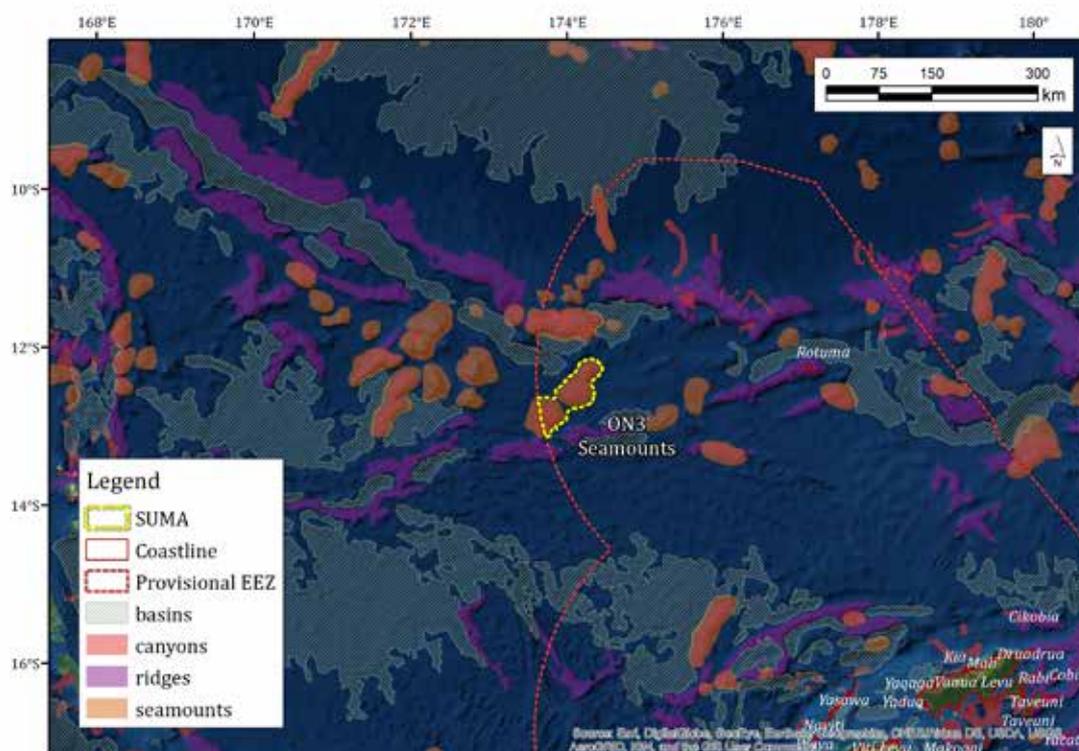
Global habitat suitability modelling indicates that there is a high probability of finding cold water corals at this site (Yesson et al., 2012).

Modelling of species richness (www.aquamaps.org) indicates the area is likely to have a relative high benthic species richness compared to that of the surrounding environment (Kaschner et al., 2016).

SITE ON3: SEAMOUNTS

TABLE 192: Site description ON3

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
ON3	EBSA 13	Seamounts		11



MAP 97: SITE ON3

Geographic coordinates: S12°21'29", E173°32'40" and S13°21'25", E174°23'15"

Area (km²): 4,318.6

¹⁹² Ecologically or Biologically Significant Area

TABLE 193: Details of Site Rating ON3

Criteria	Details	Rating (out of 3)
Biophysical Justification	Migratory pelagic including, whales, dolphins, billfish, tuna, turtles, high probability of cold water corals and benthic species richness.	3
Geomorphic Features	Two large seamounts.	2
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice available.	3
Obligations (See Appendix C)	Relevant taxa: <i>Eretmochelys imbricata</i> ; <i>Dermochelys coriacea</i> ; <i>Caretta caretta</i> ; <i>Megaptera novaeangliae</i> .	3
Overall Rating		11

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a high overall rating of 11 (Table 193). It has two large seamounts (Map 97) at the southern extent of the North Fiji Plateau EBSA¹⁹³ (SCBD, 2014).

The general area is one of the most productive tuna areas in the world (Gillett, 2011), and a migratory route for many pelagic species such as tuna (Amoe, 2007), turtles of the hawksbill, *Eretmochelys imbricata*, green, *Chelonia mydas*, loggerhead, *Caretta caretta*, and leatherback, *Dermochelys coriacea*, species, humpback whales, *Megaptera novaeangliae*, other whales and dolphins (Miller, 2007), blue marlin, *Makaira nigricans* and black marlin, *Istiompax indica* (SCBD, 2014), as well as many species of seabirds.

Site ON3 includes large seamounts that protrudes into the euphotic or epipelagic zone (<200 m), making it particularly important for biodiversity¹⁹⁴ (Section 6.14

Global habitat suitability modelling indicates that there is a high probability of finding cold water corals at this site (Yesson et al., 2012).

Modelling of species richness (www.aquamaps.org) indicates the area is likely to have high benthic species richness compared to the surrounding environment (Kaschner et al., 2016).

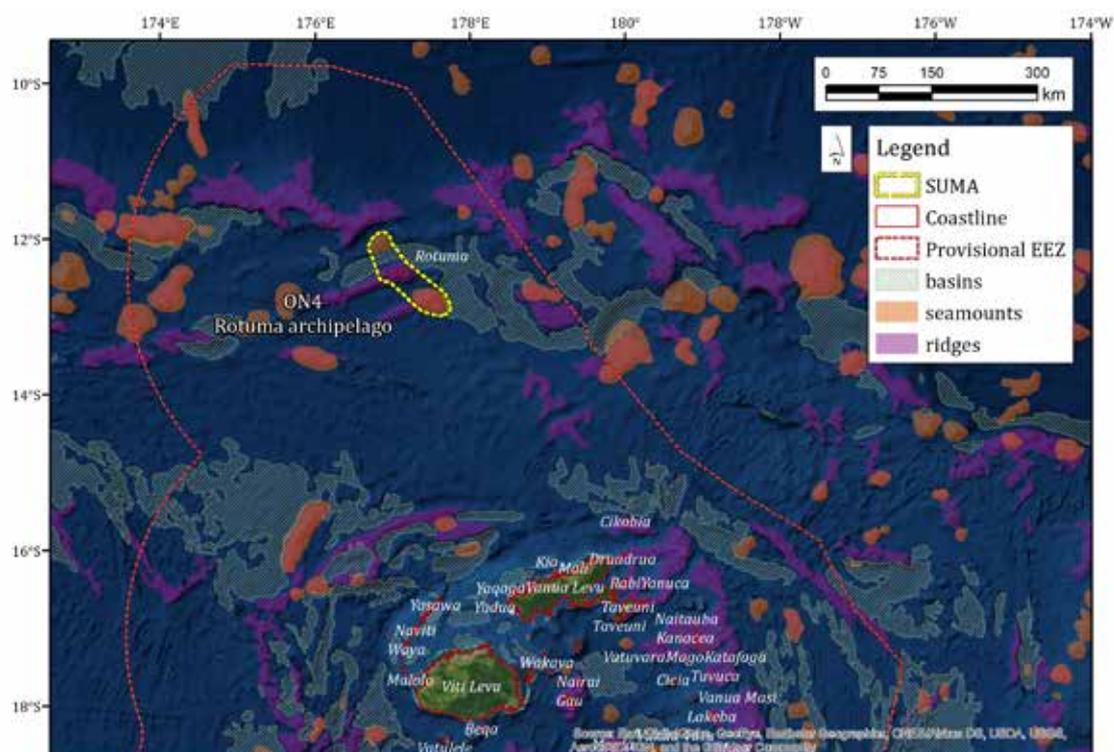
SITE ON4: ROTUMA ARCHIPELAGO

TABLE 194: Site description ON4

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
ON4	FIME OP1, EBSA 13 Site RO1– Rotuma Island	Rotuma archipelago		12

¹⁹³ ArcGIS Global Seafloor Geomorphic Features Map <http://www.arcgis.com/home/webmap/viewer.html?webmap=342d8cbfac074a53afa5e49bd0c53773>

¹⁹⁴ ArcGIS Global Seafloor Geomorphic Features Map. <http://www.arcgis.com/home/webmap/viewer.html?webmap=342d8cbfac074a53afa5e49bd0c53773>



MAP 98: SITE ON4

Geographic coordinates: S11°58'13", E176°39'43" and S13°3'31", E177°44'5"

Area (km²): 5,545.8

TABLE 195: Details of Site Rating ON4

Criteria	Details	Rating (out of 3)
Biophysical Justification	High marine species richness, sharks, sea cucumbers, humphead wrasse, bumphead parrot fish, turtle nesting, high probability of cold water corals, high benthic species richness.	3
Geomorphic Features	Large bathymetric feature diversity, connectivity between deep water features, ridges, slopes, terraces, seamounts, canyons, and shallow water reefs.	3
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice available.	3
Obligations (See Appendix C)	Relevant taxa: <i>Cheilinus undulatus</i> ; <i>Bolbometopon muricatum</i> ; <i>Chelonia mydas</i> ; <i>Eretmochelys imbricata</i> ; <i>Dermochelys coriacea</i> ; <i>Caretta caretta</i> ; <i>Megaptera novaeangliae</i> .	3
Overall Rating		12

DETAILED DESCRIPTION OF HABITAT/FEATURE

This site has a high overall rating of 12 (Table 195). This area encompasses a section of the North Fiji Plateau EBSA (Map 98) with ridges, slopes, terraces, a large tall seamount, a guyot (a seamount with a smooth, flat top), and shallow peak canyons¹⁹⁵. The ridge lying between the two seamounts is crowned with one medium-sized and several small inhabited islands (Site RO1– Rotuma Island).

The connectivity between the deep water and shallow water features creates an area with high marine species richness, predicted deep water corals, and many sharks. On the shallow reefs around the islands there are large populations of species, which are becoming endangered in the rest of Fiji's waters, such as sea cucumbers,

¹⁹⁵ ArcGIS Global Seafloor Geomorphic Features Map. <http://www.arcgis.com/home/webmap/viewer.html?webmap=342d8cbfac074a53afa5e49bd0c53773>

humphead wrasse, *Cheilinus undulatus*, bumphead parrotfish, *Bolbometopon muricatum*, green, *Chelonia mydas* and hawksbill, *Eretmochelys imbricata*, turtles (Tuxson, 2006).

The general area is globally productive tuna area (Gillett, 2011), and a migratory route for many pelagic species such as tuna (Amoe, 2007), turtles of the hawksbill, *Eretmochelys imbricata*, green, *Chelonia mydas*, loggerhead, *Caretta caretta*, and leatherback, *Dermochelys coriacea*, species, humpback whales, *Megaptera novaeangliae*, other whales and dolphins (Miller, 2007), blue marlin, *Makaira nigricans* (Collette et al., 2011) and black marlin, *Istiompax indica*, as well as many species of seabirds.

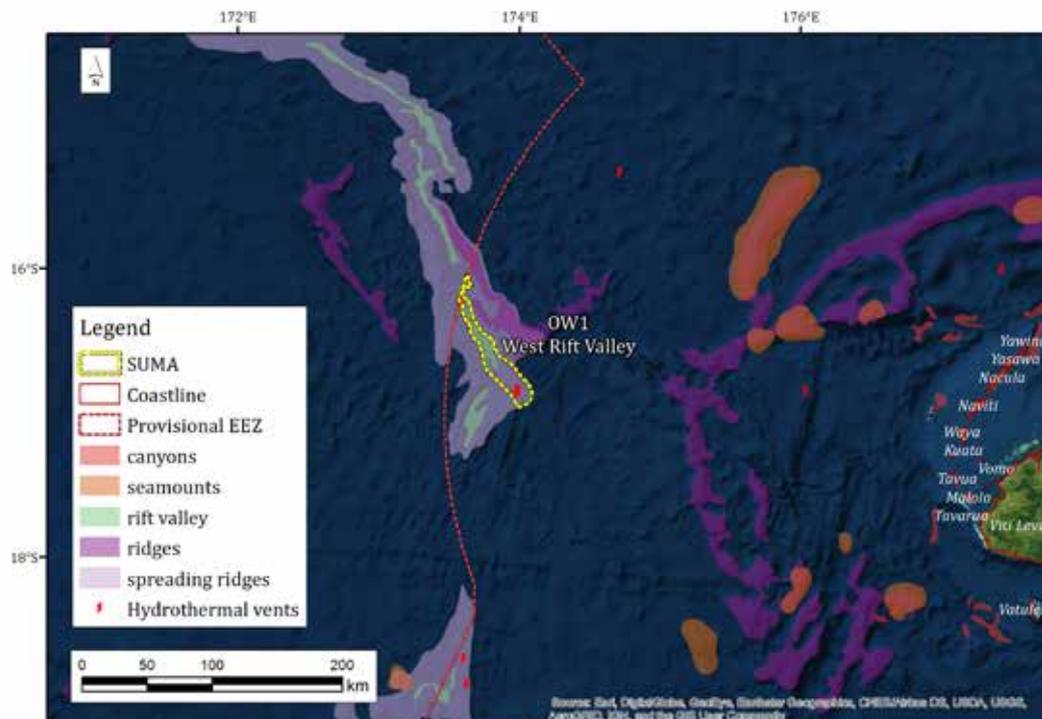
Global habitat suitability modelling indicates that there is a high probability of finding cold water corals at this site (Yesson et al., 2012).

Modelling of species richness (www.aquamaps.org) indicates the area is likely to have a relative high benthic species richness compared to that of the surrounding environment (Kaschner et al., 2016).

SITE OW1: WESTERN RIFT VALLEY

TABLE 196: Site description OW1

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
OW1		Western Rift Valley		8



MAP 99: SITE OW1

Geographic coordinates: S16°8'38", E173°31'23" and S17°4'22", E174°1'44"

Area (km²): 1,132.7

TABLE 197: Details of Site Rating OW1

Criteria	Details	Rating (out of 3)
Biophysical Justification	Very productive tuna fishing grounds, probable deep water endemic species, probability of high pelagic and benthic species richness.	3
Geomorphic Features	Escarpment and rift valley deep water system, one (inferred) active vent.	2
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice available.	3
Obligations (See Appendix C)	No obligations registered.	0
Overall Rating		8

DETAILED DESCRIPTION OF HABITAT / FEATURE

Site OW1, has a medium overall rating of 8 (Table 197). This area contains a ridge climbing from deep waters with a rift valley (Map 99), indicating that it may be a spreading ridge where seafloor spreading occurs, and includes hydrothermal vent¹⁹⁶.

Hydrothermal vents have unique ecosystems which use energy from the volcanic gases rather than sunlight. These areas are very productive, and biomass is high, but as most of the animals are unique to the vent environments, and endemic to the specific area (SCBD, 2009), they are confined to small areas around the vents.

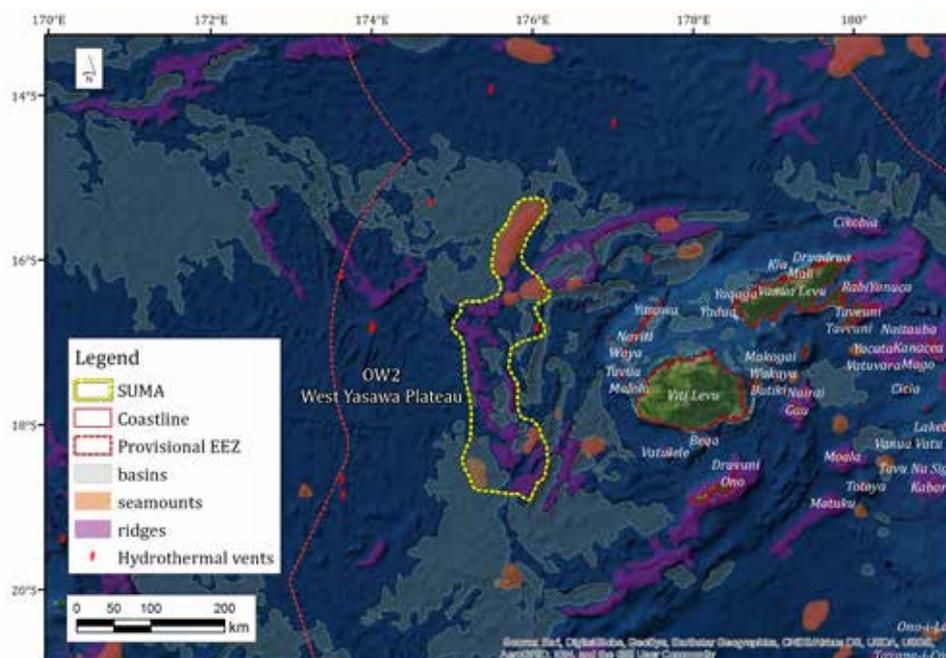
Modelling of species richness (www.aquamaps.org) indicates the area is likely to have high pelagic and benthic species richness (Kaschner et al., 2016).

SITE OW2: WEST YASAWA PLATEAU

TABLE 198: Site description OW2

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
OW2	FIME OP2	West Yasawa Plateau		9

¹⁹⁶ ArcGIS Global Seafloor Geomorphic Features Map. <http://www.arcgis.com/home/webmap/viewer.html?webmap=342d8cbfac074a53afa5e49bd0c53773>



MAP 100: SITE OW2

Geographic coordinates: S15°24'22", E174°55'47" and S19°6'45", E176°10'28"

Area (km²): 29,567.0

TABLE 199: Details of Site Rating OW2

Criteria	Details	Rating (out of 3)
Biophysical Justification	Very productive tuna fishing grounds, hydrothermal vent, predicted deep water corals and high pelagic species diversity.	3
Geomorphic Features	Plateau, ridges, upwelling, multiple types of seamounts.	3
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice available.	3
Obligations (See Appendix C)	No obligations registered.	0
Overall Rating		9

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a medium overall rating of 9 (Table 199). This section of plateau rises from the surrounding abyss, with several seamounts to the north (Map 100), one of which climbs from a seabed over 3,000 m deep to just 2 m short of the surface. The southern extent of the site includes seamounts whose peaks are found in both the bathypelagic (1000–4000m) and mesopelagic zone (200–1000m depth) ¹⁹⁷.

Site OW2 includes a hydrothermal vent. Hydrothermal vents have unique ecosystems which use energy from the volcanic gases rather than sunlight. These areas are very productive, and biomass is high, with most of the animals unique to the vent environments, and endemic to the specific area (SCBD, 2009).

There is little firm information available about the marine life of this area, but it is within an area of great tuna productivity (Amoe, 2007), suggesting that there are upwelling causing high nutrients and biomass.

Global habitat suitability modelling indicates that there is a high probability of finding cold water corals at this site (Yesson et al., 2012).

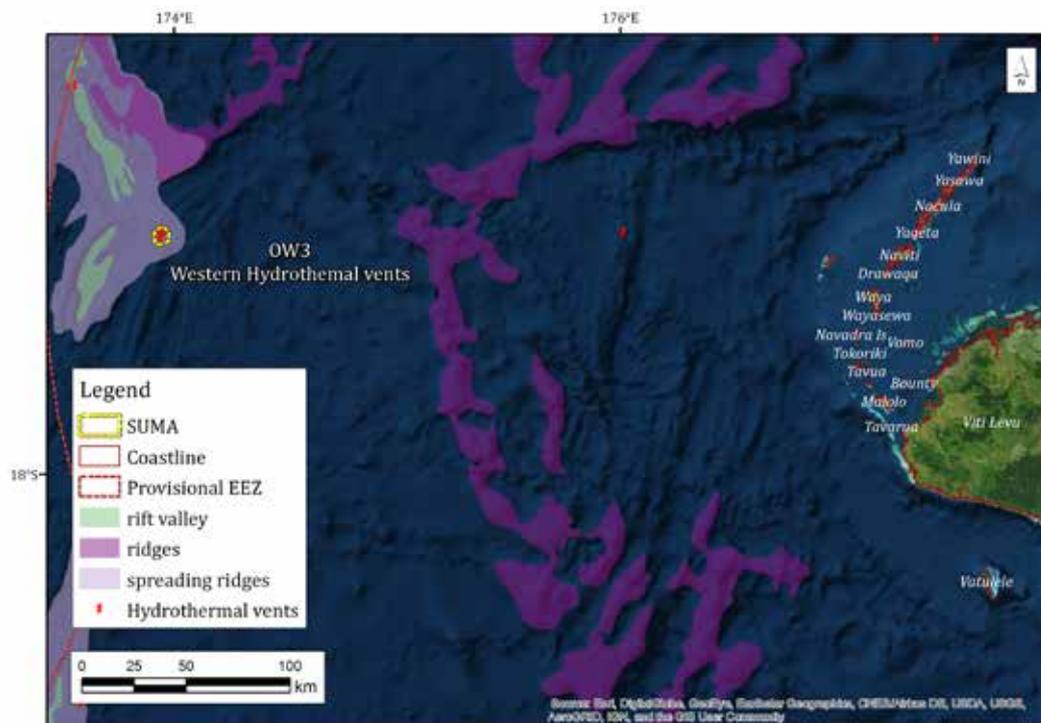
Modelling of species richness (www.aquamaps.org) indicates the area is likely to have high pelagic species richness (Kaschner et al., 2016).

