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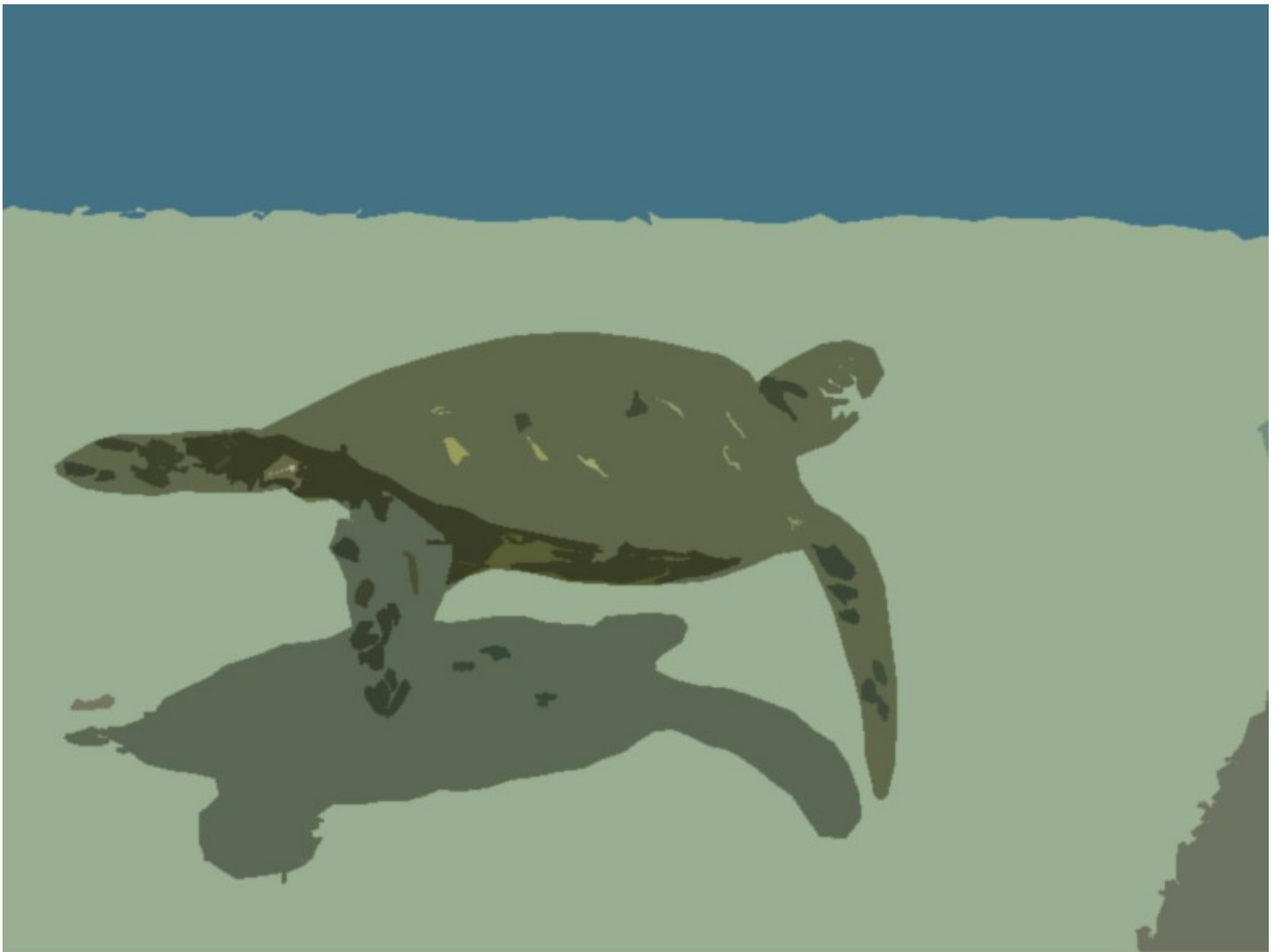
# Sea Turtles in Oceania MTSG Annual Regional Report 2020

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## ACKNOWLEDGMENTS

The Regional Vice Chairs of MTSG Oceania express their sincere thanks and appreciation to all authors of these 25 chapters for their hard work, perseverance, patience, and accomplishments. The task has been long and at times difficult, but ultimately of high reward. We dedicate this report to our dearly departed MTSG members Lui Bell (1956-2012), George Petro (2013), and Sue Taei (1962-2020). We are also grateful to the people of Oceania in support of their deep cultural and traditional ties to sea turtles in ways that are not always easily understood by others.