¹⁹⁷ ArcGIS Global Seafloor Geomorphic Features Map <http://www.arcgis.com/home/webmap/viewer.html?webmap=342d8cbfac074a53afa5e49bd0c53773>

SITE OW3: WESTERN HYDRO-THERMAL VENTS

TABLE 200: Site description ON7

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
OW3				9



MAP 101: SITE OW3

Geographic coordinates: S16°56'17", E173°53'15" and S17°0'44", E173°57'20"

Area (km²): 45.8

TABLE 201: Details of Site Rating OW3

Criteria	Details	Rating (out of 3)
Biophysical Justification	Predicted high benthic and pelagic species richness, very productive tuna fishing grounds high probability of cold water corals.	3
Geomorphic Features	Active inter-connected hydrothermal vents, in a deep ocean associated habitat.	3
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice available.	3
Obligations (See Appendix C)	No obligations registered.	0
Overall Rating		9

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a medium overall rating of 9 (Table 201). This site is a small deep-water section at the southern end of the West Yasawa Plateau with several active inter-connected hydrothermal vents¹⁹⁸ (Map 101).

Hydrothermal vents have unique ecosystems which use energy from the volcanic gases rather than sunlight. These areas are very productive, and biomass is high, but as most of the animals are unique to the vent environments, and endemic to the specific area (SCBD, 2009), they are confined to small areas around the vents. If the vents are disturbed, entire ecosystems can be destroyed very quickly, making vent areas extremely sensitive to activities such as deep sea mineral exploration or mining¹⁹⁹.

There is little firm information available about the marine life of this area, but it is within a highly productive tuna area (Amoe, 2007), suggesting high nutrients and biomass.

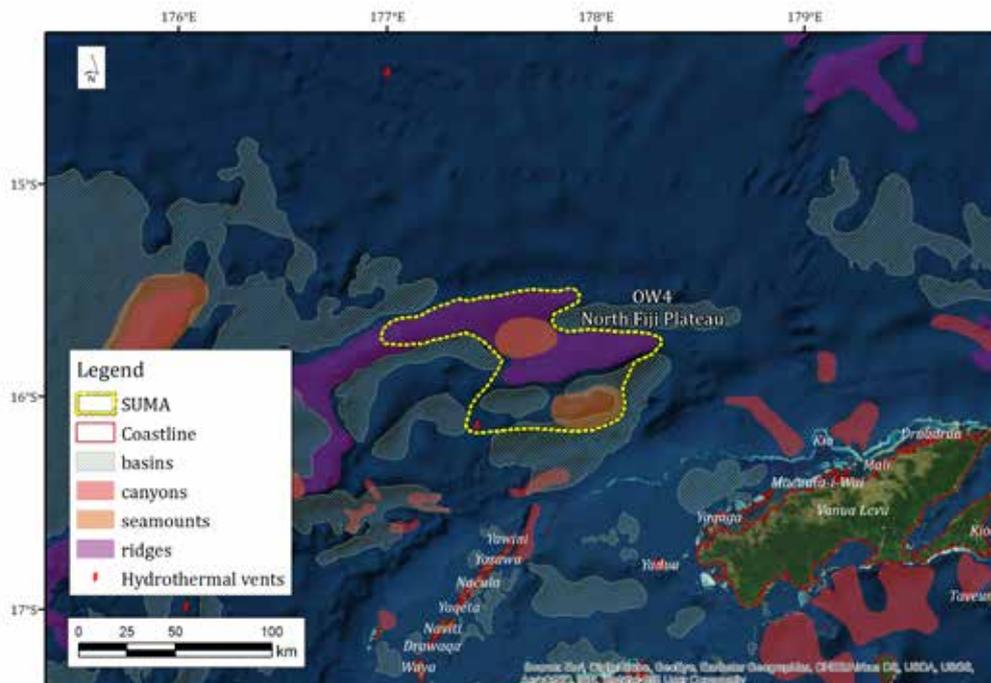
Global habitat suitability modelling indicates that there is a high probability of finding cold water corals at this site (Yesson et al., 2012).

Modelling of species richness (www.aquamaps.org) indicates the area is likely to have high benthic and pelagic species richness (Kaschner et al., 2016).

SITE OW4: NORTH FIJI PLATEAU

TABLE 202: Site description OW4

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
OW4	FIME OP5	North Fiji Plateau		8



MAP 102: SITE OW4

¹⁹⁸ ArcGIS Global Seafloor Geomorphic Features Map. <http://www.arcgis.com/home/webmap/viewer.html?webmap=342d8cbfac074a53afa5e49bd0c53773>

¹⁹⁹ One-fifth of all known hydrothermal vents are threatened by deep-sea mining, Southern Fried Science 2013 <http://www.southernfriedscience.com/one-fifth-of-all-known-hydrothermal-vents-are-threatened-by-deep-sea-mining/>

Geographic coordinates: S15°31'2", E176°57'27" and S16°11'38", E178°18'53"

Area (km²): 5,654.1

TABLE 203: Details of Site Rating OW4

Criteria	Details	Rating (out of 3)
Biophysical Justification	Predicted high benthic and pelagic species richness, very productive tuna fishing grounds high probability of cold water corals, sharks.	3
Geomorphic Features	Seamount, hydrothermal vent, ridges.	2
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice.	3
Obligations (See Appendix C)	No obligations registered.	0
Overall Rating		8

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a medium overall rating of 8 (Table 203). This site contains a section of escarpment north of the Fiji Plateau, and of the Yasawa Islands, with two seamounts and ridge features²⁰⁰ (Map 102).

In the FIME report, an area shown to lie between the Yasawas and the north coast of Viti Levu is described as an area of National Importance with one of the large seamounts within the Fiji Basin, allowing for aggregations of pelagic species such as tuna and sharks. However, there are no such seamounts in the area indicated, and it is thought that this description is more likely to refer to this section of the North Fiji Plateau.

There is little firm information available about the marine life of this area, but it is within the area of the greatest tuna catch by the Fiji domestic longline fleet in 2006 (Amoe, 2007), suggesting high nutrients and biomass.

Global habitat suitability modelling indicates that there is a high probability of finding cold water corals at this site (Yesson et al., 2012).

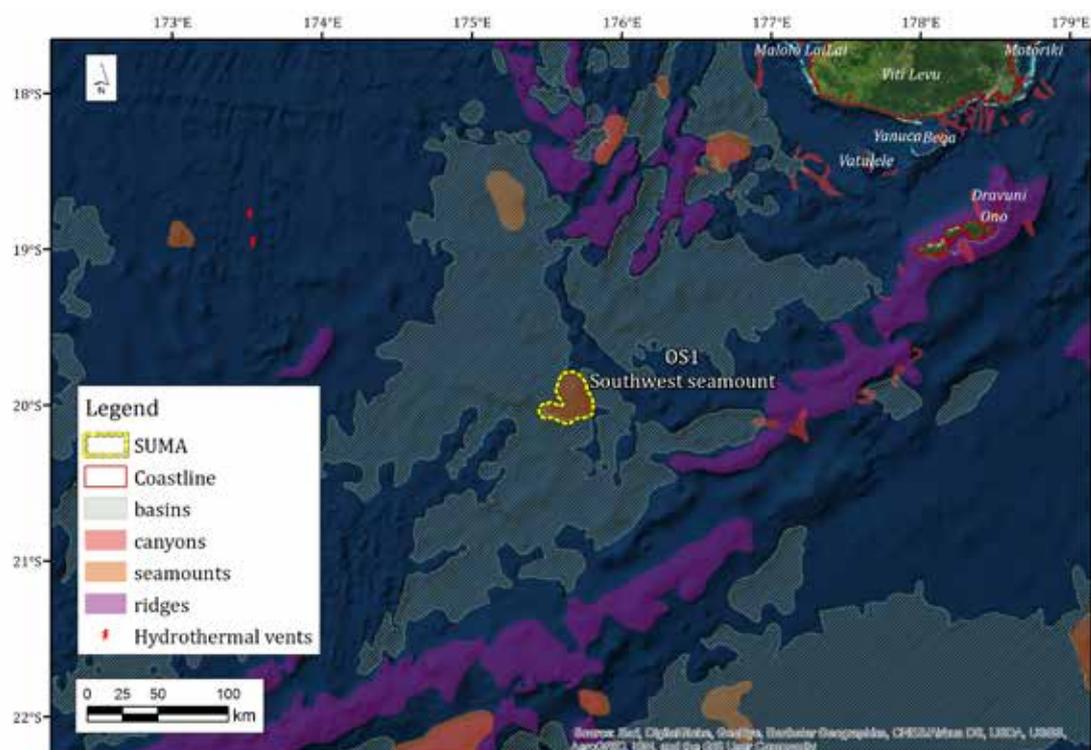
Modelling of species richness (www.aquamaps.org) indicates the area is likely to have high benthic and pelagic species richness (Kaschner et al., 2016).

SITE OS1: SOUTHWEST SEAMOUNT

TABLE 204: Site description OS1

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
OS1		Southwest seamount		8

²⁰⁰ ArcGIS Global Seafloor Geomorphic Features Map. <http://www.arcgis.com/home/webmap/viewer.html?webmap=342d8cbfac074a53afa5e49bd0c53773>



MAP 103: SITE OS1

Geographic coordinates: S19°52'58", E175°24'1" and S20°12'58", E175°46'1"

Area (km²): 850.8

TABLE 205: Details of Site Rating OS1

Criteria	Details	Rating (out of 3)
Biophysical Justification	Predicted high benthic and pelagic species richness, high probability of cold water corals, very productive tuna fishing grounds and possible tuna aggregating area.	2
Geomorphic Features	Unique and extremely deep seamount habitat.	3
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice.	3
Obligations (See Appendix C)	No obligations registered.	0
Overall Rating		8

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a medium overall rating of 8 (Table 205). This site contains an isolated seamount over 200 km southwest of Kadavu (Map 103), rising from a basin over 3,000 m deep²⁰¹, making it a uniquely deep feature in Fiji. It is likely that this is a tuna aggregation site but there is little firm information, requiring further investigation.

Global habitat suitability modelling indicates that there is a high probability of finding cold water corals at this site (Yesson et al., 2012).

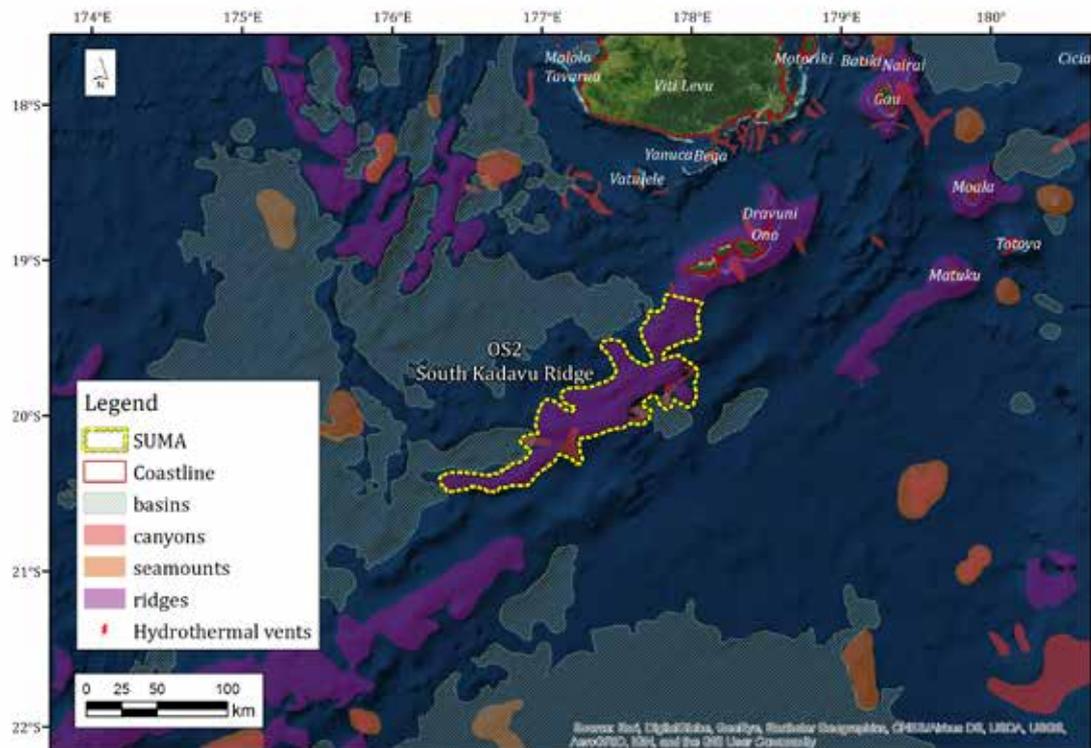
Modelling of species richness (www.aquamaps.org) indicates the area is likely to have high pelagic species richness (Kaschner et al., 2016).

²⁰¹ ArcGIS Global Seafloor Geomorphic Features Map. <http://www.arcgis.com/home/webmap/viewer.html?webmap=342d8cbfac074a53afa5e49bd0c53773>

SITE OS2: SOUTH KADAVU RIDGE

TABLE 206: Site description OS2

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
OS2	FIME OP3 EBSA 5	South Kadavu Ridge		11



MAP 104: SITE OS2

Geographic coordinates: S19°17'18", E176°46'50" and S20°31'10", E178°3'46"

Area (km²): 6,234.6

TABLE 207: Details of Site Rating OS2

Criteria	Details	Rating (out of 3)
Biophysical Justification	Marlin, sailfish, sharks, other pelagic fish, whale sharks, whales, high probability of deep water corals, predicted high benthic and pelagic species richness.	3
Geomorphic Features	Ridge with canyons.	2
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice.	3
Obligations (See Appendix C)	Relevant taxa: <i>Carcharhinus brachyurus</i> ; <i>C. falciformis</i> ; <i>Isurus oxyrinchus</i> ; <i>Scomberomorus commerson</i> ; <i>Acanthocybium solandri</i> ; <i>Coryphaena hippurus</i> ; ; <i>Megaptera novaeangliae</i> .	3
Overall Rating		11

DETAILED DESCRIPTION OF HABITAT / FEATURE

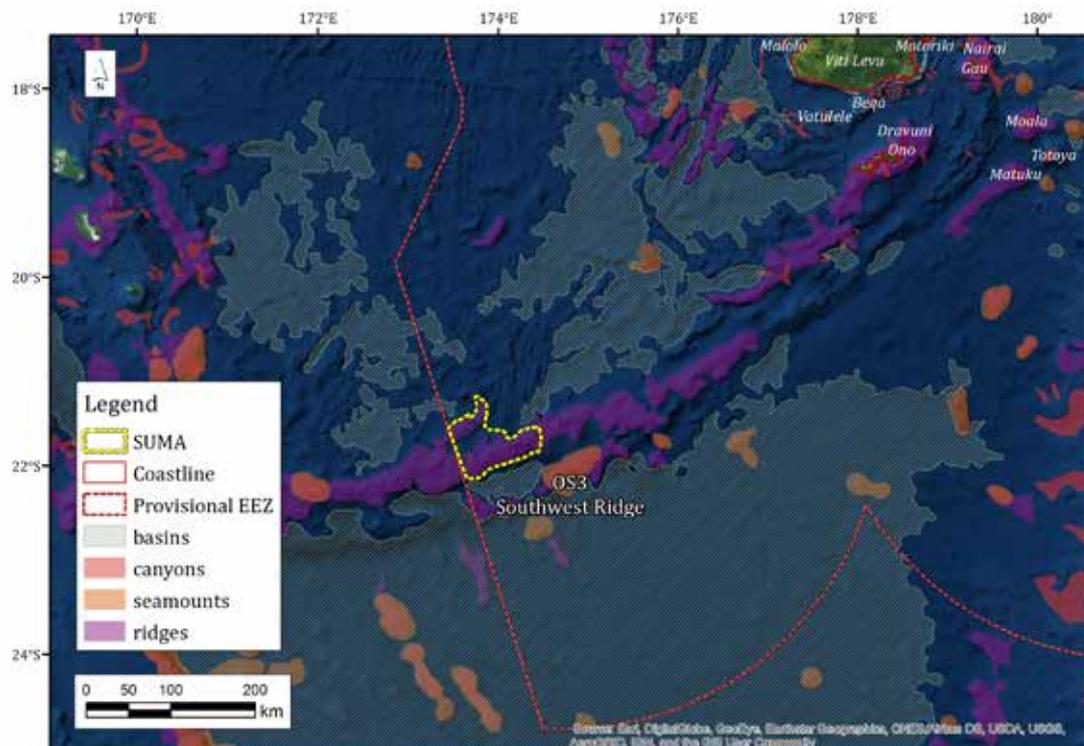
This site has a high overall rating of 11 (Table 207). This area has a section of ridge in the north western section of the Kadavu and Southern Lau Region EBSA 5 (SCBD, 2014), with several canyons running into deeper water²⁰² (Map 104). This area has a high probability of deep water corals (Yesson et al., 2012) and high benthic and pelagic species richness at the western edge (Kaschner et al., 2016). These canyons also represent Fiji’s furthest extent of canyons in the South-west of Fiji EEZ.

Tourism game fishing operators report large pelagic fish on the banks south of Kadavu, including bronze whaler sharks, *Carcharhinus brachyurus*, silky sharks, *Carcharhinus falciformis*, and mako sharks, *Isurus oxyrinchus*, as well as other pelagic predatory fish such as, walu (Spanish mackerel), *Scomberomorus commerson*, wahoo, *Acanthocybium solandri*, mahi-mahi (dolphinfish), *Coryphaena hippurus*, pacific blue marlin, *Makaira nigricans* (SCBD, 2014), black marlin, *Istiompax indica*, and Pacific sailfish, *Istiophorus platypterus*. There is anecdotal evidence of whale shark sightings along the outer reefs, and humpback whales, *Megaptera novaeangliae*, passing through on their annual migrations between New Zealand and Tonga²⁰³.

SITE OS3: SOUTHWEST RIDGE

TABLE 208: Site description OS3

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
OS3		Southwest Ridge		7



MAP 105: SITE OS3

²⁰² ArcGIS Global Seafloor Geomorphic Features Map. <http://www.arcgis.com/home/webmap/viewer.html?webmap=342d8cbfac074a53afa5e49bd0c53773>

²⁰³ Species Archives– Gamefishing Fiji– The best of Fiji Fishing, <http://gamefishingfiji.com/fish-species-fiji>

Geographic coordinates: S21°28'54", E173°18'1" and S22°21'47", E174°21'32"

Area (km²): 5,004.9

TABLE 209: Details of Site Rating OS3

Criteria	Details	Rating (out of 3)
Biophysical Justification	Tuna, predicted high benthic and pelagic species richness, high probability of cold water corals.	2
Geomorphic Features	Deepwater ridge.	2
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice.	3
Obligations (See Appendix C)	No obligations registered.	0
Overall Rating		7

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a medium overall rating of 7 (Table 209). It contains a section of ridge rising from the abyss and basins (Map 105) over 3,000 m deep at the eastern end of the New Hebrides Trench²⁰⁴. The deep water ridges connect to Conway Reef / Ceva-i-Ra Island to the east.

There is little firm information available about the marine life of this area, but it was one of the foci of the tuna catch by the Fiji domestic longline fleet in 2006 (Amoe, 2007), suggesting high nutrients and biomass.

Global habitat suitability modelling indicates that there is a high probability of finding cold water corals at this site (Yesson et al., 2012).

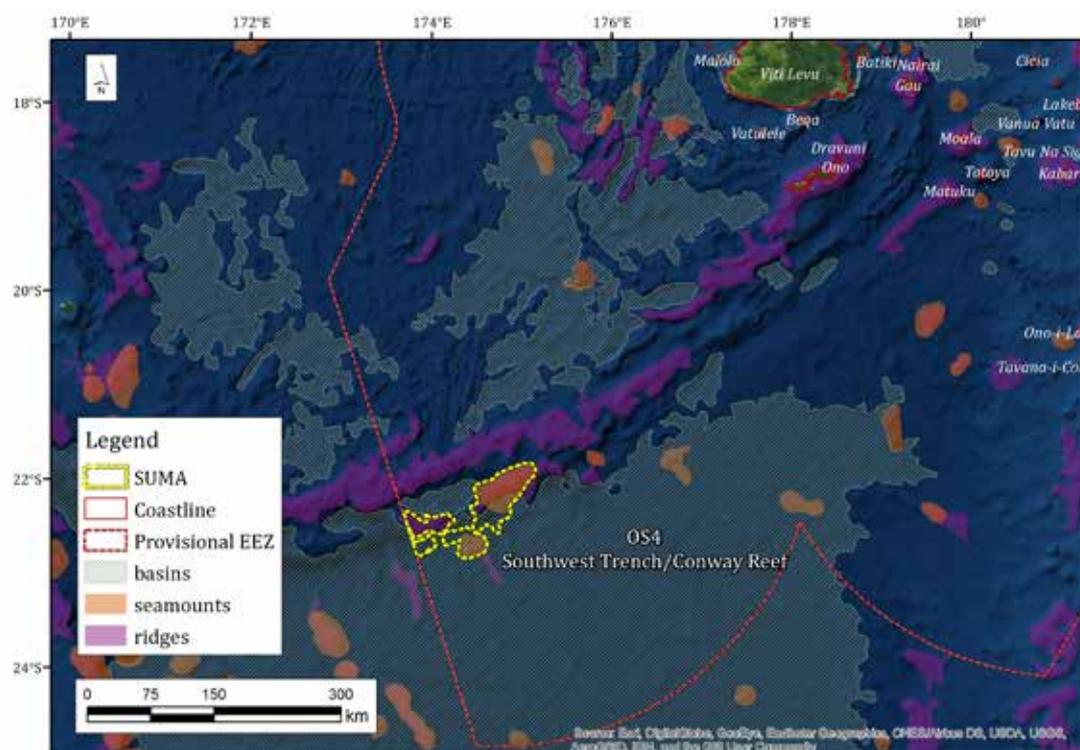
Modelling of species richness (www.aquamaps.org) indicates the area is likely to have high benthic and pelagic species richness (Kaschner et al., 2016).

SITE OS4: SOUTHWEST TRENCH / CONWAY REEF

TABLE 210: Site description OS4

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
OS4	RO2	Southwest Trench / Conway Reef		8

²⁰⁴ ArcGIS Global Seafloor Geomorphic Features Map. <http://www.arcgis.com/home/webmap/viewer.html?webmap=342d8cbfac074a53afa5e49bd0c53773>



MAP 106: SITE OS4

Geographic coordinates: S22°2'46", E173°30'57" and S23°2'56", E175°2'32"

Area (km²): 5,991.2

TABLE 211: Details of Site Rating OS4

Criteria	Details	Rating (out of 3)
Biophysical Justification	High tuna productivity, predicted high pelagic and benthic species richness, probable cold water corals.	2
Geomorphic Features	Deep trench, abyss, ridge, seamounts.	3
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice.	3
Obligations (See Appendix C)	No obligations registered.	0
Overall Rating		8

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a medium overall rating of 8 (Table 211). This is a very deep area at the eastern end of the New Hebrides Trench, including sections of trench, abyss, ridge, and two very deep seamounts (Map 106), with peaks at 1,300 and 2,500 m, ring from depths of over 5,000 m²⁰⁵.

There is little firm information available about the marine life of this area, but it has high tuna productivity (Amoe, 2007), suggesting high nutrients and biomass.

Global habitat suitability modelling indicates that there is a high probability of finding cold water corals at this site (Yesson et al., 2012).

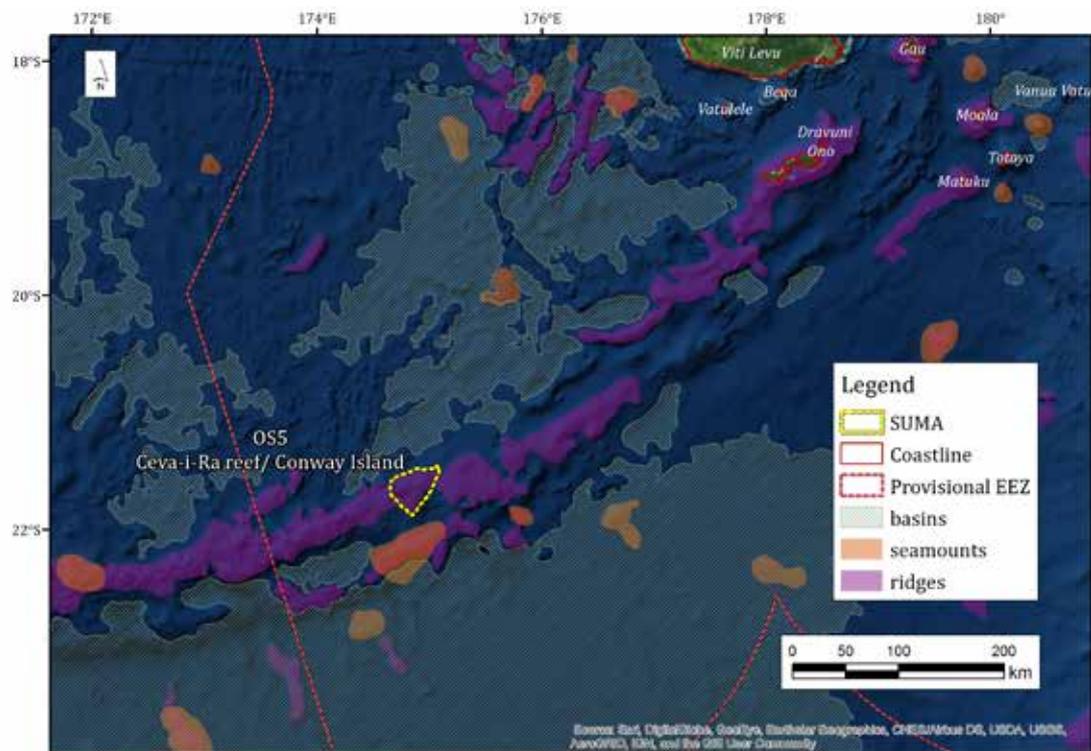
Modelling of species richness (www.aquamaps.org) indicates the area is likely to have high benthic and pelagic species richness (Kaschner et al., 2016).

²⁰⁵ ArcGIS Global Seafloor Geomorphic Features Map. <http://www.arcgis.com/home/webmap/viewer.html?webmap=342d8cbfac074a53afa5e49bd0c53773>

SITE OS5: CEVA-I-RA REEF/ CONWAY ISLAND

TABLE 212: Site description OS5

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
OS5	Site RO2– Ceva-i-Ra (Conway Island)	Ceva-i-Ra reef/ Conway Island		10



MAP 107: SITE OS5

Geographic coordinates: S21°34'24", E174°32'55" and S21°59'13", E174°59'46"

Area (km²): 1,263.5

TABLE 213: Details of Site Rating OS5

Criteria	Details	Rating (out of 3)
Biophysical Justification	Predicted high benthic and pelagic species richness, high probability of cold water corals, tuna, seabird nesting site.	2
Geomorphic Features	Plateau, coral islet with deep drop off.	2
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice.	3
Obligations (See Appendix C)	Relevant taxa: <i>Sula leucogaster</i> ; <i>S. dactylatra</i> ; <i>S. sula</i> . <i>Megaptera novaeangliae</i>	3
Overall Rating		10

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a high overall rating of 10 (Table 213). This area includes a section of plateau rising from the very deep abyss (Map 107) at the eastern end of the New Hebrides Trench, immediately north of the southwest trench seamounts (site OS4)²⁰⁶. The plateau peaks in a small uninhabited sandy cay islet, more than 250 km from the nearest island of Kadavu. The islet is about 300 m long, rising only 1.8 m above sea level. At the last report there were two shipwrecks on the surrounding reef²⁰⁷.

The island is sometimes vegetated and sometimes stripped by storms. It is a nesting site for at least three species of seabirds, the brown booby, *Sula leucogaster*, the masked booby, *Sula dactylatra*, and the red-footed booby, *Sula spp*²⁰⁸. There is very little information on the marine life of Ceva-i-Ra reef, but it is on the migratory route of the humpback whales, *Megaptera novaeangliae*, between New Zealand and Tonga, and is a focus for tuna fishing (Amoe, 2007), so it is likely to attract other larger pelagic species.

Global habitat suitability modelling indicates that there is a high probability of finding cold water corals at this site (Yesson et al., 2012).

Modelling of species richness (www.aquamaps.org) indicates the area is likely to have high benthic and pelagic species richness (Kaschner et al., 2016).

SITE OE1: CENTRAL VITI CANYONS

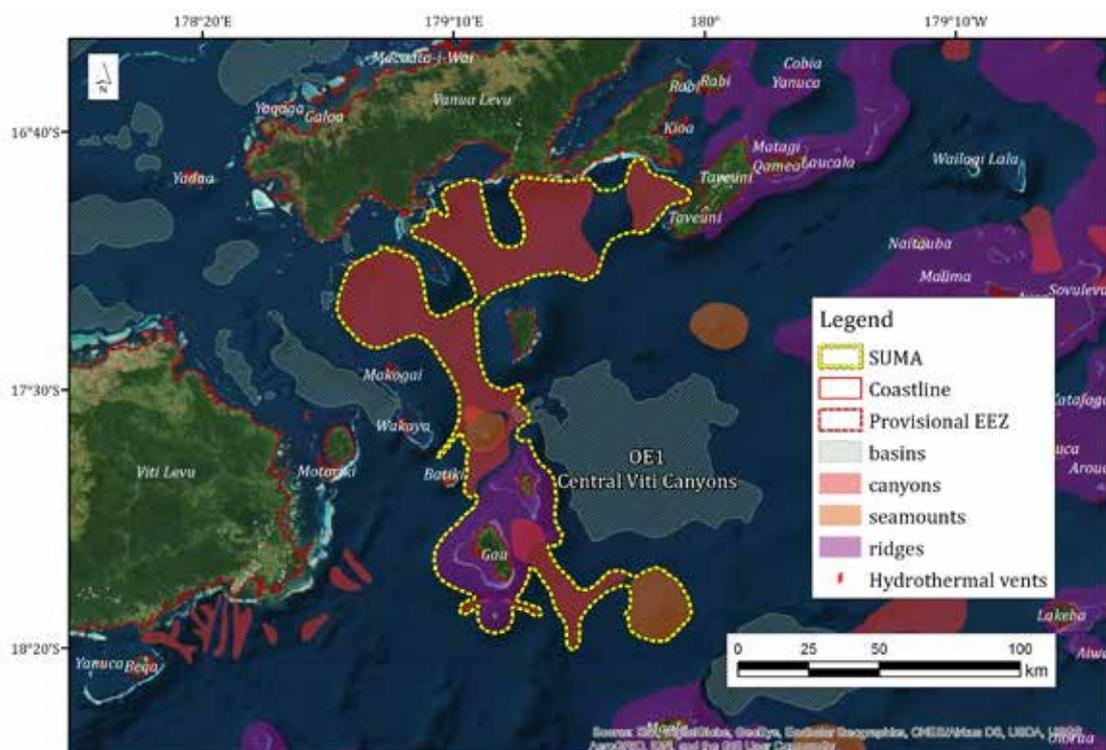
TABLE 214: Site description OE1

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
OE1	EBSA 14 and 22 FIME OP 09, 10, 11	Central Viti Canyons		11

²⁰⁶ ArcGIS Global Seafloor Geomorphic Features Map. <http://www.arcgis.com/home/webmap/viewer.html?webmap=342d8cbfac074a53afa5e49bd0c53773>

²⁰⁷ Conway Reef Expedition (2012) http://www.yt1ad.info/3d2c/about_3d2c.html

²⁰⁸ Fiji Conway Reef <http://www.qsl.net/ah6hy/fiji.html>



MAP 108: SITE OE1

Geographic coordinates: S16°45'12", E178°46'45" and S18°20'18", E179°58'3"

Area (km²): 6,777.7

TABLE 215: Details of Site Rating OE1

Criteria	Details	Rating (out of 3)
Biophysical Justification	Strong habitat connectivity, whales, dolphins, sharks, turtles, seabirds, soft corals, predicted high benthic and pelagic species richness, high probability of cold water corals.	3
Geomorphic Features	Islands, seamounts, canyons, channels, barrier and patch reefs.	3
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice.	3
Obligations (See Appendix C)	Relevant taxa: <i>Stenella longirostris</i> ; <i>Megaptera novaeangliae</i> ; Cheloniidae spp.	2
Overall Rating		11

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a high overall rating of 11 (Table 215). This area contains a series of Fiji's largest group of deep shelf incising canyons over 2,000 m deep (Map 108), between the two main islands of Fiji, interspersed with shelves and slopes, including seamounts and islands²⁰⁹. Two of the canyons flank Namena barrier reef, and the others focus currents and nutrients into the Vatu-i-Ra Passage (Site VIR1 – Vatu-i-Ra Island and reef, Site VIR2 – Vatu-i-Ra passage & Site VIR3 – Malakati (Moon) Reef and Cakau Davui), South Vanua Levu (Site SVN1 – Natewa Bay, Site SVN2 – Qaloqalo Salt Lake, Naweni, Site SVN3 – Yanuynu Island, Naweni & Site SVN4 – Kubulau and Namena) and the Somosomo Straits (Site T2 – Somosomo Straits).

The central and southern section of this site lies within the Vatu-i-Ra/Lomaiviti EBSA 14, and the eastern section within the Taveuni and Ringgold Islands EBSA 22 (SCBD, 2014).

The area has extremely high coral reef fish biomass (Obura and Mangubhai, 2002) and multiple globally significant

²⁰⁹ ArcGIS Global Seafloor Geomorphic Features Map. <http://www.arcgis.com/home/webmap/viewer.html?webmap=342d8cbfac074a53afa5e49bd0c53773>

seabird colonies. It is a migratory corridor and possibly a breeding ground for the Oceania humpback whale, *Megaptera novaeangliae*, sub-population and spinner dolphin, *Stenella longirostris*, pods (Miller et al., 2016).

The island, nearshore reefs, and passages contain important turtle nesting, foraging and migratory areas, a migratory route and aggregation site for scalloped hammerhead sharks, several manta ray cleaning stations, and a manta ray courting passage (WCS and MoF, 2017b).

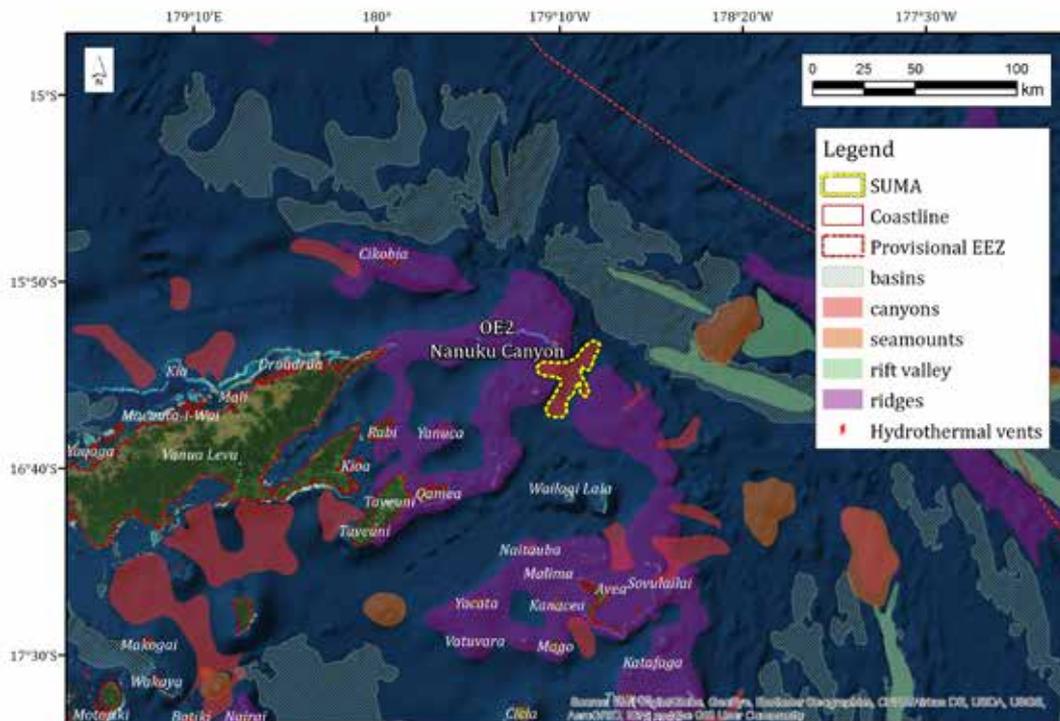
Modelling of species richness (www.aquamaps.org) indicates the area is likely to have high benthic and pelagic species richness (Kaschner et al., 2016).

Global habitat suitability modelling indicates that there is a high probability of finding cold water corals at this site (Yesson et al., 2012).

SITE OE2: NANUKU CANYON

TABLE 216: Site description OE2

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
OE2	EBSA 22 FIME OP4	Nanuku Canyon		9



MAP 109: SITE OE2

Geographic coordinates: S16°5'11", W179°15'26" and S16°25'40", W178°58'14"

Area (km²): 446.4

TABLE 217: Details of Site Rating OE2

Criteria	Details	Rating (out of 3)
Biophysical Justification	Predicted high benthic and pelagic species richness, high probability of cold water corals, whales, turtles, seabirds.	2
Geomorphic Features	Deepwater canyon.	2
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice.	3
Obligations (See Appendix C)	Relevant taxa: <i>Megaptera novaeangliae</i> ; Cheloniidae spp.	2
Overall Rating		9

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a medium overall rating of 9 (Table 217). This site lies within the Taveuni and Ringgold Islands EBSA 22, and contains a set of interlinked shelf incising canyons over 1,000 m deep lying between the ridges and slope of the northern end of the Nanuku Passage (Map 109) northeast of Taveuni Island²¹⁰.

The site is on a humpback whale, *Megaptera novaeangliae* migratory route (Miller et al., 2016), and is an open water foraging site for hawksbill and green turtles and seabirds²¹¹.

Global habitat suitability modelling indicates that there is a high probability of finding cold water corals at this site (Yesson et al., 2012).

Modelling of species richness (www.aquamaps.org) indicates the area is likely to have high benthic and pelagic species richness (Kaschner et al., 2016).

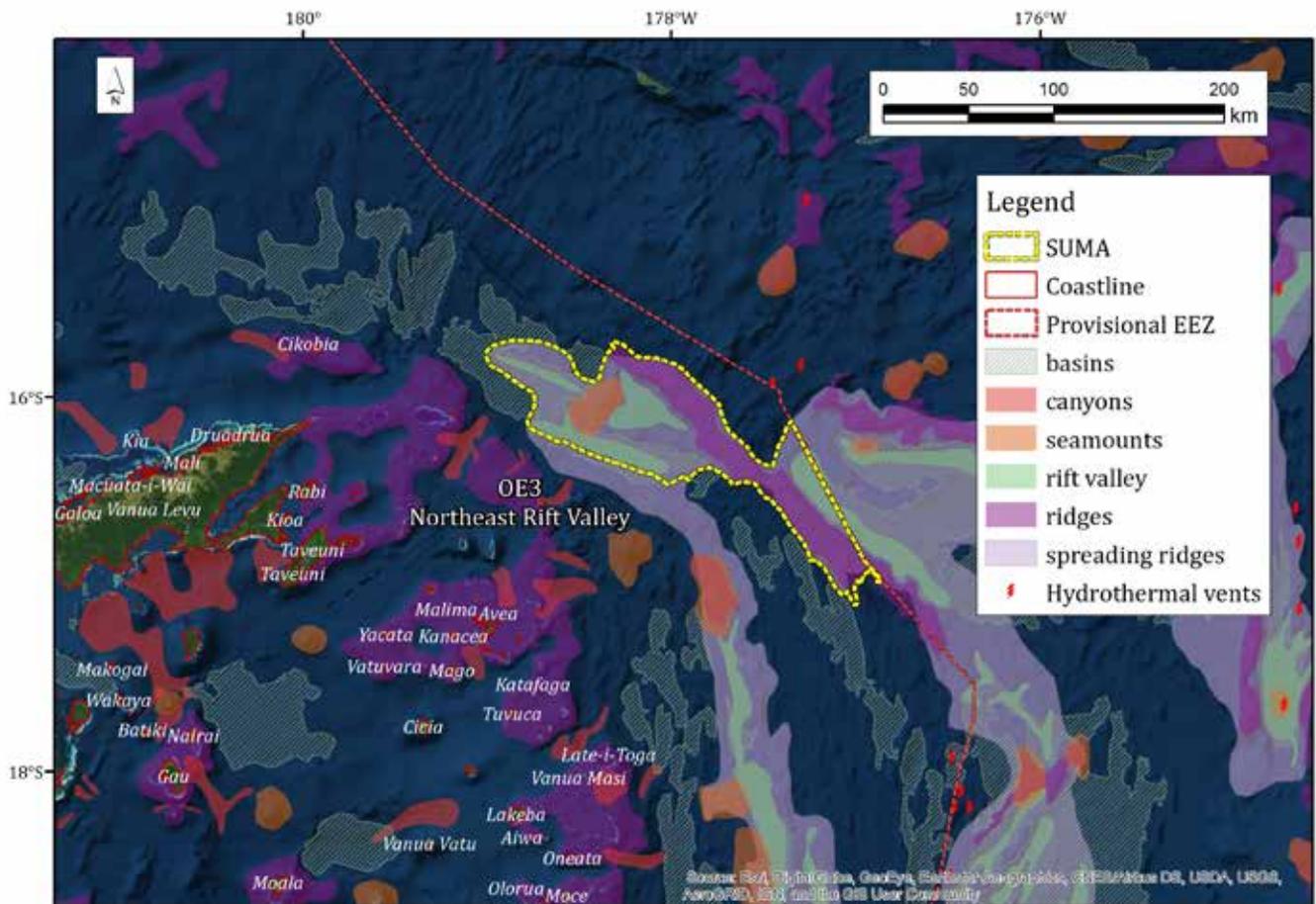
SITE OE3: NORTHEAST RIFT VALLEY

TABLE 218: Site Description OE3

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
OE3	FIME OP 14	Northeast Rift Valley		11

²¹⁰ ArcGIS Global Seafloor Geomorphic Features Map <http://www.arcgis.com/home/webmap/viewer.html?webmap=342d8cbfac074a53afa5e49bd0c53773>

²¹¹ A, Batibasaga, Fiji Ministry of Fisheries, pers. comm.



MAP 110: SITE OE3

Geographic coordinates: S15°40'56", W178°59'7" and S17°3'55", W176°48'13"

Area (km²): 10, 70.4

TABLE 219: Details of Site Rating OE3

Criteria	Details	Rating (out of 3)
Biophysical Justification	Predicted high benthic and pelagic species richness, high probability of cold water corals, upwelling, high biodiversity, whales, and turtles.	3
Geomorphic Features	Plateau, rift valley, ridge, seamount.	3
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice.	3
Obligations (See Appendix C)	Relevant taxa: <i>Megaptera novaeangliae</i> ; Cheloniidae spp.	2
Overall Rating		11

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a high overall rating of 11 (Table 219). This site, lying north of the Lau group of islands, contains a very large area of the North Fiji Basin over 2,500 m deep, a section of plateau with rift valleys, and a seamount²¹² (Map 110). The connectivity of these features, plus upwelling from the east, creates the probability of high productivity and pelagic species biodiversity.