Turtle health workshop, Fiji, 2020. Photo: Shritika Prakash

## FIJI

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### **1 RMU: *Chelonia mydas*, South Central Pacific (CM-SC PAC)**

#### **1.1 Distribution, abundance, trends**

##### **1.1.1 Nesting sites**

No comprehensive study of green turtles nesting activity has been done in the country [1]. According to recent available information, green turtles nest in Hatana Island [2], and within the Hemskerq Reef and the Ringgold Reef systems [3,4] (Fig. 1). The latter systems host index nesting sites [3,4], where a total of 40 nests were noted during the most recent survey of the area [5]. No green turtles' nesting activity has been recently recorded at historical nesting sites of Makogai Island, Namena-lala Island, and Vatoa Island. The most recent national estimation of the size of the green turtle nesting population is 50-75 adult females [4]. Additional available information is reported in Table 1.

##### **1.1.2 Marine areas**

Recent satellite tracking and tag recovery data show that Fiji is a foraging area for adult green turtles nesting in the Cook Islands [4], French Polynesian [6] and Australia [7,8]. A recent genetic study identified the shallow coastal waters of Yadua Island and Makogai Island (Fig. 1) as foraging grounds for juvenile green turtles from American Samoa, New Caledonia and French Polynesia [1]. Green turtles also reportedly feed on the seagrass beds off the easternmost point of Vanua Levu [4].

#### **1.2 Other biological data**

Minimum curved carapace length of green turtles nesting in Fiji is 90 cm [4].

#### **1.3 Threats**

##### **1.3.1 Nesting sites**

Interviewees from Rotuma Island identified erosion linked to tropical depressions and cyclones as current major threat to the nesting sites. This likely affects the rest of the green turtle nesting sites in Fiji.

##### **1.3.2 Marine areas**

Illegal capture of green turtles has been occasionally reported in coastal waters [2,9–12], but never quantified. Offshore bycatch of green turtles in the industrial longline fisheries (deep and shallow altogether) is known [13]. Based on observer program data, cumulative interactions from 1989 to 2015 reportedly ranged between 0.000071-0.000758 green turtle interactions per 100,000 hooks to 0.018871-0.037867 green turtle interactions per 100,000 hooks. Overexploitation from subsistence and industrial fisheries, together with by-catch, are perceived as major threats [12]. Climate change, in particular its effects on primary green turtles' habitats such as seagrass beds, have been identified as likely threats [14].

## 1.4 Conservation

All sea turtles in Fiji are currently protected under the national law “Regulation 5 of the Offshore Fisheries Management Regulations 2014” [15], which applies to all internal, inshore and offshore areas of Fiji, and that does not allow for exemption on sea turtles harvest. Previously, sea turtles were protected under a “Moratorium on molesting, taking or killing of turtles” (2004-2008 [16] and 2008-2018 [17]). The Moratorium acknowledged the traditional and spiritual role of sea turtles in the ceremonies, and the Fiji Department of Fisheries could approve special requests of sea turtles’ harvest [18].

Fiji has signed several international conventions that have a nexus to conservation of all sea turtle species (Table 3) and, in 2017, has also signed a United Nations Ocean Conference voluntary commitment to formulate a National Sea Turtle Conservation Regulation by 2019 and to fully implement the Fiji Sea Turtle Recovery Plan (see <https://oceanconference.un.org/commitments/?id=19909#intro>).

In order to reduce sea turtles bycatch in the longline fishery, Fiji Fisheries Offshore Division has encouraged the use of circle hooks, de-hookers and line cutters [19].