²¹² ArcGIS Global Seafloor Geomorphic Features Map <http://www.arcgis.com/home/webmap/viewer.html?webmap=342d8bcfac074a53afa5e49bd0c53773>

The site is on a humpback whale, *Megaptera novaeangliae*, migratory route (Miller et al., 2016), and is a productive tuna area (Amoe, 2007).

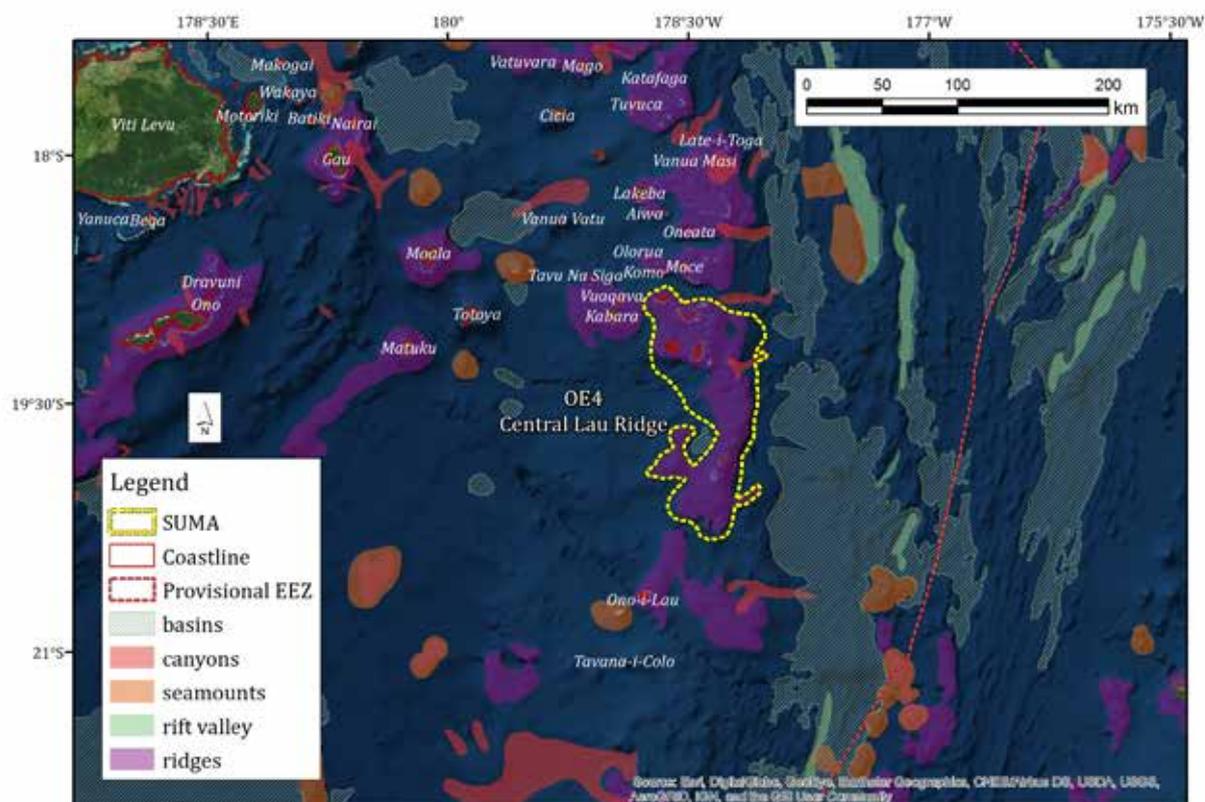
Global habitat suitability modelling indicates that there is a high probability of finding cold water corals at this site (Yesson et al., 2012).

Modelling of species richness (www.aquamaps.org) indicates the area is likely to have high benthic and pelagic species richness (Kaschner et al., 2016).

SITE OE4: CENTRAL LAU RIDGE

TABLE 220: Site description OE4

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
OE4	EBSA 5 FIME OP13	Central Lau Ridge		11



MAP 111: SITE OE4

Geographic coordinates: S18°46'29", W178°45'24" and S20°18'0", W177°58'38"

Area (km²): 8,274.7

TABLE 221: Details of Site Rating OE4

Criteria	Details	Rating (out of 3)
Biophysical Justification	Predicted high benthic and pelagic species richness, high probability of cold water corals, upwelling, high biodiversity, deep sea squid and pelagic fish, whales, turtles, seabirds.	3
Geomorphic Features	Ridge, slope, canyon.	2
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice.	3
Obligations (See Appendix C)	Relevant taxa: <i>Thunnus albacares</i> ; <i>Acanthocybium solandri</i> ; <i>Megaptera novaeangliae</i> ; <i>Chelonia mydas</i> ; <i>Eretmochelys imbricata</i> ; <i>Tridacna tevoroa</i> .	3
Overall Rating		11

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a high overall rating of 11 (Table 221). This site, within the Kadavu and Southern Lau EBSA, contains part of the Lau Ridge (Map 111), the northern end of a large ridge system extending south to New Zealand via the Colville Ridge (Segev et al., 2012). The site extends over 130 km from Moce Island in the north to Vatoa Island in the south, sloping to deep abyss, with a canyon in the north east side which is over 1,500 m deep²¹³.

There are several small inhabited and uninhabited limestone islands and shallow reef systems along the ridge, and the connectivity between these deep water features creates upwelling that support rich marine life. It is the main subsistence fishing grounds for nearby island communities.

The deep waters support diamond squid, *Thysanoteuthis rhombus*, and pelagic fish such as yellowfin tuna, *Thunnus albacares*, and wahoo, *Acanthocybium solandri*²¹⁴. The site is on a humpback whale, *Megaptera novaeangliae*, migratory route (Miller et al., 2016).

The shallow reefs and islands are the location of the endemic giant clam, *Tridacna tevoroa*, green, *Chelonia mydas*, and hawksbill, *Eretmochelys imbricata*, turtles and seabird nesting and foraging grounds²¹⁵.

Global habitat suitability modelling indicates that there is a high probability of finding cold water corals at this site (Yesson et al., 2012).

Modelling of species richness (www.aquamaps.org) indicates the area is likely to have high benthic and pelagic species richness (Kaschner et al., 2016).

SITE OE5: CENTRAL LAU SEAMOUNT

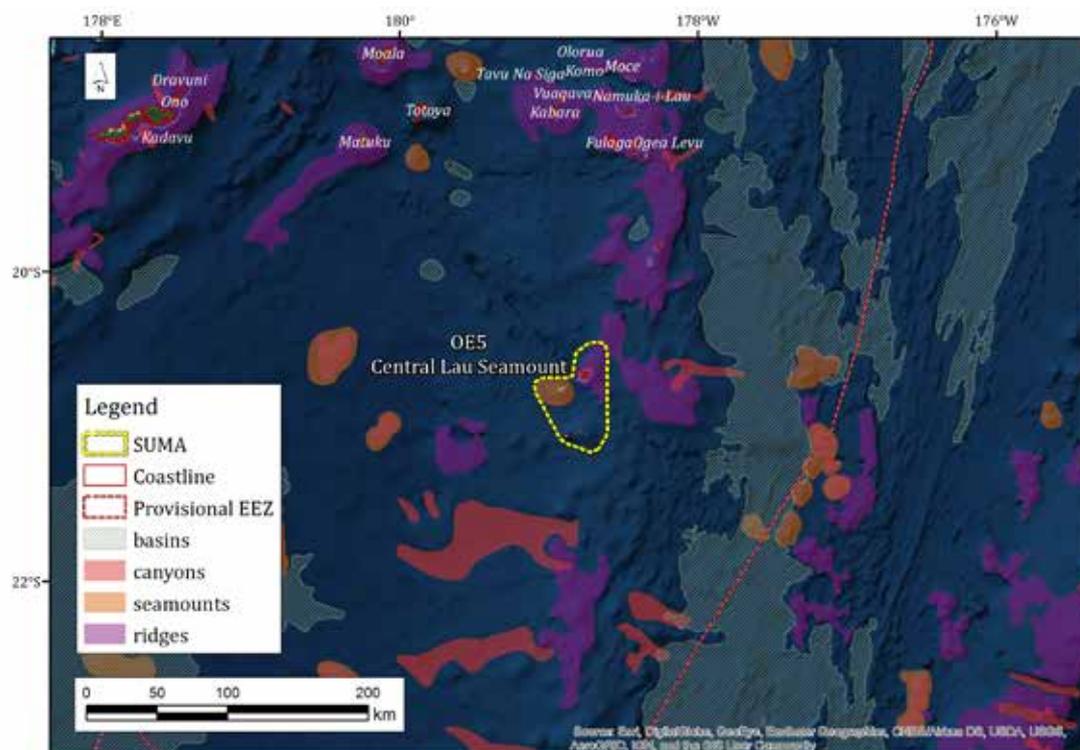
TABLE 222: Site description OE5

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
OE5	EBSA 5 FIME OP12	Central Lau Seamount		10

²¹³ ArcGIS Global Seafloor Geomorphic Features Map. <http://www.arcgis.com/home/webmap/viewer.html?webmap=342d8cbfac074a53afa5e49bd0c53773>

²¹⁴ A. Batibasaga, Fiji Ministry of Fisheries, pers. comm., 19.07.2016

²¹⁵ E. Rupeni, pers. comm., 19.07.2016



MAP 112: SITE OE5

Geographic coordinates: S20°26'8", W179°4'2" and S21°8'58", W178°34'0"

Area (km²): 2,640.9

TABLE 223: Details of Site Rating OE5

Criteria	Details	Rating (out of 3)
Biophysical Justification	Predicted high benthic and pelagic species richness, high probability of cold water corals, upwelling, high biodiversity, deep sea squid and pelagic fish, whales, dolphins, turtles, seabirds.	3
Geomorphic Features	Ridge, slope, seamount.	2
Source Number and Type	More than one good report and expert advice available.	2
Obligations (See Appendix C)	Relevant taxa: <i>Caranx lugubris</i> ; <i>Tridacna maxima</i> ; <i>Charonia tritonis</i> , <i>Thunnus albacares</i> ; <i>Acanthocybium solandri</i> ; <i>Megaptera novaeangliae</i> ; <i>Chelonia mydas</i> ; <i>Eretmochelys imbricata</i> ; <i>Tridacna tevoroa</i> .	3
Overall Rating		10

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a high overall rating of 10 (Table 223). This site within the Kadavu and Southern Lau EBSA, includes an area of deep abyss, a section of the Lau Ridge that rises to the surface as Ono-i-Lau Island, and a seamount, Vuata Ono, rising from 1,500 m deep to 2 m of the surface (Map 112), approximately 14 km south east of Ono-i-Lau. It also encompasses Tuvana-i-Colo and Tuvana-i-Ra islands²¹⁶.

The deep waters support fish benthic species biodiversity and pelagic fish such as barracuda, yellowfin tuna, *Thunnus albacares*, wahoo, *Acanthocybium solandri*, and black trevally, *Caranx lugubris*, as well as several species of dolphin²¹⁷.

The shallow reefs and islands are the location of the endemic giant clam, *Tridacna tevoroa*, green turtle, *Chelonia mydas*,

²¹⁶ ArcGIS Global Seafloor Geomorphic Features Map. <http://www.arcgis.com/home/webmap/viewer.html?webmap=342d8cbfac074a53afa5e49bd0c53773>

²¹⁷ A. Batibasaga, Fiji Ministry of Fisheries, pers. comm., 19.07.2016

and hawksbill, *Eretmochelys imbricata*, turtles and seabird nesting and foraging grounds²¹⁸. The shallower reefs systems also support giant grouper and other apex predatory fish species, as well as rich invertebrate populations, including many bivalves, in particular, *Tridacna maxima*, not commonly seen in Fiji waters, triton's trumpet shell, *Charonia tritonis*, and lobsters (Fiji Fisheries Department, 2008).

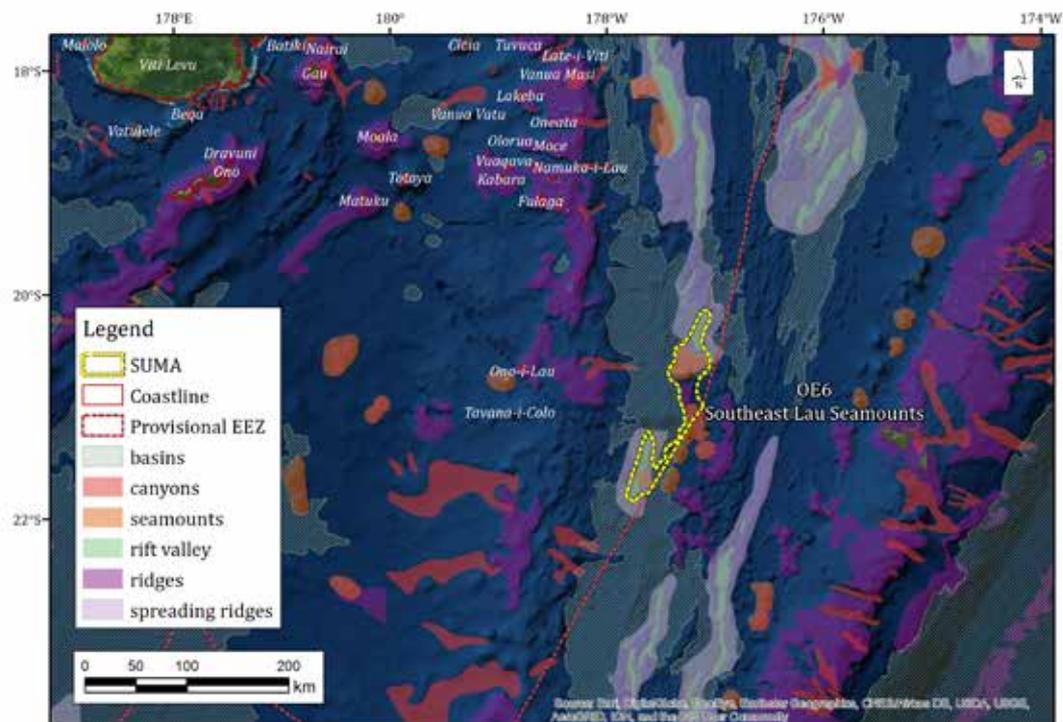
Global habitat suitability modelling indicates that there is a high probability of finding cold water corals at this site (Yesson et al., 2012).

Modelling of species richness (www.aquamaps.org) indicates the area is likely to have high benthic and pelagic species richness (Kaschner et al., 2016).

SITE OE6: SOUTHEAST LAU SEAMOUNTS

TABLE 224: Site description OE6

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
OE6	EBSA 5 FIME OP6	Southeast Lau Seamounts		8



MAP 113: SITE OE6

Geographic coordinates: S20°5'43", W177°43'43" and S21°47'50", W176°42'21"

Area (km²): 7,575.5

²¹⁸ E. Rupeni, pers. comm.

TABLE 225: Details of Site Rating OE6

Criteria	Details	Rating (out of 3)
Biophysical Justification	Seamounts, upwelling, predicted high pelagic species richness.	2
Geomorphic Features	Seamounts, rift valley, ridges, canyons.	3
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice.	3
Obligations (See Appendix C)	No obligations registered.	0
Overall Rating		8

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a medium overall rating of 8 (Table 225). This site is on the eastern boundary of Fiji's EEZ, approximately equidistant between Ono-i-Lau and Tongatapu Islands. It is an area of spreading ridges and rift valleys with an unusual association of seamounts (Map 113) rising from a floor over 2,500 m deep²¹⁹, creating a connected deep water system that causes upwelling of nutrients and rich marine life biodiversity. There is little firm information available about the marine life of this area, but the connectivity between spreading ridge/rift valley geomorphology and so many seamounts in such a remote area argues that this is likely to be an important site, about which more needs to be known.

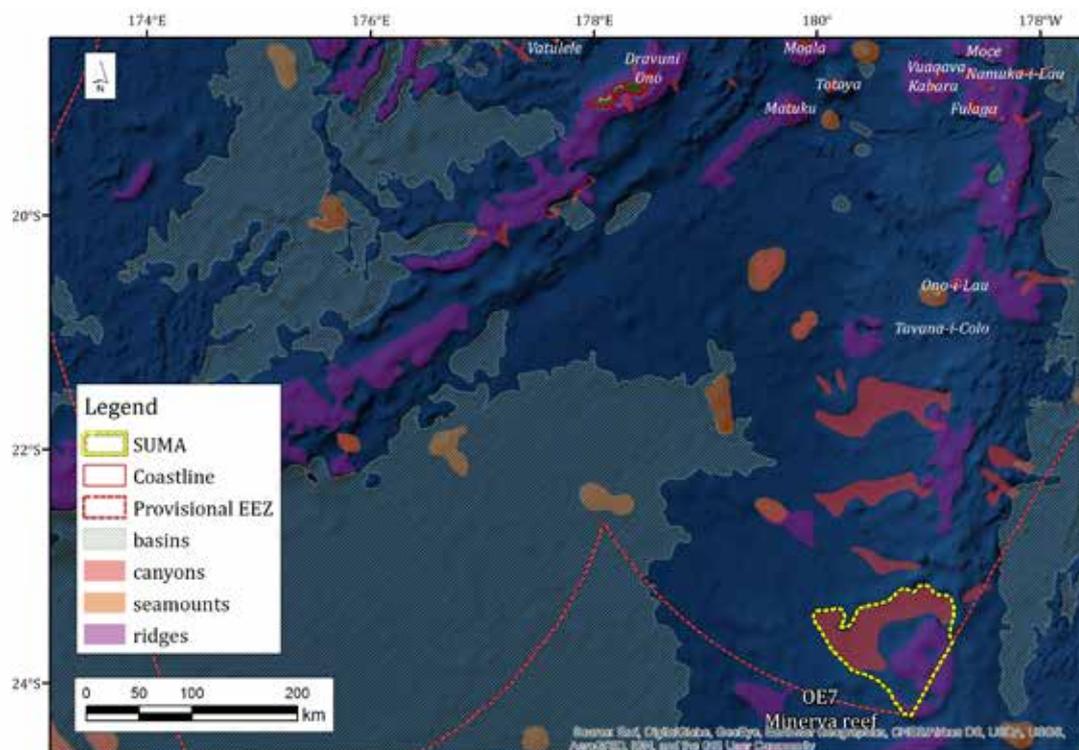
Modelling of species richness (www.aquamaps.org) indicates the area is likely to have high pelagic species richness (Kaschner et al., 2016).

SITE OE7: MINERVA REEF

TABLE 226: Site description OE7

Site Code	Linked Report Code	Site Name	Locator Map	Overall Rating
OE7	EBSA 5 FIME OP 6	Minerva Reef		9

²¹⁹ ArcGIS Global Seafloor Geomorphic Features Map. <http://www.arcgis.com/home/webmap/viewer.html?webmap=342d8cbfac074a53afa5e49bd0c53773>



MAP 114: SITE OE7

Geographic coordinates: S23°15'11", W179°59'31" and S24°24'42", W178°40'47"

Area (km²): 10,316.3

TABLE 227: Details of Site Rating OE7

Criteria	Details	Rating (out of 3)
Biophysical Justification	Seamount to reef connectivity, potentially high biodiversity, likely to have high diversity of benthic species, and a strong likelihood of deep water corals.	3
Geomorphic Features	Two coral reefs on a seamount, ridge and canyon.	3
Source Number and Type	At least one peer reviewed paper and at least one good report and expert advice.	3
Obligations (See Appendix C)	No obligations registered.	0
Overall Rating		9

DETAILED DESCRIPTION OF HABITAT / FEATURE

This site has a medium overall rating of 9 (Table 227). This site is on the south eastern boundary of Fiji's EEZ, more than 580 km south of Suva on the large island of Viti Levu. The site is found within the *Kadavu and the Southern Lau EBSA 5*, and is made up of abyssal hills with a ridge, escarpment and one of Fiji's largest canyons (Map 114) almost 2,000 m deep²²⁰. Two atoll reefs on top of the seamount were artificially filled in to create a small sand bar in a flat lagoon, which is a focus for passing yachts and reputed to have good fishing and diving²²¹.

The coral reef atolls that are 27 km apart and they are completely submerged during high tide. North Minerva Reef has a circular lagoon about 5km in diameter with a single, deep pass on the western side. South Minerva Reef is about 12 x 5 km and is separated into two lagoon sections without any deep passes. Lagoons of both islands have sandy bottoms

²²⁰ ArcGIS Global Seafloor Geomorphic Features Map. <http://www.arcgis.com/home/webmap/viewer.html?webmap=342d8cbfac074a53afa5e49bd0c53773>

²²¹ Underwater images of North Minerva reef (2009).http://www.52hertz.com/pictures/minerva_reef/

that reach up to about 25m deep and have many small patch reefs. Coral cover on the steep outer reef is at high density, whereas lagoon patch reefs have very variable coral cover. Large pelagic species are often sighted but frequent fishing has reduced large, reef-associated fishes to very low numbers²²².

There is little firm information available about the marine life of this area, but the connectivity between the deep canyon and the shallow reef atolls in such a remote area argues that this is likely to be an important site, about which more needs to be known.

Global habitat suitability modelling indicates that there is a high probability of finding cold water corals at this site (Yesson et al., 2012).

Modelling of species richness (www.aquamaps.org) indicates the area is likely to have high benthic species richness (Kaschner et al., 2016).

²²² T. Trnski, Auckland War Memorial Museum, pers comm., 21.11.2017

5. DISCUSSION

Enclosed by the expanse of the Pacific Ocean, Fiji's ocean supports a large biodiversity of marine life, much of which is still undocumented. The resources of both the nearshore and offshore marine environments are vital to the well-being and prosperity of the country and its people, and the sustainable management and conservation of these resources is in the interests of all that depend on them.

Fiji has an estimated area of 4550 km² of coral reefs surrounding over 320 islands and more than 500 islets and cays, in the form of fringing, line, patch, atoll, and barrier reefs (Mangubhai et al., in press). Extensive mangrove, seagrass and salt marsh habitats remain in good condition along more remote shores and river estuaries. Deepwater habitats include trenches, basins, canyons, seamounts, rift valleys, ridges, plateaus, spreading ridges, and hydrothermal vents (IHO, 2008).

In total, 98 sites were identified by the expert workshop as Special, Unique Marine Areas (SUMAs) and were given scores between 5 and 12 (Table 231). This large number of sites reflects the variety of marine habitats within the Fiji Islands, reefs, and surrounding oceans. Much of this information has been published in formal papers and reports, but there is also a great vein of local knowledge held by the traditional resource owners. The MACBIO Project would also like to acknowledge the initial prioritisation processes outlined in section 3.3 without which this report would not have been as thorough.

This scoring system is mainly subjective, albeit systematic, and is designed primarily to use as a guide for planning purposes. The final score for each site reflects the amount and type of knowledge available for that site, as well as the attributes of the site; lower-scoring sites may benefit from ground-truthing before definitive decisions are made about their protection or management. Because the highest scoring sites have a more robust information base, these areas can be prioritised with greater confidence during conservation or management planning across all sectors. However, the scoring system is based upon information available at the time of writing and, as more information is gathered or as time goes on, the "real" score of any site may change.

A number of sites both inshore and offshore received the highest score of 12. This was the result of a combination of factors: they were geographically clearly defined, there was high-quality information directly relevant to the site, and the attributes of the sites were clearly special. Some of these high-scoring sites have already been recognised for their special attributes through various forms of increased protection and management; the Vatu-i-Ra Seascape and Namena Marine Reserve.

Low-scoring sites, such as Malamala Island in the Mamanuca Islands and Matuku in the Lau Islands were those that had been selected for a single specific organism or attribute, or those for which very little information was available. This indicates that both high and low scores are useful for management; while high-scoring sites can be prioritised with confidence, lower-scoring sites can be highlighted for needing more research or requiring protection for the purposes of ecosystem recovery, or even restoration efforts.

As ever, more information is needed. There are many areas of Fiji on which there is little firm data. In particular, there is a need for more investigation of the offshore, deepwater habitats. As more studies are done, it is anticipated that the list of biodiversity of the Fiji Islands will grow, and the importance of the marine habitats become even stronger.

Future scoring systems could, more explicitly, take into account levels of human use or impact, as this affects the intrinsic ecological value of a habitat, assemblage, population or ecosystem. This intrinsic ecological value is embedded within the ability of the system to function in a balanced and sustainable manner. This includes elements of assemblage structure and diversity, nutrient cycling, trophic linkages and the abundance of keystone species. Sometimes a single species can indicate that these processes are likely to be intact. However, in the absence of existing information, only ground-truthing can confirm the special, unique nature of a site.

The identification and scoring of special, unique marine areas can guide the next steps in creating a system of marine protected areas for Fiji, as well as providing a baseline of information for other management measures or Environmental Impact Assessments that may be necessary in the future at these locations. The identified sites all scored at least 5 points or above, which is not surprising, given that they all contain features that somehow distinguish them as unique or special, and all are sites / features subject to obligations at national or international level. Sites with higher scores can be seen as priority sites at a national level, while those scoring lower should be flagged for further research.

5.1 SUMMARY OF SITES BY GEOGRAPHIC CLUSTER

Sites were clustered into regions of similar character and geographic location. A number of sites within each region were identified as Special, Unique Marine Areas (SUMAs) (Table 228).

TABLE 228: Number of sites in each geographic cluster

Geographic Cluster	Number of sites
Yasawa Islands	4
Mamanuca Islands	7
South Viti Levu (Beqa, Vatulele, Kadavu)	5
North Viti Levu	7
West Viti Levu	7
East Viti Levu	8
Vatu-i-Ra	3
Lomaiviti	8
North Vanua Levu	3
South Vanua Levu	4
Taveuni and Ringgold Islands	4
Lau	16
Remote Offshore (Rotuma and Conway)	2
Deep Water / Open Ocean North of Fiji	4
Deep Water / Open Ocean West of Fiji	4
Deep Water / Open Ocean South of Fiji	5
Deep Water / Open Ocean East of Fiji	7
Total number of SUMA sites	98

5.2 PRIORITISATION BY GEOGRAPHIC CLUSTER

It should be noted that in Lau and Deepwater clusters, the overall score is lowered by lack of firm information sources.

TABLE 229: Site ratings within geographic clusters

Geographic Cluster	Site Code	Biophysical	Geographic	Source	Obligations	Overall score (1-12)
Yasawas	Y1	3	2	2	3	10
	Y2	3	2	3	3	11
	Y3	2	2	1	2	7
	Y4	2	3	1	3	9
Mamanucas	M1	1	2	2	2	7
	M2	1	2	1	1	5
	M3	2	3	2	2	9
	M4	1	3	2	2	8
	M5	1	2	1	1	5
	M6	2	2	2	2	8
	M7	3	2	3	3	11
South Viti Levu	SVT1	3	3	3	3	12
	SVT2	3	2	3	3	11
	SVT3	2	3	3	3	11
	SVT4	3	2	3	3	11
	SVT5	3	2	2	2	9
North Viti Levu	NVT1	2	2	2	3	9
	NVT2	3	2	2	2	9
	NVT3	3	3	2	3	11
	NVT4	3	3	2	2	10
	NVT5	3	3	2	3	11
	NVT6	2	1	3	3	9
	NVT7	3	2	2	3	10
West Viti Levu	WVT1	3	2	3	3	11
	WVT2	2	3	3	1	9
	WVT3	1	1	3	2	7
	WVT4	3	2	3	2	10
	WVT5	2	3	3	2	10
	WVT6	3	2	3	3	11
	WVT7	3	2	3	2	10
East Viti Levu	EVT1	3	2	2	3	10
	EVT2	2	2	3	3	10
	EVT3	3	2	2	3	10
	EVT4	3	3	3	3	12
	EVT5	2	2	3	1	8
	EVT6	3	2	3	1	9
	EVT7	2	2	3	0	7
	EVT8	3	2	3	2	10
Vatu-i-Ra Passage	VIR1	3	3	3	3	12
	VIR2	3	2	3	3	11
	VIR3	3	3	3	3	12
Lomaiviti	LV1	2	1	3	2	8
	LV2	3	3	3	3	12
	LV3	3	3	3	3	12
	LV4	1	2	2	2	7
	LV5	3	3	3	3	12
	LV6	3	2	3	2	10
	LV7	2	2	3	1	8
	LV8	3	2	3	3	11

Geographic Cluster	Site Code	Biophysical	Geographic	Source	Obligations	Overall score (1-12)
North Vanua Levu	NVN1	3	2	3	3	11
	NVN2	3	2	3	3	11
	NVN3	2	2	2	3	9
South Vanua Levu	SVN1	2	2	3	3	10
	SVN2	2	2	1	3	8
	SVN3	1	2	3	2	8
	SVN4	3	3	3	3	12
Taveuni and the Ringgold Islands	T1	3	2	3	3	11
	T2	3	2	3	3	11
	T3	3	2	3	2	10
	T4	3	3	2	3	11
Lau	L1	3	1	2	3	9
	L2	3	2	2	3	10
	L3	3	1	2	2	8
	L4	3	1	2	3	9
	L5	3	1	2	2	8
	L6	3	2	2	3	10
	L7	3	2	2	3	10
	L8	3	2	2	2	9
	L9	3	2	2	2	9
	L10	3	2	2	2	9
	L11	3	2	2	1	8
	L12	3	2	2	0	7
	L13	3	2	2	3	10
	L14	3	2	2	2	9
	L15	3	2	2	2	9
	L16	3	2	2	3	10
Remote Offshore	RO1	3	2	3	3	11
	RO2	2	3	2	3	10
Deep Water (Open Ocean)						
North of Fiji	ON1	3	3	3	3	12
	ON2	3	3	3	3	12
	ON3	3	2	3	3	11
	ON4	3	3	3	3	12
West of Fiji	OW1	3	2	3	0	8
	OW2	3	3	3	0	9
	OW3	3	3	3	0	9
	OW4	3	2	3	0	8
South of Fiji	OS1	2	3	3	0	8
	OS2	3	2	3	3	11
	OS3	2	2	3	0	7
	OS4	2	3	3	0	8
	OS5	2	2	3	3	10
East of Fiji	OE1	3	3	3	2	11
	OE2	2	2	3	2	9
	OE3	3	3	3	2	11
	OE4	3	2	3	3	11
	OE5	3	2	2	3	10
	OE6	2	3	3	0	8
	OE7	3	3	3	0	9

6. REFERENCES

- Allen, G.R., Randall, J.E., 2005. A new species of damselfish (Pomacentrus: Pomacentridae) from Fiji. *Aqua, Journal of Ichthyology and Aquatic Biology* 10, 95-1-1.
- Allen, M.S., Ladefoged, T.N., Wall, J.J., 2001. Traditional Rotuman fishing in temporal and regional context. *International Journal of Osteoarchaeology* 11, 56-71. doi:10.1002/oa.546
- Amandine, D.M., Miller, C., Cawich, C., Piovano, S., Rico, C., 2017. Empirical evidence identifies the Rewa Delta as critical nursery habitat for scalloped hammerhead sharks (*Sphyrna lewini*) in the South Pacific. In press.
- Amoe, J., 2007. Fiji's Tuna Fisheries, WCPFC – SC 3 in Honolulu, Hawaii on August 2007. Fisheries Department, Ministry of Agriculture, Fisheries and Forests, Suva, Fiji.
- Anderson, A., Clark, G., 1999. The age of Lapita settlement in Fiji. *Archaeology in Oceania* 34, 31-39. doi:10.1002/j.1834-4453.1999.tb00424.x
- Baker, E., Beaudoin, Y., 2013. Deep Sea Minerals: Cobalt-rich Ferromanganese Crusts, a physical, biological, environmental, and technical review. Vol. 1C. Secretariat of the Pacific Community.
- Batibasaga, A., Korovulavula, J., 1997. Fisheries Impact Assessment, Vulani Island Resort Mangrove Reclamation (No. Fisheries Research Resort No.3).
- Bell, G. (n.d). Rainbow Revisted – Taveuni Fiji Sport diving Magazine. Accessed 10.10.2016, http://www.oceanwideimages.com/Fiji_GaryBell.asp.
- Beqa Lagoon Resort. Fiji Islands (2012). Accessed 10.10.2016, <http://www.beqalagoonresort.com/fishing>
- Bird Life International (2013). NatureFiji- MaqeretiViti welcome BirdLife Fiji Staff. Accessed 10.10.2016, <http://www.birdlife.org/pacific/news/naturefiji-mareqetiviti-welcome-birdlife-fiji-staff>
- BirdLife International (2017). Important Bird Areas factsheet: Vatu-i-Ra. Accessed 10.10.2016, <http://datazone.birdlife.org/site/factsheet/vatu-i-ra-iba-fiji>
- BirdLife International (2017). Important Bird Areas factsheets: Namenalala. Accessed 10.10.2016, <http://datazone.birdlife.org/site/factsheet/namenalala-iba-fiji/details>
- BirdLife International (2017). Important Bird Areas facesheet: Ringgold Islands. Accessed 10.10.2016, <http://datazone.birdlife.org/site/factsheet/ringgold-islands-marine-iba-fiji>
- Birdlife International (2017). Important Bird Areas factsheets: Northern Lau Marine. Accessed 10.10.2016, <http://datazone.birdlife.org/site/factsheet/northern-lau-marine-iba-fiji>
- Bite Me GameFishing Charters (2017). Archives for Species. Accessed 10.10.2016, <http://gamefishingfiji.com/category/fish-species-fiji/>
- Bite Me Gamefishing Charters (2017). Accessed 10.10.2016, <http://gamefishingfiji.com/fish-species-fiji/>
- Blue Habitats (n.d). Continental Shelf. Accessed 10.10.2016, http://www.bluehabitats.org/?page_id=1660
- Blue Habitats (n.d). Continental Slope. Accessed 10.10.2016, http://www.bluehabitats.org/?page_id=1662
- Bluhm, H., 2001. Re-establishment of an abyssal megabenthic community after experimental physical disturbance of the sea floor. *Deep Sea Res. Part Oceanogr. Res. Pap.* 48, 3841-3868.
- Bonito, V., Simpson, R., Waqairagata, F., 2012. Evaluating the performance of LMMAs in the districts of Korolevu-I-Wai, Dawasamu, and Nakorotubu (Technical Report). Reef Explorer Fiji Ltd, University of the South Pacific's Institute of Applied Science.
- Bruckner, A. W., Dempsey, A. C., Coward, G., Saul, S., Rauer, E. M., Heemsoth, A. (2016) Global Reef Expedition: Lau Province, Fiji. Final Report. Khaled bin Sultan Living Oceans Foundation, Annapolis, MD. 113p.
- Bryan, E.H.J., 1953. Checklist of Atolls (No. No. 19). Pacific Science Board, National Academy of Sciences, National Research Council, Washington, DC.
- Bryant, D., Burke, L., McManus, J., Spalding, M., 1998. Reefs at Risk: A Map-Based Indicator of Threats to the World's Coral Reefs. World Resources Institute (WRI), International Center for Living Aquatic Resources Management (ICLARM), World Conservation Monitoring Centre (WCMC), United Nations Environment Programme (UNEP).
- Cambridge Dictionary. Meaning of atoll in the English Dictionary. Accessed 10.10.2016, <http://dictionary.cambridge.org/dictionary/english/atoll>
- Cardenosa, D., Glaus, K.B.J., Brunnschweiler, J.M., 2016. Occurrence of juvenile bull sharks (*Carcharhinus leucas*) in the Navua River in Fiji. *Marine and Freshwater Research*. doi:10.1071/MF16005

- Ceccarelli M., Wendt H., Matoto A.L., Fonua E. and Fernandes L. (2017) Biophysically special, unique marine areas of Tonga. MACBIO (GIZ, IUCN, SPREP), Suva.
- Choy, S.C., 1991. The atyid shrimps of Fiji with description of a new species. *Zoologische Mededelingen* 56, 343–362.
- Clark, M., Rowden A., Schlacher T., Williams A., Consalvey M., Stocks K.I., Rogers A.D., O'Hara T.D., White M., Shank T.M., Hall-Spencer J.M., 2010. The Ecology of Seamounts: Structure, Function, and Human Impacts. *Ann. Rev. Mar. Sci.* 2, 253–278 (2010)
- Clark, M.R., Watling, L., Rowden, A.A., Guinotte, J.M., Smith, C.R., 2011. A global seamount classification to aid the scientific design of marine protected area networks. *Ocean Coast. Manag.* 54, 19–36. doi:10.1016/j.ocecoaman.2010.10.006
- Collette, B., Acero, A., Amorim, A.F., Boustany, A., Canales Ramirez, C., Cardenas, G., Carpenter, K.E., de Oliveira Leite Jr, N., Di Natale, A., Die, D., Fox, W., Fredou, F.L., Graves, J., Guzman-Mora, A., Viera Hazin, F.H., Hinton, M., Juan Jorda, M., Minte Vera, C., Miyabe, N., Montano Cruz, R., Nelson, R., Oxenford, H., Restrepo, V., Salas, E., Schaefer, K., Schratwieser, J., Serra, R., Sun, C., Teixeira Lessa, R.P., Pires Ferreira Travassos, P.E., Uozumi, Y., Yanez, E., 2011. Makaira nigricans. The IUCN Red List of Threatened Species 2011: e.T170314A6743776. IUCN. doi:10.2305/IUCN.UK.2011-2.RLTS.T170314A6743776.en
- Comley, J., Harding, S., Barnard, N., Hine, A., Raines, P., 2003. Fiji Coral Reef Conservation Project – 1st Annual Report. Coral Cay Conservation Ltd.
- Conway Reef DX- Pedition (2012). Conway Reef. Accessed 10.10.2016, http://www.yt1ad.info/3d2c/about_3d2c.html
- Coral Reef Watch (n.d). NOAA Coral Reef Watch Melanesia Coral bleaching Data Products. Accessed 10.10.2016, https://coralreefwatch.noaa.gov/satellite/vs/melanesia.php#Beqa_Fiji
- Cribb, N., Miller, C., Seuront, L., 2012. Site fidelity and behaviour of spinner dolphins (*Stenella longirostris*) in Moon Reef, Fiji Islands: implications for conservation. *Journal of the Marine Biological Association of the United Kingdom* 92, 1793–1798. doi:10.1017/S0025315412000033
- CSIRO, 2008. Reports from an expedition. <http://www.cmar.csiro.au/publications/facts/anfc/anfc.html#> Accessed 11 Jan 2017.
- Dautei, R. University of the South Pacific, in prep
- Davis, M.T., Newell, P.F., Quinn, N.J., 1998. An urban women's subsistence fishery off Suva Peninsula, Fiji: potential threats and public health consideration, in: Seeto, J., Bulai, N. (Eds.), *Papers Presented at Symposium 8th Pacific Science Inter-Congress*. University of the South Pacific, Fiji.
- De Leo, F.C., Smith, C.R., Rowden, A.A., Bowden, D.A., Clark, M.R., 2010. Submarine canyons: hotspots of benthic biomass and productivity in the deep sea. *Proc. R. Soc. B Biol. Sci.* 277, 2783–2792.
- Dive site Directory (2008). Accessed 10.10.2016, http://www.divesitedirectory.co.uk/dive_site_fiji_mamanuca_reef_big_w.html
- Dive Operators (2017). Accessed 10.10.2016, <http://www.thebarefootcollection.com/manta-island/manta-rays.htm>
- Dive Somosomo, Diving in Taveuni, Dive the World. Accessed 10.10.2016, <http://www.dive-the-world.com/diving-sites-fiji-taveuni.php>, and Bell, G. *Rainbow Revisited, Taveuni*. *Sportdiving Magazine*: www.oceanwideimages.com/Fiji_GaryBell.asp
- Dive the World. Live board charters in Fiji. Accessed 10.10.2016, <http://liveboards.dive-the-world.com/liveboards-fiji.php>
- Dive worldwide. (2017). Accessed 10.10.2016, <http://www.diveworldwide.com/locations/mamanuca-yasawa-islands>
- Dolphin trip to Natewa Bay (n.d.). Accessed 10.10.2016, <http://dakuresort.com/tag/natewa-bay/> and <http://www.saltlakelodgefiji.com/thingstodo.html>
- Dupouy, C., 1981. Satellite image in the infra-red spectrum showing the Fiji Islands and reefs.
- Earle, J., Whitton, R. and Pyle, R. (2010). Shark Reef Marine Reserve (SRMR) Fish List. Accessed 10.10.2016, <http://fijisharkdive.com/conservation/shark-reef-fish-list/>
- Eldredge, L.G., 1996. *Birgus latro*. The IUCN Red List of Threatened Species 1996: e.T2811A9484078. IUCN. doi:10.2305/IUCN.UK.1996.RLTS.T2811A9484078.en
- Endangered and Protected Species Act 2002, Fiji.
- Endangered and Protected Species (Amendment) Act 2017, No.10, Fiji.
- Environment Australia. 2003. Australia's South-east Marine Region: A User's Guide to Identifying Candidate Areas for a Regional Representative System of Marine Protected Areas. Commonwealth of Australia.
- Fernandes, L., Dobbs, K., Day, J., Slegers, S., 2010. Identifying biologically and physically special or unique sites for inclusion in the protected area design for the Great Barrier Reef Marine Park. *Ocean & Coastal Management* 53, 80–88. doi:10.1016/j.ocecoaman.2009.12.003
- Feussner, K.-D., Ragini, K., Kumar, R., Soapi, K.M., Aalbersberg, W.G., Harper, M.K., Carte, B., Ireland, C.M., 2012. Investigations of the marine flora and fauna of the Fiji Islands. *Natural Product Reports* 29, 1424. doi:10.1039/c2np20055d