## 1.5 Research

Literature review shows missing key information for green turtles in Fiji, as little is known about their nesting and foraging activities. Publication of at least two sets of unpublished data would help filling this knowledge gaps; green turtles' satellite tracks (currently with different stakeholders) will help in the identification of possible migratory routes and potential benthic foraging areas, while publication of recent data on green turtles' catch and by-catch in the longline fisheries will help understanding the magnitude of these threats on the offshore, commercial fishery.

## 2 RMU: *Eretmochelys imbricata*, South Central Pacific (EI-SC PAC)

### 2.1 Distribution, abundance, trends

#### 2.1.1 Nesting sites

Hawksbill turtles are known to nest on several beaches of the islands of Fiji [3,4,11,12,20] (Fig. 2). Available data recorded in the last 20 years are summarized in Table 2. A severe drop in the number of nests laid at historically known sites of Namena-lala Island, which is the only index site for hawksbill, and at Makogai Island, has been reported [4]. The most recent national estimation of the size of the hawksbill turtle nesting population is 150-200 adult females [4]. Additional available information is reported in Table 1.

#### 2.1.2 Marine areas

Recent satellite tracking shows that Fiji is a foraging area for adult hawksbill turtles nesting in American Samoa [21]. Hawksbill turtles feed on the several Fijian coral reefs, among which the Great Sea Reef [10], however no survey to collect abundance indexes has been performed in the Country in the last twenty years. Hawksbill turtles reportedly feed on the seagrass beds off the easternmost point of Vanua Levu [4].

### 2.2 Other biological data

Minimum curved carapace length of hawksbill turtles nesting in Fiji is 75 cm [4]. Average clutch size and average emergence success calculated from available data [10,11,22,23] are 116 eggs and 98.36% hatchlings/eggs, respectively.

## 2.3 Threats

### 2.3.1 Nesting sites

No threat has been specifically reported for hawksbill nesting sites, however, as for the green turtle, flooding and erosion linked to tropical depressions and cyclones are likely the current major threats.

### 2.3.2 Marine areas

Illegal capture of hawksbill turtles in shallow coastal waters has been occasionally reported [9–12], but not quantified.

## 2.4 Conservation

All sea turtles in Fiji are currently protected under the national law “Regulation 5 of the Offshore Fisheries Management Regulations 2014” [15], which applies to all internal, inshore and offshore areas of Fiji, and that does not allow for exemption on sea turtles harvest. Previously, sea turtles were protected under a “Moratorium on molesting, taking or killing of turtles” (2004-2008 [16] and 2008-2018 [17]). The Moratorium acknowledged the traditional and spiritual role of sea turtles in the ceremonies, and the Fiji Department of Fisheries could approve special requests of sea turtles’ harvest [18].

Fiji has signed several international conventions that have a nexus to conservation of all sea turtle species (Table 3) and, in 2017, has also signed a United Nations Ocean Conference voluntary commitment to formulate a National Sea Turtle Conservation Regulation by 2019 and to fully implement the Fiji Sea Turtle Recovery Plan (see <https://oceanconference.un.org/commitments/?id=19909#intro>).

The only long-term conservation project of which the authors are aware of was carried out from 2010 to 2014 by SPREP, WWF South Pacific Programme and National Trust of Fiji [12].

## 2.5 Research

Literature review shows missing key information for hawksbill turtles in Fiji, as little is known about their nesting and foraging activities. Publication of hawksbill turtles' satellite tracks (currently with different stakeholders) will help in the identification of possible migratory routes and potential benthic foraging areas.

## 3 RMU: *Caretta caretta*, South Pacific (CC-S PAC)

### 3.1 Distribution, abundance, trends

#### 3.1.1 Nesting sites

No nests of loggerhead has ever being reported for Fiji [4].

#### 3.1.2 Marine areas

Loggerheads reportedly form foraging aggregations in shallow waters of the Great Sea Reef, the Hemskercq Reef and the Ringgold Reef systems, Central and Southern Lau group, and along Suva and Kaba peninsulas [4].

### 3.2 Other biological data

None available.