- Fiji Bureau of Statistics (n.d). Census 2007 General Tables. Accessed 10.10.2016, <http://www.statsfiji.gov.fj/index.php/2007-census-of-population>
- Fiji Bureau of Statistics, 2016. Provisional Hotels & Tourist Accommodation – Quarter 3 (No. Release No. 97).
- Fiji Conway Reef (n.d). Accessed 10.10.2016, <http://www.qsl.net/ah6hy/fiji.html>
- Fiji's First marine conservation area officially gazette(2002). *WWF News and Stories*. Accessed 02.03.2017, http://wwf.panda.org/wwf_news/?4183%2FFijis-first-marine-conservation-area-officially-gazetted%3E
- Fiji Fisheries Department, 2008. Fisheries Resource Inventory Survey Report: Komo, Nayau and Moce marine biodiversity assessment draft report, Central Lau. Research Division, Fisheries Department, Ministry of Fisheries and Forests.
- Fiji Fisheries Department, 2007a. Fisheries Resource Inventory Survey Report : Vanuabalavu (No. Fisheries Research Technical Report). Research Division, Fisheries Department, Ministry of Fisheries and Forests.
- Fiji Fisheries Department, 2007b. Fisheries Resource Inventory Survey Report: Tikina Mualevu-i-iQoliqoli, Vanuabalavu. Research Division, Fisheries Department, Ministry of Fisheries and Forests.
- Fiji Manta Ray Project (2015). Manta Trust Annual Report. Accessed 02.03.2017, http://www.mantatrust.org/wpcontent/uploads/2016/05/2015_Fiji_Manta_Project_Annual_Report.pdf
- Fisheries Shark Reef Marine Reserve, Serua Regulations 2014, Legal notice No.41 Government of Fiji Gazette Supplement No. 20, pp 264-266.
- Fisheries Wakaya Marine Reserve Regulations 2015, Legal Notice No. 40, Government of Fiji Gazette Supplement No. 6, pp 32-34.
- Fisheries verifying dead baby sharks report (2013). Fiji Broadcasting Corporation. Accessed 02.03.2017, <http://www.fbc.com.fj/fiji/7217/fisheries-verifying-dead-baby-sharks-report->
- Fishing in the Salt Lake: <http://www.saltlakelodgefiji.com/fishing.html>
- Finlay, A.R., 2004a. Yadua's Reefs, Greenforce Yadua Expedition 2001–2004. National Trust of Fiji.
- Finlay, A.R., 2004b. Yadua's Fishery, Greenforce Yadua Expedition 2001–2004. National Trust of Fiji.
- Fiu, M., Tokece, M., Tokece, F., 2010. The Ono-i-Lau cluster of islands, Marine Biological Survey 2008 Report. WWF South Pacific Programme, Suva, Fiji.
- Garrigue, C., Clapham, P.J., Geyer, Y., Kennedy, A.S., Zerbini, A.N., 2015. Satellite tracking reveals novel migratory patterns and the importance of seamounts for endangered South Pacific humpback whales. *R. Soc. Open Sci.* 2, 150489. doi:10.1098/rsos.150489
- Ghazanfar, S.A., Keppel, G., Khan, S., 2001. Coastal vegetation of small islands near Viti Levu and Ovalau, Fiji. *New Zealand Journal of Botany* 39, 587–600. doi:10.1080/0028825X.2001.9512762
- Gillett, R., 2011. Fisheries of the Pacific Islands: Regional and National Information, RAP Publication 2011/03. FAO Regional Office for Asia and the Pacific, Bangkok, Thailand. Government of Fiji, 1993. The National Environment Strategy. In: Watling D, Chape SA (eds). IUCN - World Conservation Union, Suva, Fiji
- Gollner, S., Govenar, B., Fisher, C.R., Bright, M., 2015. Size matters at deep-sea hydrothermal vents: different diversity and habitat fidelity patterns of meio- and macrofauna. *Mar. Ecol. Prog. Ser.* 520, 57–66.
- Greenfield, D.W., Langston, R.C., Randall, J.E., 2005. Two new cardinalfishes of the Indo-Pacific fish genus *Zoramia* (Apogonidae). *Proc. Calif. Acad. Sci.* 56.
- Guppy, H.B., 1903. Observations of a naturalist in the Pacific between 1896 and 1899. Macmillan and Co., London. doi:10.5962/bhl.title.33650
- Harris, P.T., Macmillan-Lawler, M., Rupp, J., Baker, E.K., 2014. Geomorphology of the Oceans. *Marine Geology* 352, 4–24. doi:10.1016/j.margeo.2014.01.011
- Harris, P.T., Whiteway, T., 2011. Global distribution of large submarine canyons: Geomorphic differences between active and passive continental margins. *Marine Geology* 285, 69–86. doi:10.1016/j.margeo.2011.05.008
- Hawkes, J.A., Rossel, P.E., Stubbins, A., Koschinsky, A., Chavagnac, V., Hansen, C.T., Bach, W., Dittmar, T., 2015. Efficient removal of recalcitrant deep-ocean dissolved organic matter during hydrothermal circulation. *Nat. Geosci.* 8, 856–860.
- Heider, C., 2013. MESCAL Mangrove Carbon Assessment: Rewa Delta, Fiji Islands. Pacific Mangroves Initiative, IUCN Oceania, Suva, Fiji.
- Huvenne, V.A.I., Tyler, P.A., Masson, D.G., Fisher, E.H., Hauton, C., Hühnerbach, V., Le Bas, T.P., Wolff, G.A., 2011. A picture on the wall: innovative mapping reveals cold-water coral refuge in submarine canyons. *PLoS ONE* 6, e28755. doi:10.1371/journal.pone.0028755.
- IBA FJ18 Namenalala Birdlife International Data Zone, Accessed 02.03.2017, <http://datazone.birdlife.org/site/factsheet/namenalala-iba-fiji/details>
- IHO, 2008. Standardization of Undersea Feature Names: Guidelines Proposal form Terminology.

- ISA, 1999. Deep-seabed polymetallic nodule exploration: Development of environmental guidelines. International Seabed Authority, Kingston, Jamaica.
- IUCN, 2009. Marine Protected Areas case studies: Navakavu Locally-Managed Marine Area, Viti Levu Island, Fiji.
- Jenkins, A., Boseto, D., 2005. *Schismatogobius vitiensis*, a new freshwater goby (Teleostei: Gobiidae) from the Fiji Islands. *Ichthyological Exploration of Freshwaters* 16, 75–82.
- Jenkins, A., Mailautoka, K., 2011. Fishes of the Nadi basin and bay, conservation ecology and habitat mobility. Proceedings of the Second Fiji Conservation Science Forum, Suva, Fiji.
- Jenkins, J., Sykes, H.R., Skelton, P., Fiu, M., Lovell, E., 2004. Fiji's Great Sea Reef :The first marine biodiversity survey of Cakaulevu and associated coastal habitats, 5-16 December. WWF Pacific.
- Jupiter, S., McClennen, C., Matthews, E., 2012. Vatu-i-Ra Seascape, Fiji, in: Hilty, J.A., Chester, C.C., Cross, M.S. (Eds.), *Climate and Conservation: Landscape and Seascape Sciences, Planning and Action*. Island Press, Washington, DC.
- Jupiter, S., Tora, K., Mills, M., Weeks, R., Adams, V., Qauqau, I., Nakeke, A., Tui, T., Nand, Y., Yakub, N., 2011. Filling the gaps: identifying candidate sites to expand Fiji's national protected area network. Outcomes report from provincial planning meeting, 20-21 September 2010. Wildlife Conservation Society, Suva, Fiji.
- Jupiter, S.D., Egli, D.P., 2011. Ecosystem-Based Management in Fiji: Successes and Challenges after Five Years of Implementation. *Journal of Marine Biology* 2011, 1–14. doi:10.1155/2011/940765
- Kastl, B., Gow, S., 2014. Economic Valuation of Tourism and Fisheries in the Vatu-i-Ra Seascape. Wildlife Conservation Society, Suva, Fiji.
- Kaneko, T., Maejima, Y., Teishima, A., 1997. The abundance and vertical distribution of abyssal benthic fauna in the Japan Deep-Sea Impact Experiment. Presented at the The Seventh International Offshore and Polar Engineering Conference, Honolulu, Hawaii, USA.
- Kaschner, K., Kesner-Reyes, C., Garilao, J., Rius-Barile, T., Rees, T., and R. Froese. 2016. AquaMaps: Predicted range maps for aquatic species. World wide web electronic publication, www.aquamaps.org, Version 08/2016.
- Klein, C.J., Jupiter, S.D., Selig, E.R., Watts, M.E., Halpern, B.S., Kamal, M., Roelfsema, C., Possingham, H.P., 2012. Forest conservation delivers highly variable coral reef conservation outcomes. *Ecological Applications* 22, 1246–1256.
- Klose, J., Polz, M.F., Wagner, M., Schimak, M.P., Gollner, S., Bright, S., 2015. Endosymbionts escape dead hydrothermal vent tubeworms to enrich the free-living population. *Proc. Natl. Acad. Sci. U. S. A.* 112, 11300–11305.
- Kaschner, K., Kesner-Reyes, K., Garilao, C., Rius-Barile, J., Rees, T., Froese, R., 2016. AquaMaps: Predicted range maps for aquatic species. World wide web electronic publication, www.aquamaps.org, Version 08/2016.
- LäjeRotuma Initiative, 2007. "Mobilizing community to manage well their natural resources": Survey of Marine Turtles In Rotuma, Progress Report March 2007. LäjeRotuma Initiative.
- Laveti, M., Solomona, P., Batibasaga, A., Nand, N., Tora, K., 2011. Critical Habitats of Sea Turtles in Fiji.
- Lawler, M.M (2014). ArcGIS Global Seafloor Geomorphic Features Map. Accessed 02.03.2017, <http://www.arcgis.com/home/item.html?id=342d8cbfac074a53afa5e49bd0c53773>
- Ledua, E., 1993. Fiji, in: Munro, P. (Ed.), *Genetic Aspects of Conservation and Cultivation of Giant Clams: Report of the Workshop Held on 17-18 June 1992 at the ICLARM Headquarters, Makati, Metro Manila, Philippines*, ICLARM Conference Proceedings. International Center for Living Aquatic Resources Management ; Australian Centre for International Agricultural Research ; International Development Research Centre, [Makati, Metro Manila, Philippines] : Canberra, Australia : Ottawa, Canada, pp. 45–47.
- Little, C.T.S., Vrijenhoek, R.C., 2003. Are hydrothermal vent animals living fossils? *Trends Ecol. Evol.* 18, 582–588.
- Littler, M.M., Littler, D.S., Brooks, B.L., Koven, J.F., 1997. A unique coral reef formation discovered on the Great Astrolabe Reef, Fiji. *Coral Reefs* 16, 51–54. doi:10.1007/s003380050059
- Lovell, E., 2004. Re-establishment of the marine monitoring programme for the proposed Momi Bay resort, environmental impact assessment phase I and II (Professional and Technical Reports). University of the South Pacific.
- Lovell, E., 1995. Preliminary Biological Survey of the coral reefs along north Nadi Bay to Vuda Point, Ba. Biological Consultants, Fiji.
- Lovell, E., Sykes, H.R., 2008. Rapid recovery from bleaching events – Fiji Coral Reef Monitoring Network Assessment of hard coral cover from 1999-2007.
- Lovell, E., Sykes, H.R., 2004. Status of Coral Reefs In The Fiji Islands, 2004. Institute of Marine Resources, University of the South Pacific.
- Lovell, E., Sykes, H.R., Bonito, V., Khan, Z., Quinn, N., 2008. In-situ Monitoring of Sea Temperatures in Fiji: An Archipelago-wide Programme.

- Lovell, E., Whippy-Morris, C., 2009. Live coral fishery for aquaria in Fiji: sustainability and management. *Species Diversity* 1.
- Luschi, L., 2013. Long-distance animal migrations in the oceanic environment: orientation and navigation correlates. *Int. Sch. Res. Not. – Zool. Artic.* ID 631839 23 Pages 2013 Doi1011552013631839.
- MACBIO, 2016. Macuata Province Learning Site, MACBIO Introductory Field Visit to the Mali District, September 12, 2016. MACBIO, Suva, Fiji.
- Macdonald, K.C., 2001. Mid-Ocean Ridge Tectonics, Volcanism, and Geomorphology, in: *Encyclopedia of Ocean Sciences*. Elsevier, pp. 852–866.
- Mad Fish Dive Centre-Fiji-. (n.d). Amazing Manta Reef. Accessed 02.03.2017, <http://scuba-diving-fiji.com/fiji-dive-sites/vesi-kadavu-fiji/manta-reef/>
- Mangubhai S (2016) Impact of Tropical Cyclone Winston on Coral Reefs in the Vatu-i-Ra Seascape. Wildlife Conservation Society, Suva, Fiji. Report No. 01/16. Suva, Fiji, 26 pp.
- Mangubhai S, Sykes H, Lovell E, Brodie G, Jupiter S, Lal R, Lee S, Loganimoce EM, Morris C, Nand Y, Qauqau I, Rashni B (in press) Fiji: Coastal and marine ecosystems. In C. Sheppard (ed.) *World Seas: An Environmental Evaluation Volume II: The Indian Ocean to the Pacific*. Elsevier.
- Manta Trust (2017). Fiji Manta Ray Project. Conservation through research, awareness and education. Accessed 02.03.2017, <http://www.mantatrust.org/in-the-field/fiji/>
- Marchese, C., 2015. Biodiversity hotspots: A shortcut for a more complicated concept. *Global Ecology and Conservation* 3, 297–309. doi:10.1016/j.gecco.2014.12.008
- Masibalavu, V.T., Dutson, G.C.L., BirdLife International (Eds.), 2006. Important bird areas in Fiji: conserving Fiji's natural heritage. BirdLife International Pacific Partnership Secretariat, Suva, Fiji.
- Matava Resort, Kadavu. Accessed 02.03.2017, <http://matava.com/nature/whales-and-dolphins/>
- McKenzie, L.J., Yoshida, R.L., 2007. Seagrass-Watch: Guidelines for Monitoring Seagrass Habitats in the Fiji Islands, Proceedings of a training workshop, Corpus Christi Teachers College, Laucala Bay. Seagrass-Watch HQ, Suva, Fiji.
- Meaning of "Atoll" Cambridge Dictionary <http://dictionary.cambridge.org/dictionary/english/atoll>
- Meo, S., Erdmann, M.V. and Tuisese, S.W., (eds.). In Press. A Rapid Marine Assessment of the Southern Lau Islands, Fiji. Conservation International, Arlington.
- Miller, C., 2007. Current State of Knowledge of Cetacean Threats, Diversity and Habitats in the Pacific Islands Region. WDCS Australasia Inc.
- Miller, C., Batibasaga, A., Chand, P., Dulunaqio, S., Fox, M., Jupiter, S., Naisililili, W., Nand, Y., Sharma-Gounder, S., Smith, B., 2016. Cetacean diversity, common occurrence and community importance in Fijian waters. *Pacific Conservation Biology* 22, 272. doi:10.1071/PC14933
- Miller K, Nand Y, Mangubhai S, Lee S, Naisililili W, Sykes H (2018) Marine Biological Surveys of the Northern Lau Group. Report No. 01/18. Vatuvara Foundation and the Wildlife Conservation Society, Suva, Fiji. 46 pp
- Moors-Murphy, H.B., 2014. Submarine canyons as important habitat for cetaceans, with special reference to the Gully: A review. *Deep Sea Research Part II: Topical Studies in Oceanography* 104, 6–19. doi:10.1016/j.dsr2.2013.12.016
- Morato, T., Clark, M.R., 2007. Seamount fishes: ecology and life histories, in: Pitcher, T.J., Morato, Telmo, Hart, P.J.B., Clark, Malcolm R., Haggan, N., Santos, R.S. (Eds.), *Seamounts: Ecology, Fisheries & Conservation*. Blackwell Publishing Ltd, Oxford, UK. doi:10.1002/9780470691953
- Morris, C., Bala, S., 2012. Value adding and supply chain development for fisheries and aquaculture products in Fiji, Samoa and Tonga: Supply chain for Sea grapes (*Caulerpa racemosa*) in Fiji (IMR Technical Report 05/2012). Institute of Marine Resources, School of Marine Studies, FSTE, USP.
- Morrison, R., Narayan, S., Gangaiya, P., 2001. Trace Element Studies in Laucala Bay, Suva, Fiji. *Marine Pollution Bulletin* 42, 397–404. doi:10.1016/S0025-326X(00)00169-7
- MPA News Staff, 2002. Involvement of the Private Sector in a Community-Based MPA: Case example from Fiji. MPA News.
- Mystical, Magical Mantas (2017). Barefoot Collection Fiji. Accessed 02.03.2017, <http://www.thebarefootcollection.com/manta-island/manta-rays.htm>
- Nair, V., Rupeni, E., Wilson, L., O'Gorman, D., Holloway, C., Sriskanthan, G., Tabunakawai, K., Afzal, D., Areki, F., Fiu, M., 2003. Setting priorities for marine conservation in the Fiji Islands Marine Ecoregion. WWF – South Pacific Program.
- Naiova, M (2008), Environmental and Resource Management Consultants December 2007, Fiji Preliminary Environmental Impact Assessment Report – Aggregate Extraction in Selected Sites of the Navua and Sigatoka Rivers and The Sigatoka Sand Dunes, South Viti Levu, EU-EDF 8/9 SOPAC Project Report 99 Reducing Vulnerability of Pacific ACP States
- Nand Y, Mangubhai S, Naisililili W, Tamanitokula J, Jupiter S (2018) Assessment of Coral Reefs around Koro Island 18 Months after Cyclone Winston. Report No. 01/18. Wildlife Conservation Society, Suva, Fiji. 28 pp.

- Natewa Bay-Daku Resort (2015). Dolphin Dreaming. Accessed 02.03.2017, <https://dakuresort.com/tag/natewa-bay/>
- Natewa Bay- Daku Resort (2015). The Sacred red prawns of Naweni. Accessed 02.03.2017, <https://dakuresort.com/the-rare-red-prawns-of-naweni/>
- National Oceanic and Atmospheric Administration (2016). What is hydrothermal vent?. Accessed 02.03.2017, <http://oceanservice.noaa.gov/facts/vents.html>
- National Sites and Places of Heritage Significance in Fiji (n.d). A collaborative submission by the Department of Heritage & Arts, Fiji Museum and National Trust of Fiji. Accessed 02.03.2017, <http://www.fijiembassydc.com/about-fiji/FIJS-NATIONAL-HERITAGE-SITES.pdf>
- National Trust of Fiji Islands (n.d). The REDD desk. Accessed 02.03.2017, <http://theredddesk.org/countries/actors/national-trust-fiji-islands>
- NatureFiji-MaraqetiViti, 2013. Fiji: State of Birds.
- NatureFiji- Mareqeti Viti (2012). Taveuni National Park Project. Accessed 02.03.2017, <https://naturefiji.org/project/taveuni-national-park-project/>
- NatureFiji-MaraqetiViti, 2010. Paper to the National Environment Council meeting on the continuing destruction of Fiji's rivers and streams (Position statement)
- NatureFiji-MaraqetiViti, 2009. Resolving an enigma: Conservation management of the critically endangered Fiji Petrel – background information on the Fiji Petrel project. NatureFiji-MaraqetiViti, National Trust of Fiji Islands, Suva, Fiji.
- NatureFiji Mareqeti Viti (2008). Hawksbill turtle (*Eretmochelys imbricata*). Accessed 02.03.2017, <https://naturefiji.org/hawksbill-turtle-eretmochelys-imbricata/>
- Navuku, S., 2009. An Ecosystem-Based Approach for Managing Tropical Ecosystems.
- Neubauer, I.L., 2011. Fiji's Rainbow Reef. Time magazine.
- NOAA, 2016. National Ocean Service <http://oceanservice.noaa.gov/facts/vents.html> Accessed 10/01/17.
- Nunn, P., Gerraghty, P., Nakoro, E., Nasila, A., Tukidia, S., 2005. Vuniivilevu and Burotu: The Geography, Ethnography and Hazard Implications of Vanished Islands in Fiji. *People and Culture in Oceania* 21, 87–114.
- Nunn, P.D., 1990. Coastal Geomorphology of Beqa and Yanuca Islands, South Pacific Ocean, and Its Significance for the Tectonic History of the Vatulele-Beqa Ridge. *Pacific Science* 44, 348–365.
- N'Yeurt, A.D.R., 1996. A preliminary floristic survey of the benthic marine algae of Rotuma Island. *Australian Systematic Botany* 9, 361. doi:10.1071/SB9960361
- Obura, D., Mangubhai, S., 2003. Marine Biological Survey Report of the Great Astrolabe Reef, Ono Kadavu. Fiji Barrier Reef Ecoregion, Fiji Islands. WWF South Pacific Programme.
- Obura, D., Mangubhai, S., 2002. Coral Reef Biodiversity in the Vatu-i-Ra Seascape in Fiji. WWF South Pacific Programme, Suva, Fiji.
- Planetary Coral Reef Foundation (2005). Health of the Great Astrolabe Reef. Accessed 02.03.2017, <http://www.pcrf.org/science/Astrolabe/reefreport.html>
- Preliminary Report on Turtle Occurrence in Sovi Bay, Viti Levu, Fiji (2007), Institute of Marine Resources, University of the South Pacific.
- QGIS (Version 2.18.9) [Software]. Accessed 02.03.2017, <http://qgis.org/en/site/>
- Ramsar (2014). Nasoata mangrove island Fiji: Update on Ramsar site nominations and development of a Pacific Mangrove Declaration. Accessed 02.03.2017, <http://www.ramsar.org/news/fiji-update-on-ramsar-site-nominations-and-development-of-a-pacific-mangrove-declaration>
- Rasalato, E., Maginnity, V., Brunnschweiler, J.M., 2010. Using local ecological knowledge to identify shark river habitats in Fiji (South Pacific). *Environmental Conservation* 37, 90–97. doi:10.1017/S0376892910000317
- ReefBase : A Global Information System for Coral Reefs (2017). Accessed 02.03.2017, <http://reefgis.reefbase.org/default.aspx?wms=RGWRR2011&bbox=178,855978432685,-19.517502690678,192.7964683737,-12.4663710486786>
- Richer de Forges, B., Koslow, J.A., Poore, G.C.B., 2000. Diversity and endemism of the benthic seamount fauna in the southwest Pacific. *Nature* 405, 944–947.
- Robb, K.F., Nunn, P.D., 2014. Changing role of nearshore-marine foods in the subsistence economy of inland upland communities during the last millennium in the tropical Pacific Islands: Insights from the Bā River Valley, Northern Viti Levu Island, Fiji. *Environmental Archaeology* 19, 1–11. doi:10.1179/1749631413Y.0000000012
- Roberts, J. M., Wheeler, A. J. & Freiwald, A. Reefs of the deep: the biology and geology of cold-water coral ecosystems [Review]. *Science*. 312, 543–547 (2006).
- Sadovy, Y., 2011. Naiqoro Passage in Kadavu, Fiji: Grouper Survey and Tagging Project. Society for the Conservation of Reef Fish Aggregations, University of Hong Kong Joint project with Fisheries Research Division, Fisheries at Lami, Suva, Fiji.
- Salt Lake Lodge (n.d). Things to do. Retrieved from <http://www.saltlakelodgefiji.com/thingstodo.html>

- Saunders, A., Blaffart, H., Morley, C., Kuruyawa, J., Masibalavu, V., Seniloli, E., 2007. A community approach to invasive species management: some Pacific case studies, in: Witmer, G.W., Pitt, W.C., Fagerstone, K.A. (Eds.), *Managing Vertebrate Invasive Species: Proceedings of an International Symposium*. USDA/APHIS Wildlife Services, National Wildlife Research Center, Fort Collins, Colorado, USA.
- SCBD, 2014. Ecologically or Biologically Significant Marine Areas (EBSAs). Special places in the world's oceans (No. Volume 1: Western South Pacific Region), EBSA number 14: Vatu-i-Ra / Lomaiviti, Fiji. Secretariat of the Convention on Biological Diversity.
- SCBD, 2009. Azores scientific criteria and guidance. Secretariat of the Convention on Biological Diversity.
- Scuba Bula Dive Centre Fiji (n.d). WWF (World Wildlife Fund). Accessed 02.03.2017, <http://www.scubabula.com/HTML/ScubaBula/WWF.html>
- Seabird Island Restoration Project (2013), NatureFiji-MareqetiViti welcome BirdLife Fiji staff 16 Apr 2013, Accessed 02.03.2017, <http://www.birdlife.org/pacific/news/naturefiji-mareqetiviti-welcome-birdlife-fiji-staff> and <https://naturefiji.org/profile/elenoa-seniloli/>
- Segev, A., Rybakov, M., Mortimer, N., 2012. A crustal model for Zealandia and Fiji: Crustal model for Zealandia and Fiji. *Geophysical Journal International* 189, 1277–1292. doi:10.1111/j.1365-246X.2012.05436.x
- Shark Reef Marine Reserve, Serua Regulations 2014, Legal notice No.41 Government of Fiji Gazette Supplement No. 20, pp 264 – 266
- Shephard, F., 1964. *Submarine Geology*, 2nd ed. New York.
- Shetty, S., Shine, R., 2002a. Philopatry and Homing Behavior of Sea Snakes (*Laticauda colubrina*) from Two Adjacent Islands in Fiji. *Conservation Biology* 16, 1422–1426. doi:10.1046/j.1523-1739.2002.00515.x
- Shetty, S., Shine, R., 2002b. Activity Patterns of Yellow-Lipped Sea Kraits (*Laticauda colubrina*) on a Fijian Island. *Copeia* 2002, 77–85. doi:10.1643/0045-8511(2002)002[0077:APOYLS]2.0.CO;2
- Species Archives – Gamefishing Fiji – The best of Fiji Fishing. Accessed 02.03.2017, <http://gamefishingfiji.com/fish-species-fiji>
- Stock, J.H., Iliffe, T.M., 1991. Two new species of *Liagoceradocus* (Hypogean Amphipoda) from south-western Pacific Islands, with key to the world species. *Invertebrate Systematics* 5, 807. doi:10.1071/IT9910807
- Subsurface Fiji. Adventure Scuba Diving (2017). Accessed 02.03.2017, <http://fijidiving.com/dive-sites/>
- Stone, G.S., Madin, L.P., Stocks, K., Hovermale, G., Hoagland, P., Scumacher, M., Etnoyer, P., Sotka, C., Tausig, H., 2004. Chapter 2. Seamount biodiversity, exploitation and conservation, in: *Defy Ocean's End*. Island Press, Washington D.C.
- Sykes H (2011) *Assessment of Marine Resources*, Kaibu Resort, Kaibu Island, Yacata, Northern Lau, Fiji. Marine Ecology Consulting. 63 pp.
- Sykes, H.R., 2016a. *Foreshore Ecosystem Assessment*, Waikalou Inlet, Rovodrau Bay, Pacific Harbour. Viti Levu (EIA). Marine Ecology Consulting (Fiji) Ltd.
- Sykes, H.R., 2016b. *Assessment of Marine Resources for proposed redevelopment of "Seashell Cove Resort"*, Momi Bay, Viti Levu (EIA). Marine Ecology Consulting (Fiji) Ltd.
- Sykes, H.R., 2016c. *Baseline Ecological Assessment for Nakalawaca Road Upgrade*, Tailevu, Viti Levu (EIA). Marine Ecology Consulting (Fiji) Ltd.
- Sykes, H.R., 2015a. *Results of Three Years of the Great Fiji Shark Count*, Apr2015. The Great Fiji Shark Count, Suva, Fiji.
- Sykes, H.R., 2015b. *Assessment of Marine Resources at proposed treated effluent site in Dreketi Inlet*, Lautoka, Viti Levu (EIA). Marine Ecology Consulting (Fiji) Ltd.
- Sykes, H.R., 2015c. *Second Assessment of Marine Resources for proposed extension of development "First Landing Resort"*, Lautoka, Viti Levu (EIA). Marine Ecology Consulting (Fiji) Ltd.
- Sykes, H.R., 2012a. *Assessment of Marine Resources for proposed development at Lomanisue Beach*, Nananu-i-Ra Island, Ba (EIA). Marine Ecology Consulting (Fiji) Ltd.
- Sykes, H.R., 2012b. *Assessment of Marine Resources for proposed refurbishment and upgrading of "Shangri-La's Fijian Resort"*, Coral Coast, Viti Levu (EIA). Marine Ecology Consulting (Fiji) Ltd.
- Sykes, H.R., 2010a. *Assessment of Marine Resources for proposed development "Tadrai Resort"*, Mana Island, Mamanuca Islands (EIA). Marine Ecology Consulting (Fiji) Ltd.
- Sykes, H.R., 2010b. *Assessments of Marine Resources for proposed development at "Denarau Peninsula"*, Nadi, Viti Levu (EIA). Marine Ecology Consulting (Fiji) Ltd.
- Sykes, H.R., 2009a. *Assessment of Marine Resources for proposed development "Nila Resort"*, Vuda Point, Viti Levu (EIA). Marine Ecology Consulting (Fiji) Ltd.
- Sykes, H.R., 2009b. *Assessment of Marine Resources for proposed development for Bua Wharf / Large Boat Channel*, Galoa Bay, Bua, Vanua Levu, Fiji Islands (EIA). Marine Ecology Consulting (Fiji) Ltd.
- Sykes, H.R., 2009c. *Assessment of Marine Resources for proposed development Nukuvulavula*, Natewa Bay, Vanua Levu (EIA). Marine Ecology Consulting (Fiji) Ltd.
- Sykes, H.R., 2009d. *Assessment of Marine Resources for proposed development on Nukudrau Island*, Natewa Bay, Vanua Levu (EIA). Marine Ecology Consulting (Fiji) Ltd.

- Sykes, H.R., 2007a. Assessment of Marine Resources for proposed development “Sunny Bay”, Vuda Point, Viti Levu (EIA). Marine Ecology Consulting (Fiji) Ltd.
- Sykes, H.R., 2007b. Assessment of Marine Resources for proposed development at Sovi Bay, Coral Coast, Viti Levu, Stage 2 (EIA). Marine Ecology Consulting (Fiji) Ltd.
- Sykes, H.R., 2007c. Preliminary overview of Marine Resources Waitagi Lala Atoll, Northern Lau, Fiji (EIA). Resort Support/Marine Ecology Consulting (Fiji) Ltd.
- Sykes, H.R., 2007d. Marine Resource Assessment Waitagi Lala Atoll, Northern Lau, Fiji (EIA). Resort Support/Marine Ecology Consulting (Fiji) Ltd.
- Sykes, H.R., 2006a. Assessment of Marine Resources for proposed development extension “Mantaray Island Resort”, Nanuya Balavu Island, Yasawa Islands (EIA). Marine Ecology Consulting (Fiji) Ltd.
- Sykes, H.R., 2006b. Assessment of Marine Resources for proposed development “Paradise Resort”, Malolo Island, Mamanuca Islands (EIA). Marine Ecology Consulting (Fiji) Ltd.
- Sykes, H.R., 2006c. Assessment of Marine Resources for proposed development at “South Denarau”, Viti Levu (EIA). Marine Ecology Consulting (Fiji) Ltd.
- Sykes, H.R., 2006d. Assessment of Marine Resources for proposed development “Vuda Beach Resort”, Vuda Point, Viti Levu (EIA). Marine Ecology Consulting (Fiji) Ltd.
- Sykes, H.R., 2006e. Assessments of Marine Resources for proposed development at “Naisosovu Island”, Nadi, Viti Levu (EIA). Marine Ecology Consulting (Fiji) Ltd.
- Sykes, H.R., 2006f. Assessments of Marine Resources for proposed development at “Vulani Islands”, Nadi, Viti Levu (EIA). Marine Ecology Consulting (Fiji) Ltd.
- Sykes, H.R., 2006g. Assessments of Marine Resources for proposed development at “Denarau, Plot 1, and Plot 2”, Nadi, Viti Levu (EIA). Marine Ecology Consulting (Fiji) Ltd.
- Sykes, H.R., 2006h. Reef Mapping and Resource Assessment Project for Wainikeli and Bouma iQoliqoli and Lavena iQoliqoli 2004/5 (EIA), Report on First Stage April 2004 – April 2006. Resort Support/Marine Ecology Consulting (Fiji) Ltd.
- Sykes, H.R., 2005a. Assessment of Marine Resources for proposed development “Two Islands” Nanuya Balavu and Naukacuvu Islands, Yasawa Islands, Fiji (EIA). Marine Ecology Consulting (Fiji) Ltd.
- Sykes, H.R., 2005b. Preliminary Assessment of Marine Resources for proposed developments on Nananu-i-Ra Island, Nananu-i-Ra Island, Ba (EIA). Resort Support/Marine Ecology Consulting (Fiji) Ltd.
- Sykes, H.R., 2005c. Assessment of Marine Resources for proposed development “Safari Lodge”, Nananu-i-Ra Island, Ba (EIA). Resort Support/Marine Ecology Consulting (Fiji) Ltd.
- Sykes, H.R., 2003. Assessment of Marine Resources for proposed development “Bamboo Beach Overwater Bures”, Nananu-i-Ra Island, Ba (EIA). Marine Ecology Consulting (Fiji) Ltd.
- Sykes, H.R., Morris, C., 2007. Status of Coral Reefs in the Fiji Islands, 2007, in: South-West Pacific Status of COral Reefs Report. Institute of Marine Resources, University of the South Pacific.
- Sykes, H.R., Reddy, C., 2009. “Sacred Water”; 10 years of community managed marine protection supported by ecotourism-based income generation at Waitabu Marine Park, Fiji Islands, Proceedings of the 11th Pacific Interscience Congress, March 2-6, 2009. PSI, Tahiti, French Polynesia.
- Tarburton, M.K., 1987. Migration and Breeding Strategies of the Black Noddy, Fiji. *Emu* 87, 50. doi:10.1071/MU9870050
- Terry, J.P., Kisun, P., Qareqare, A., Rajan, J., 2006. Lagoon degradation and management in Yanuca Channel on the Coral Coast of Fiji. *The South Pacific Journal of Natural Science* 24, 1. doi:10.1071/SP06001
- Thaler, A.D (2013). Southern Fried Science. One fifth of all known hydrothermal vents are threatened from deep-sea mining. Accessed 02.03.2017, <http://www.southernfriedscience.com/one-fifth-of-all-known-hydrothermal-vents-are-threatened-by-deep-sea-mining/>
- Thaman, R.R., Balawa, A., Fong, T., Bukarau S. (2014), Voices from the Lagoon: A Retrospective Taxonomic Assessment of the Recovery of a Managed Fishery – A Case Study of the Vanua Navakavu, Fiji Islands, Technical briefing on Data-poor Fisheries Management Approach: Cross Hotel Conference Room, Suva, Fiji, 16th October 2014
- The Ramsar Convention on Wetlands (2012). Conserving Fiji’s wetlands. Accessed 02.03.2017, http://ramsar.rgis.ch/cda/en/ramsar-news-archives-2012-fijireportunca/main/ramsar/1-26-45-520%5E25939_4000_0_
- The sacred red prawns of Naweni: Accessed 02.03.2017, <https://dakuresort.com/the-rare-red-prawns-of-naweni/>
- Thiel, H., Schriever, G., Ahnert, A., Bluhm, H., Borowski, C., Vopel, K., 2001. The large-scale environmental impact experiment DISCOL— reflection and foresight. *Deep Sea Res. Part II Top. Stud. Oceanogr.* 48, 3869–3882.
- To the rescue, Fiji Times Online (2016). Accessed 10.11.2017. <https://divingfiji.blogspot.com/2012/01/to-rescue-fiji-imes-online.html?m=0>.

- Tokoriki Diving (2008). Accessed 02.03.2017, <http://www.tokorikidiving.com/dive-sites-map>
- Travelonline.com (2017). Accessed 02.03.2017, <https://www.travelonline.com/fiji/diving.html>
- TropicalFiji.com (2014). Accessed 02.03.2017, http://www.tropicalfiji.com/sights_and_activities/activities/fishing/
- Tuiwawa, M.V., Morrison, C.F., 2008. Marine and Terrestrial Biodiversity Survey of the Northern Lau Group, Fiji from September 14-October 2, 2007 (No. No. 15), IAS Environmental Studies Report. South Pacific Regional Herbarium (USP), NatureFiji-MareqetiViti, Institute of Applied Sciences (USP), Fiji Department of Forestry, Fiji Department of Fisheries and National Trust of Fiji.
- Tuiwawa, M.V., Pene, S., Tuiwawa, S.H., 2013. A Rapid Biodiversity Assessment, Socioeconomic Study and Archeological Survey of the Rewa river mangroves, Viti Levu, Fiji. IUCN Oceania, Suva, Fiji.
- Tuxson, T., 2006. Rotuma coral reef survey report 2006, November 8 – December 7, 2006, Rotuma Coral Reef Conservation project III. LājeRotuma Initiative.
- Underwater images of North Minerva reef (2009).http://www.52hertz.com/pictures/minerva_reef/
- Vakacola, M. (2013, June 30). Little turtle delights Mana. *The Jet*. Accessed 02.03.2017, <https://www.scribd.com/document/143869889/The-Jet-Volume-5-Number-5>
- Vetter, E.W., Smith, C.R., De Leo, F.C., 2010. Hawaiian hotspots: enhanced megafaunal abundance and diversity in submarine canyons on the oceanic islands of Hawaii. *Mar. Ecol.* 31, 183–199.
- Vrijenhoek, R.C., 1997. Gene flow and genetic diversity in naturally fragmented metapopulations of deep-sea hydrothermal vent animals. *J. Hered.* 88, 85–293.
- Watling, D., 2006. The Sea and Shore Birds of the Suva Lagoon, in: Morrison, J., Aalbersberg, W.A. (Eds.), *Management of the Suva Lagoon*, Fiji. Institute of Applied Sciences, University of the South Pacific, Suva.
- Watling, D., 1986. A mangrove management plan for Fiji: Phase 2. A plan for the mangroves of the Nadi Bay and Suva-Navua locales. Government Press, Suva, Fiji.
- Watling, D., 1985. A mangrove management plan for Fiji: Phase 1. Zonation requirements and a plan for the mangroves of Ba, Labasa and Rewa deltas. Government Press, Suva, Fiji.
- WCS, 2012. Ecosystem-Based Management Plan: Kubulau District, Vanua Levu, Fiji. Wildlife Conservation Society, Suva, Fiji.
- WCS, MoF, 2017a. Vatu-i-Ra Conservation Park Management Plan. Wildlife Conservation Society and Ministry of Fisheries, Suva, Fiji.
- WCS, MoF, 2017b. Bligh Waters and Central Viti Marine Managed Areas Management Plan, In Prep. Wildlife Conservation Society and Ministry of Fisheries, Suva, Fiji.
- Wells, S., 1996. *Tridacna mbalavuana*. The IUCN Red List of Threatened Species 1996: e.T22141A96381292. IUCN. doi:10.2305/IUCN.UK.1996.RLTS.T22141A96381292.en
- WWF, 2013. The day Tutuwalu visited Yadua, WWF South Pacific Programme stories. WWF South Pacific Programme.
- WWF, 2012. Pita Qarau and the turtles of Yadua, WWF South Pacific Programme stories. WWF South Pacific Programme.
- WWF, 2011. WWF Priority Places-Southwest Pacific: Macuata iQoliqoli Cokovata-Fiji (Factsheet). WWF Pacific.
- Yesson, C., Taylor, M., Tittensor, D., Davies, A., Guinotte, J., Baco, A., Black, J., Hall-Spencer, J., Roger, A., 2012. Global habitat suitability of cold-water octocorals. *J. Biogeogr.* 39, 1278–1292 (2012).
- Zug, G.R., Springer, V.D., Williams, J.T., Johnson, G.D., 1988. The vertebrates of Rotuma and surrounding waters. *Atoll Research Bulletin* 316, 1–25.



7. APPENDICES

APPENDIX A

WORKSHOP AGENDA

IDENTIFYING AND CONFIRMING NATIONAL PRIORITY AREAS FOR THE MANAGEMENT AND CONSERVATION OF MARINE BIODIVERSITY

VENUE: STUDIO 6 APARTMENTS, 1–3 WALU ST, SUVA

DATE: 19–20 JULY 2016

WORKSHOP OBJECTIVES

5. Review and update where necessary, previous marine priority sites identified through 2004 Fiji Islands Marine Ecoregions (FIME), Fiji's Protected Area Committee (PAC) marine ecological gap analysis, Ecologically and Biologically Significant Marine Areas (EBSA) information and other available data;
6. Collect additional information including references, data and reports to fill critical gaps;
7. Develop spatial layers for updated marine priority sites; and
8. Map updated marine priority sites for Fiji.

TIME	AGENDA ITEM	LEAD
DAY 1		
8:30–9:00	Chair Registration Prayer Welcome Remarks	Ms. Adi Meretui Mr. Hans Karl Wendt
9:00–9:10	Key Note Address by PS Local Government, Housing and Environment	Dr. Leanne Fernandes
9:10–9:20	Introductions	Mr. Joshua Wycliffe
9:20–9:40	Overview of meeting & expectations	Ms. Kate Davey
9:40–10:00	Introductions of participants	
10:00–10:15	Objective: <i>Understanding of Fiji's 2020 Commitment to protect 30% of its seas, and where are we at?</i> PRESENTATIONS	
10:15–10:45	30% MPA network commitment & how priority marine areas fits into this process Objective: <i>Understanding of Prioritization activities to date</i> Recap of FIME, Provincial Gap Analysis, EBSA and Vatu I Ra	Mr. Naqali, Dept. of Fisheries WWF/WCS/MACBIO
10:45–11:15	TEA BREAK	
11:15–12:15	PRESENTATIONS Habitats: coral reefs, algae and sea turtles Mangrove areas Selected migratory species: whales and dolphins	Dr. Sangeeta Mangubhai Dr. Wolf Forstreuter Dr. Cara Miller
12:15–12:45	Objective: <i>Definition of criteria for the selection of Marine Priorities and Introduction to Spatial Data</i> PRESENTATIONS	
12:45–13:00	Process for refining Priority Marine Areas Introduction of spatial data	Dr. Leanne Fernandes Ms. Jimaima LeGrand and Mr. Jonah Sullivan
13:00–14:00	Lunch	

TIME	AGENDA ITEM	LEAD
14:00–17:00	<p>Objective: <i>Update and complete existing priority marine areas Worksheet</i></p> <p>Introduction to Group work</p> <p>GROUP WORK</p> <p>1. Update existing basis for decisions on current priority marine areas. Supply additional:</p> <ul style="list-style-type: none"> ▪ Amount, detail and nature of justification ▪ Geographic explicitness ▪ Source types and number ▪ National/international obligations <p>2. Identify additional existing priority areas</p>	<p>Ms. Kate Davey</p> <p>(Four divisional inshore “stations” with; one offshore group)</p> <p>Each Group has: Facilitator, Rapporteur and GIS technician</p>
DAY 2		
9:00–9:30 9:30–16:00	<p>Recap of Day 1 and objectives for Day 2</p> <ul style="list-style-type: none"> ▪ Overview of meeting & expectations ▪ Brief on Group Work <p>Day 2 Objective: Continue with work from the afternoon of Day 1: To <i>update and complete existing priority marine areas Worksheet</i></p>	<p>Ms. Kate Davey</p> <p>Facilitators and rapporteurs</p>
10:30–11:00	TEA BREAK	
11:00–13:00	Day 2 Objective: Continue with work from the afternoon of Day 1: Facilitators & rapporteurs to <i>update and complete existing priority marine areas Worksheet</i>	
13:00–14:00	LUNCH BREAK	
15:30–16:30	Present back to the plenary group + discussion + wrap up + closing prayer	Facilitator and rapporteurs
17:00–19:00	Cocktail at IUCN, 5 Ma’afu Street, Suva	

APPENDIX B

PARTICIPANTS LIST

No.	Participant Name	Agency
1	Aisake Batibasaga	Ministry of Fisheries (MoF)
2	Aklesh Kumar	Mineral Resources Department (MRD)
3	Alfred Ralifo	World Wide Fund for Nature (WWF)
4	Alifereti Tawake	Locally-Managed Marine Area (LMMA) network
5	Andra Whiteside	Marine and Coastal Biodiversity Management in Pacific Island countries (MACBIO) project
6	Cara Miller	University of the South Pacific (USP)
7	Chinnamma Reddy	WWF
8	Constancia Levertz	MACBIO
9	Craig Bohm	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)
10	Edward Lovell	Biological Consultants
11	Eleni Tikoduadua	Department of Environment (DoE)
12	Etika Rupeni	International Union for the Conservation of Nature (IUCN)
13	Francis Areki	WWF
14	Gandercillar Vosaki	Wildlife Conservation Society (WCS)
15	Hans Karl Wendt	MACBIO
16	Helen Sykes	Marine Ecology Consulting
17	Jasha Dehm	MACBIO
18	Jimaima LeGrand	MACBIO
19	Jonah Sullivan	MACBIO
20	Kate Davey	MACBIO
21	Kesaia Tabunakawai	WWF
22	Laitia Tamata	WWF
23	Leanne Fernandes	MACBIO
24	Margaret Vakalabure	MoF
25	Marian Gauna	MACBIO
26	Marica Vakaoca	Mamanuca Environment Society (MES)
27	Marika Tuiwawa	USP
28	R. Mavileko	MACBIO
29	Mere Bainimarama	DoE
30	Meretui Ratunabuabua	Fiji Museum
31	Mika Seru Qio	MRD
32	Nakita Bingham	MACBIO
33	Naushad Yakub	MACBIO
34	Nunia Vunituko	MRD
35	Phillip Gassner	MACBIO
36	Rahul Chand	DoE
37	Rahul Tikaram	Institute of Applied Sciences (IAS), USP
38	Roselyn Naidu	University of Fiji
39	Rosemary Dautei	IAS, USP
40	Saiasi Buluta	iTaukei Affairs Board (iTAB)
41	Sangeeta Mangubhai	WCS
42	Saras Sharma-Gounder	MoF
43	Sione Kaituu	MACBIO
44	Sovaia Lewanavanua	MRD
45	Sumeet Prasad	MoF
46	Tevita Vodivodi	MoF

APPENDIX C

OBLIGATIONS (NATIONAL AND INTERNATIONAL)

LIST OF TAXA KNOWN TO OCCUR IN FIJI WITH NATIONAL AND INTERNATIONAL OBLIGATIONS.