### 3.3 Threats

#### 3.3.1 Nesting sites

Not applicable.

### 3.3.2 Marine areas

Loggerhead are incidentally captured on gillnets and, in some areas, targeted with set turtle nets [4], but never quantified. Offshore bycatch of loggerhead turtles in the industrial longline fisheries (deep and shallow altogether) is known [24]. Based on data from the observer program, cumulative interactions from 1989 to 2015 ranged between 0.000231-0.001165 loggerhead turtle interactions per 100,000 hooks to 0.017685-0.041279 loggerhead turtle interactions per 100,000 hooks [24].

### 3.4 Conservation

See Section 1.4

### 3.5 Research

Literature review shows missing key information for loggerhead turtles in Fiji. Publication of loggerhead turtles' satellite tracks (currently with different stakeholders) will help in the identification of migratory routes and potential benthic foraging areas.

## 4 RMU: *Dermochelys coriacea*, West Pacific (DC-W PAC)

### 4.1 Distribution, abundance, trends

#### 4.1.1 Nesting sites

No nesting activity of leatherbacks has been reported in the last twenty years [4]. The most recent national estimation of the size of the leatherback turtle nesting population is 20-30 adult females, which are considered sporadic nesters from other rookeries [4]. Additional available information is reported in Table 1.

#### 4.1.2 Marine areas

It is suggested that leatherbacks are present in low numbers in Fiji pelagic water [4].

### 4.2 Other biological data

None available.

### 4.3 Threats

#### 4.3.1 Nesting sites

Not applicable.

#### 4.3.2 Marine areas

Offshore bycatch of leatherback turtles in the industrial longline fisheries (deep and shallow altogether) is known [24]. Based on data from the observer program, cumulative interactions from 1989 to 2015 ranged between 0.004308-0.010064 leatherback turtle interactions per 100,000 hooks to 0.000160-0.000826 leatherback turtle interactions per 100,000 hooks [24].

### 4.4 Conservation

See Section 1.4.

### 4.5 Research

Literature review shows that virtually no information is available for leatherback turtles in Fiji. Publication of leatherback turtles' satellite tracks (currently with different stakeholders) will help in the identification of migratory routes.

Table 1. Main table.

RMU	CM-SC PAC	Ref #	EI- SC PAC	Ref #	CC-S PAC	Ref #	DC-W PAC	Ref #
<b>Occurrence</b>								
Nesting sites	Y	[3,2,5,12,1]	Y	[3,4,11,20,12]	N	[4]	Y	[4]
Pelagic foraging grounds	n/a	n/a	N	n/a	n/a	n/a	n/a	n/a
Benthic foraging grounds	Y	[1,4,6–8]	Y	[4,10]	Y	[4]	n/a	n/a
<b>Key biological data</b>								
Nests/yr: recent average (range of years)	21 (2007-2010)	[5]	47 (2003-2014)	[2,23,25,12]	n/a	n/a	n/a	n/a
Nests/yr: recent order of magnitude	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	1	[5]	2	[25,12]	n/a	n/a	n/a	n/a
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	2	2,3,21	5	[2,25,12]	n/a	n/a	n/a	n/a
Nests/yr at "major" sites: recent average (range of years)	40 (2010)	[5]	41 (2009-2014)	[23,25,12]	n/a	n/a	n/a	n/a
Nests/yr at "minor" sites: recent average (range of years)	7 (2007, 2010)	3,21	3 (2003-2014)	[12]	n/a	n/a	n/a	n/a
Total length of nesting sites (km)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Nesting females / yr	50-75	[4]	n/a	n/a	n/a	n/a	n/a	n/a
Nests / female season (N)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Female remigration interval (yrs) (N)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Sex ratio: Hatchlings (F / Tot) (N)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Sex ratio: Immatures (F / Tot) (N)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Sex ratio: Adults (F / Tot) (N)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Min adult size, CCL or SCL (cm)	90 CCL	[4]	75 CCL	[4]	n/a	n/a	n/a	n/a
Age at maturity (yrs)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Clutch size (n eggs) (N)	n/a	n/a	116 (N=26 nests)	[10,11,22,23]	n/a	n/a	n/a	n/a