The species list was generated as per Fiji's EPS Act 2002 and EPS Amendment Act 2017 and the IUCN Red List (www.iucnredlist.org). This table was used to verify the obligations for each site, where particular species were known to occur at the site. CITES: The Convention on International Trade in Endangered Species of Wild Fauna and Flora; CMS: Convention on Migratory Species; IUCN: International Union for the Conservation of Nature; NPOA: National Plan of Action; UNCLOS: United Nations Convention on the Law of the Sea; DD: Data Deficient; LC: Least Concern; NT: Near Threatened; VU: Vulnerable; EN: Endangered.

Scientific Name	Category	Common Name	EPS Act 2002	EPS 2017	CITES	CMS	IUCN Red List	Comment (also in)
<i>Acanthocybium solandri</i>	Fishes	Wahoo	x	x			LC	
<i>Aetobatus narinari</i>	Eagle ray	Eagle ray	x	x			NT	
<i>Alectis ciliaris</i>	Fishes	African pompano	x	x			LC	
<i>Anous minutus</i>	Seabirds	Black noddies	x	x			LC	
<i>Anous stolidus</i>	Seabirds	Brown noddies	x	x			LC	
<i>Aphareus rutilans</i>	Fishes	Lehi	x	x			LC	
<i>Puffinus pacifica</i>	Seabirds	Wedgetail shearwater	x	x			LC	
<i>Aristaeomorpha foliacea</i>	Crustaceans	Vatulele red prawn / Ura damu	x	✓			NE	
<i>Balaenoptera acutorostrata</i>	Whales	Common Minke Whale	x	x	I		LC	
<i>Balaenoptera edeni</i>	Whales	Bryde's whales / Tovutu sesevula	x	✓	I	II	DD	
<i>Birgus latro</i>	Crustaceans	Coconut crab / Ugavule	x	✓			DD	
<i>Bolbometopon muricatum</i>	Fishes	Bumphead Parrotfish / Kalia	x	✓			VU	
<i>Bruguiera gymnorhiza</i>	Mangroves	Oriental mangrove / Dogo	Crown Lands Act (Cap 132), Forests Decree (1992), Environment Management Act (2005)				LC	
<i>Caranx lugubris</i>	Fishes	Black jack	x	x			LC	
<i>Caranx sexfasciatus</i>	Fishes	Bigeye trevally	x	x			LC	
<i>Carcharhinus albimarginatus</i>	Sharks	Silver-tip shark / Qio seawula, Qio dina	x	✓			VU	
<i>Carcharhinus amblyrhynchos</i>	Sharks	Gray reef shark / Qio saqa	x	✓			NT	
<i>Carcharhinus brachyurus</i>	Sharks	Whaler sharks	x	x			NT	
<i>Carcharhinus falciformis</i>	Sharks	Silky shark / Qio sisi	x	✓		II	NT	
<i>Carcharhinus leucas</i>	Sharks	Bull shark / Qio Qa / Qio ni uciwai	x	✓			NT	
<i>Carcharhinus longimanus</i>	Sharks	Oceanic white-tip / Qio Vulaki	x	✓	II		VU	
<i>Carcharhinus melanopterus</i>	Sharks	Black-tip reef shark / Qio tokiloa	x	✓			NT	
<i>Carcharhinus plumbeus</i>	Sharks	Sandbar shark / Qio Vanuku	x	✓			VU	

Scientific Name	Category	Common Name	EPS Act 2002	EPS 2017	CITES	CMS	IUCN Red List	Comment (also in)
<i>Caretta caretta</i>	Marine Turtles	Loggerhead turtle	x	✓	I	I/II	VU	Fisheries Act Reg.20A (expires Dec.2018)
<i>Cassis cornutus</i>	Molluscs	Giant Lamp shell / Bulicina	x	✓			NE	
<i>Charonia tritonis</i>	Molluscs	Giant Triton shell / Davuidina	x	✓			NE	
<i>Chelonia mydas</i>	Marine Turtles	Green turtle	x	✓	I	I/II	EN	Fisheries Act Reg.20A (expires Dec.2018)
<i>Conus cakobau</i>	Molluscs	Cakobau's cone shell / Viro kei Bau	x	✓			LC	
<i>Conus gigasulcatus</i>	Molluscs	Great cone shell / Viro levu	x	✓			LC	
<i>Conus fijiensis</i>	Molluscs	Fiji Cone shell / Viro sewa	x	✓			LC	
<i>Conus fijiulcatus</i>	Molluscs	Sacred cone shell / Viro tabu	x	✓			LC	
<i>Conus jolivet</i>	Molluscs	Jolivet's cone / Viro I Jolivet	x	✓			DD	
<i>Coryphaena hippurus</i>	Fishes	Mahimahi	x	x			LC	
<i>Cypraea aurantium</i>	Molluscs	Golden cowry / Buli kula	x	✓			NE	
<i>Cypraea desforgesi</i>	Molluscs	Des Forges cowry / Buli I foresi	x	✓			NE	
<i>Cypraea summersi</i>	Molluscs	Summer's cowry / Buli kata	x	✓			NE	
<i>Cypraeacassis rufa</i>	Molluscs	Bullmouth helmet / Buli Tagane	x	✓			NE	
<i>Dermochelys coriacea</i>	Marine Turtles	Leatherback turtle	x	✓	I	I/II	VU	Fisheries Act Reg.20A (expires Dec.2018)
<i>Epinephelus lanceolatus</i>	Fishes	Giant Grouper / Kavuvula	✓	✓			VU	
<i>Epinephelus fuscoguttatus</i>	Fishes	Brown marble grouper	x	x			NT	
<i>Epinephelus malabaricus</i>	Fishes	Malabar grouper	x	✓			NT	
<i>Epinephelus polyphkadion</i>	Fishes	Camouflage grouper	x	x			NT	
<i>Eretmochelys imbricata</i>	Marine Turtles	Hawksbill turtle	x	✓	I	I/II	CR	Fisheries Act Reg.20A (expires Dec.2018)
<i>Etelis carbuculatus</i>	Fishes	Ehu	x	x			LC	
<i>Etelis coruscans</i>	Fishes	Onaga	x	x			LC	
<i>Fregata ariel</i>	Seabirds	Lesser frigatebird	✓	x			LC	
<i>Galeocerdo cuvier</i>	Sharks	Tiger shark / Qio oria	x	✓			NT	
<i>Globicephala macrorhynchus</i>	Whales	Short-finned Pilot Whale	x	✓			DD	

Scientific Name	Category	Common Name	EPS Act 2002	EPS 2017	CITES	CMS	IUCN Red List	Comment (also in)
<i>Gymnosarda unicolor</i>	Fishes	Dogtooth tuna	x	x			LC	
<i>Heliopora coerulea</i>	Corals	Blue coral / Lase-Seilagi	x	✓			VU	
<i>Hippopus hippopus</i>	Giant Clams	Horse-hoof clam / Teke ni ose	x	✓	II		LC	
<i>Holothuria scabra</i>	Sea cucumbers	Sandfish / Dairo / Dairo dina	x	✓			EN	
<i>Holothuria scabra var. versicolor</i>	Sea cucumbers	Golden sandfish / Dairo – kula	x	✓			EN	
<i>Holothuria whitmaei</i>	Sea cucumbers	Black teatfish / Loaloa	x	✓			EN	
<i>Istiompax indica</i>	Fishes	Black marlin	x	x			DD	
<i>Istiophorus platypterus</i>	Fishes	Pacific sailfish	x	x			LC	
<i>Isurus oxyrinchus</i>	Sharks	Mako shark (Shortfin) / Qio mako	x	✓		II	VU	
<i>Isurus paucus</i>	Sharks	Mako shark (Longfin) / Qio mako	x	✓		II	VU	
<i>Katsuwonus pelamis</i>	Fishes	Skipjack tuna	x	x			LC	
<i>Kogia simus</i>	Whales	Dwarf sperm whale / Tovutu bajisewa	x	✓			DD	
<i>Lagenodelphis hosei</i>	Dolphins	Fraser's Dolphins / Babale levu	x	✓	II	II	LC	
<i>Lambis truncata</i>	Molluscs	Truncate spider shell / Ega levu	x	✓			NE	
<i>Laticauda semifasciata</i>	Sea snakes	Chinese Sea Snake	x	✓ (spp.)			NT	
<i>Lepidochelys olivacea</i>	Marine Turtles	Olive / Pacific ridley turtle	x	✓	I	I/II	VU	Fisheries Act Reg.20A (expires Dec.2018)
<i>Lutjanus argentimaculatus</i>	Fishes	Mangrove red snapper	x	x			LC	
<i>Makaira nigricans</i>	Fishes	Indo-Pacific blue marlin	x	x			VU	
<i>Manta alfredi</i>	Manta ray	Coastal / Inshore manta ray	x	x	II	I/II	VU	
<i>Manta birostris</i>	Manta ray	Giant / Oceanic manta ray	x	x	II	I/II	VU	
<i>Megaptera novaeangliae</i>	Whales	Humpback Whale / Tovuto dakurodu	x	✓	I	I	EN	
<i>Mesoplodon densirostris</i>	Whales	Blainvilles Beaked whale / Yavuto ni nubu	x	✓			DD	
<i>Mesopristes kneri</i>	Fishes	Orange-spotted therapon perch	✓	x			NE	
<i>Mobula japanica</i>	Mobula ray	Spinetail Mobula	x	x		I/II	NT	
<i>Mobula tarapacana</i>	Mobula ray	Box Ray	x	x		I/II	VU	
<i>Mobula thurstoni</i>	Mobula ray	Bentfin Devil Ray	x	x		I/II	NT	
<i>Mola mola</i>	Fishes	Ocean sunfish	x	x			VU	
<i>Naso brachycentron</i>	Fishes	Humpback unicornfish	x	x			LC	
<i>Nebrius ferrugineus</i>	Sharks	Nurse shark	x	x			VU	

Scientific Name	Category	Common Name	EPS Act 2002	EPS 2017	CITES	CMS	IUCN Red List	Comment (also in)
<i>Nesofregatta albigularis</i>	Seabirds	Polynesian storm-petrel	✓	✗			NE	
<i>Orcinus orca</i>	Whales	Killer Whale / Tovutu Qaqa	✗	✓		II	DD	
<i>Panulirus ornatus</i>	Crustaceans	Ornate spiny lobster / Urau tamata	✗	✓			LC	
<i>Panulirus versicolor</i>	Crustaceans	Painted spiny lobster / Urau dina	✗	✓			LC	
<i>Pateobatis fai</i>	Ray	Pink whipray	✗	✗			VU	
<i>Peponocephala electra</i>	Whales	Melon-headed whale / Tovutu ululoa	✗	✓			LC	
<i>Phaethon lepturus</i>	Seabirds	White-tailed tropic bird	✓	✗			LC	
<i>Physeter macrocephalus</i>	Whales	Sperm Whale / Tovuto batitabua	✗	✓	I	I	VU	
<i>Pinctada margaritifera</i>	Molluscs	Pearl oyster shell / Civa	✗	✓			NE	
<i>Plectropomus areolatus</i>	Fishes	Squartail coral grouper	✗	✗			VU	
<i>Plectropomus laevis</i>	Fishes	Black saddle grouper	✗	✗			VU	
<i>Polydactylus plebeius</i>	Fishes	Threadfin	✗	✗			NE	
<i>Prionace glauca</i>	Sharks	Blue shark / Qio Tuiloa	✗	✓			NT	
<i>Pristipomoides filamentosus</i>	Fishes	Opakapaka	✗	✗			LC	
<i>Pristis microdon</i>	Sharks	Sawfish / Qio uluvaro	✗	✓	I		CR	
<i>Procelsterna cerulea</i>	Seabirds	Blue noddy	✓	✗			LC	
<i>Pseudobulweria macgillivrayi</i>	Seabirds	Fiji petrel	✓	✗			CR	
<i>Pseudobulweria rostrata</i>	Seabirds	Tahiti petrel	✓	✗			NT	
<i>Pseudorca crassidens</i>	Whales	False Killer Whale	✗	✓			DD	
<i>Pteria penguin</i>	Molluscs	Penguin winged oyster / Civa dranikea	✗	✓			NE	
<i>Puffinus lherminieri</i>	Seabirds	Audubon's shearwater	✓	✗			LC	
<i>Rhincodon typus</i>	Whale shark	Whale shark	✗	✗	II		EN	
<i>Rhinomuraena quaesita</i>	Eel	Blue ribbon eel	✗	✗			LC	
<i>Rhizophora</i> spp.	Mangroves	Tiri	Crown Lands Act (Cap 132), Forests Decree (1992), Environment Management Act (2005)				LC	
<i>Rhizophora samoensis</i>	Mangroves	Tiri					LC	
<i>Rhizophora stylosa</i>	Mangroves	Red mangrove / Tiri					NT LC	
<i>Rhynchobatus australiae</i>	Fishes	Guitarfish	✗	✗			VU	
<i>Scomberomorus commerson</i>	Fishes	Spanish mackarel	✗	✗			NT	
<i>Sphyrna lewini</i>	Hammerhead Shark	Scalloped hammerhead / Qio ulutuki	✗	✓	II	II	EN	
<i>Sphyrna mokarran</i>	Hammerhead Shark	Great hammerhead / Qio ulutuki levu	✗	✓	II	II	EN	
<i>Sphyrna zygaena</i>	Hammerhead Shark	Smooth hammerhead / Qio ulutuki	✗	✓	II		VU	

Scientific Name	Category	Common Name	EPS Act 2002	EPS 2017	CITES	CMS	IUCN Red List	Comment (also in)
<i>Stegostoma fasciatum</i>	Sharks	Zebra shark	x	x			VU	
<i>Stenella attenuata</i>	Dolphins	Bridled Dolphin, Pan-tropical Spotted / Babale saivola	x	✓	II	II	LC	
<i>Stenella longirostris</i>	Dolphins	Spinner dolphin / Babale daulade	x	✓	II	II	DD	
<i>Steno bredanensis</i>	Dolphins	Rough Tooth dolphin / Babale bajise	x	✓	II		LC	
<i>Sterna anaethetus</i>	Seabirds	Bridled tern	✓	x			LC	
<i>Sterna bergii</i>	Seabirds	Crested tern	✓	x			LC	
<i>Sterna fuscata</i>	Seabirds	Sooty tern	✓	x			LC	
<i>Sula Sula</i>	Seabirds	Red-footed booby	x	x			LC	
<i>Sula dactylatra</i>	Seabirds	Masked booby	✓	x			LC	
<i>Sula leucogaster</i>	Seabirds	Brown booby	✓	x			LC	
<i>Taenianotus triacanthus</i>	Scorpionfish	Leaf scorpionfish	x	x			LC	
<i>Taeniura meyeni</i>	Reef ray	Giant reef ray	x	x			VU	
<i>Thunnus albacares</i>	Fishes	Yellowfin tuna	x	x			NT	
<i>Triaenodon obesus</i>	Sharks	White-tip reef shark / Qio tukivula	x	✓			NT	
<i>Trichiurus lepturus</i>	Fishes	Hairtail	x	x			LC	
<i>Tridacna crocea</i>	Giant Clams	Boring Clam	x	x	II		LC	
<i>Tridacna derasa</i>	Giant Clams	Southern Giant Clam / Vasua dina	x	x	II		VU	
<i>Tridacna maxima</i>	Giant Clams	Small Giant Clam / katavatu	x	x	II		LC	
<i>Tridacna mbalavuana</i>	Giant Clams	Devil Giant Clam / Vasua tevoro	x	✓	II		VU	
<i>Tridacna squamosa</i>	Giant Clams	Fluted Giant Clam / Cega	x	x	II		LC	
<i>Trochus niloticus</i>	Molluscs	Trochus	x	✓			NE	
<i>Tubipora musica</i>	Corals	Music coral / Lase Balavu	x	✓			NT	
<i>Tursiops truncatus</i>	Dolphins	Common bottlenose / Babale dina	x	✓	II	I/II	LC	
<i>Wattsia mossambica</i>	Fishes	Mozambique large eye bream	x	x			LC	
<i>Ziphius cavirostris</i>	Whales	Cuviers Beaked whale / Tovutu gusula	x	✓		I	LC	

APPENDIX D

LIST OF MAIN RESOURCES AVAILABLE AT THE WORKSHOP

MAPS AVAILABLE IN HARDCOPY ON THE RESOURCE WALL

1. Fiji Bathymetry and basemap
2. Fiji Benthic Marine Species Richness
3. Fiji Chlorophyll-a Concentration (mg/m³) (2002–present)
4. Fiji Cold Water Coral Habitat Suitability
5. Fiji Ecologically or Biologically Significant Marine Areas (EBSAs)
6. Fiji Geomorphology
7. Fiji Hydrothermal Vents
8. Fiji Mangroves, Seagrass, Reefs
9. Fiji Marine Important Bird and Biodiversity Areas (IBAs)
10. Fiji Marine Species Richness
11. Fiji Mixed Layer Depth
12. Fiji Modelled Reef Fish Species Richness
13. Fiji Named Cyclones (1980–2015)
14. Fiji Pelagic Marine Species Richness
15. Fiji Photosynthetically Available Radiation (PAR)
16. Fiji Productivity (gC/m²/yr)
17. Fiji Reef Conditions
18. Fiji Sea Surface Currents (1992–2016)
19. Fiji Sea Surface Temperature (2002–present)
20. Fiji Seamount Morphology
21. Fiji Tuna Catch within (2001–2010)

SPATIAL DATA AVAILABLE ON THE GIS

1. All of the above
2. All Wildlife Conservation Society monitoring data
3. Fiji cetacean data 2013
4. Fiji dive sites
5. Fiji Great Sea Reef fish species check list
6. Fiji Key Biodiversity Areas
7. Fiji Mamanuca Environment Society turtle feeding and nesting sites
8. Fiji fish aggregation devices
9. Fiji turtle tracks
10. Fiji Vatu-i-Ra seascape

MAPS FOR WORKSHOP PARTICIPANTS ON PAST PRIORITY AREAS BY CENTRAL, EASTERN, WESTERN AND NORTHERN DIVISIONS

A. National Environment Strategy (1993)

1. Fiji sites of national significance

B. Setting Priorities for Marine Conservation in the Fiji Islands Marine Ecoregion (FIME)

1. Coastal terrestrial vegetation and small offshore islands Coral reef fish
2. Coral reefs and associated fauna
3. Inshore ecosystems
4. Open ocean
5. Species of concern

C. Filling the gaps: identifying candidate sites to expand Fiji's national protected area network

1. Provincial gap analysis
2. Connectivity priority areas
3. Endemic fish priority areas

D. Ecologically or Biologically Significant Marine Areas (EBSAs)

1. Kadavu and the Southern Lau Region
2. North Fiji Plateau
3. Vatu-i-Ra/Lomaiviti
4. South Fiji Basin
5. Taveuni and Ringgold Islands





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