Emergence success (hatchlings/egg) (N)	n/a	n/a	98.6 (N=20 nests)	[10,11,22,23]	n/a	n/a	n/a	n/a
Nesting success (Nests/ Tot emergence tracks) (N)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>Trends</b>								
Recent trends (last 20 yrs) at nesting sites (range of years)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Recent trends (last 20 yrs) at foraging grounds (range of years)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Oldest documented abundance: nests/yr (range of years)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>Published studies</b>								
Growth rates	N	n/a	N	n/a	N	n/a	N	n/a
Genetics	Y	[1]	n/a	n/a	N	n/a	N	n/a
Stocks defined by genetic markers	n/a	n/a	n/a	n/a	N	n/a	N	n/a
Remote tracking (satellite or other)	Y	[7,4,8,6]	Y	[21]	n/a	n/a	n/a	n/a
Survival rates	N	n/a	N	n/a	N	n/a	N	n/a
Population dynamics	n/a	n/a	N	n/a	N	n/a	N	n/a
Foraging ecology (diet or isotopes)	n/a	n/a	n/a	n/a	N	n/a	N	n/a
Capture-Mark-Recapture	n/a	n/a	n/a	n/a	N	n/a	N	n/a
<b>Threats</b>								
Bycatch: presence of small scale / artisanal fisheries?	n/a	n/a	n/a	n/a	Y	[4]	n/a	n/a
Bycatch: presence of industrial fisheries?	Y (PLL)	[13,12]	n/a	n/a	Y	[24]	Y	[24]
Bycatch: quantified?	Y	[13]	n/a	n/a	Y	[24]	Y	[24]
Take. Intentional killing or exploitation of turtles	Y	[2,9–12]	Y	[9–12]	Y	[4]	n/a	n/a
Take. Egg illegal harvest	n/a	n/a	n/a	n/a	N	n/a	n/a	n/a
Coastal Development. Nesting habitat degradation	n/a	n/a	n/a	n/a	N	n/a	n/a	n/a



Other	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
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**Table 2.** Green and hawksbill turtles nesting sites reported for Fiji in the last twenty years. (Note: central point refers to the island, not the single beach).

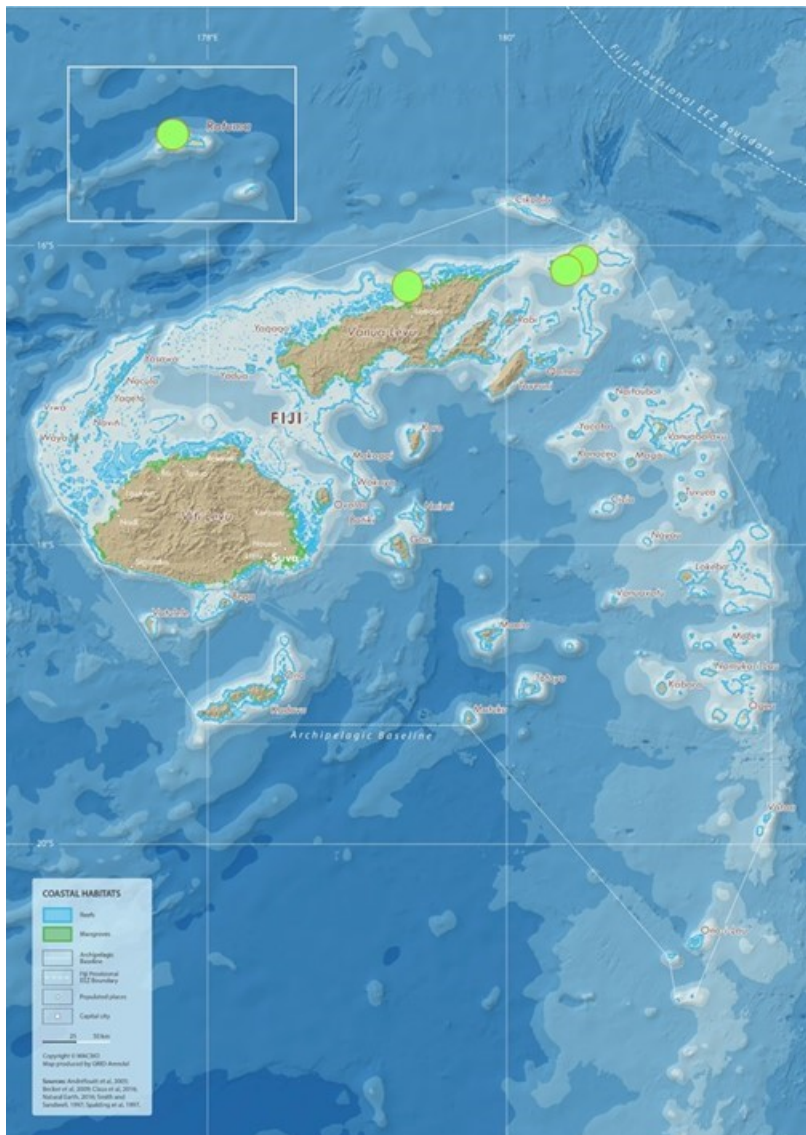
RMU / Nesting beach name	Index site	Nests/yr : recent average (range of years)	Crawls/yr : recent average (range of years)	Central point		Length (km)	% Monitored	Reference #	Monitoring Level (1-2)	Monitoring Protocol (A-F)
<b>CM-SC PAC</b>										
Hemskercq Reef	Y	n/a	n/a	- 16.7208	- 179.4417	n/a	n/a	[3]	n/a	n/a
Ringgold Reef	Y	40 (2010)	14 (2010)	- 16.3000	- 179.4083	n/a	n/a	[5]	n/a	n/a
Mali	N	1 (2009-2010)	n/a	- 16.3433	- 179.3254	n/a	n/a	[12]	n/a	n/a
Hatana Island	N	13 (2007)	n/a	- 12.4795	- 176.9658	n/a	n/a	[2]	n/a	n/a
<b>EI-SC PAC</b>										
Namena Lala Island	Y	8 (1995-1999)	n/a	- 17.1121	- 179.0972	n/a	n/a	[3]	n/a	n/a
Makogai Island	N	1 (1999-2000)	n/a	- 17.4479	- 178.9650	n/a	n/a	[3]	n/a	n/a

Makogai Island	N	3 (1995-1999)	n/a	- 17.447 9	- 178.965 0	n/a	n/a	[3]	n/a	n/a
Leluvia & Caqalai Islands	N	3 (1995-1999)	n/a	- 16.815 2	- 178.301 2	n/a	n/a	[3]	n/a	n/a
Yadua Islands	N	14.5 (2009-2011)	5 (2009-2011)	- 16.741 3	- 178.528 1	n/a	100	[11,20,12]	n/a	n/a
Koroinasolo	N	0 (2009-2010)	1 (2009-2010)	- 16.590 8	- 178.589 6	n/a	n/a	[12]	n/a	n/a
Yaqaga	N	8 (2009-2010)	n/a	- 16.590 8	- 178.589 6	n/a	n/a	[12]	n/a	n/a
Druadrua	N	5 (2009-2010)	n/a	- 16.199 8	- 179.616 1	n/a	n/a	[12]	n/a	n/a
Mali	N	1 (2009-2010)	n/a	- 16.343 3	- 179.325 4	n/a	n/a	[12]	n/a	n/a
Katawaqa	N	44.5 (2009-2011)	n/a	- 16.194 2	- 179.559 3	n/a	n/a	[20,12]	n/a	n/a
Nukuci	N	2 (2009-2011)	n/a	- 16.497 7	- 178.846 2	n/a	n/a	[20,12]	n/a	n/a
Kia	N	1.5 (2009-2011)	1 (2009-2010)	- 16.234 4	- 179.094 0	n/a	n/a	[20,12]	n/a	n/a
Hatana Island	N	8 (2007)	n/a	- 12.479 5	- 176.965 8	n/a	n/a	[2]	n/a	n/a

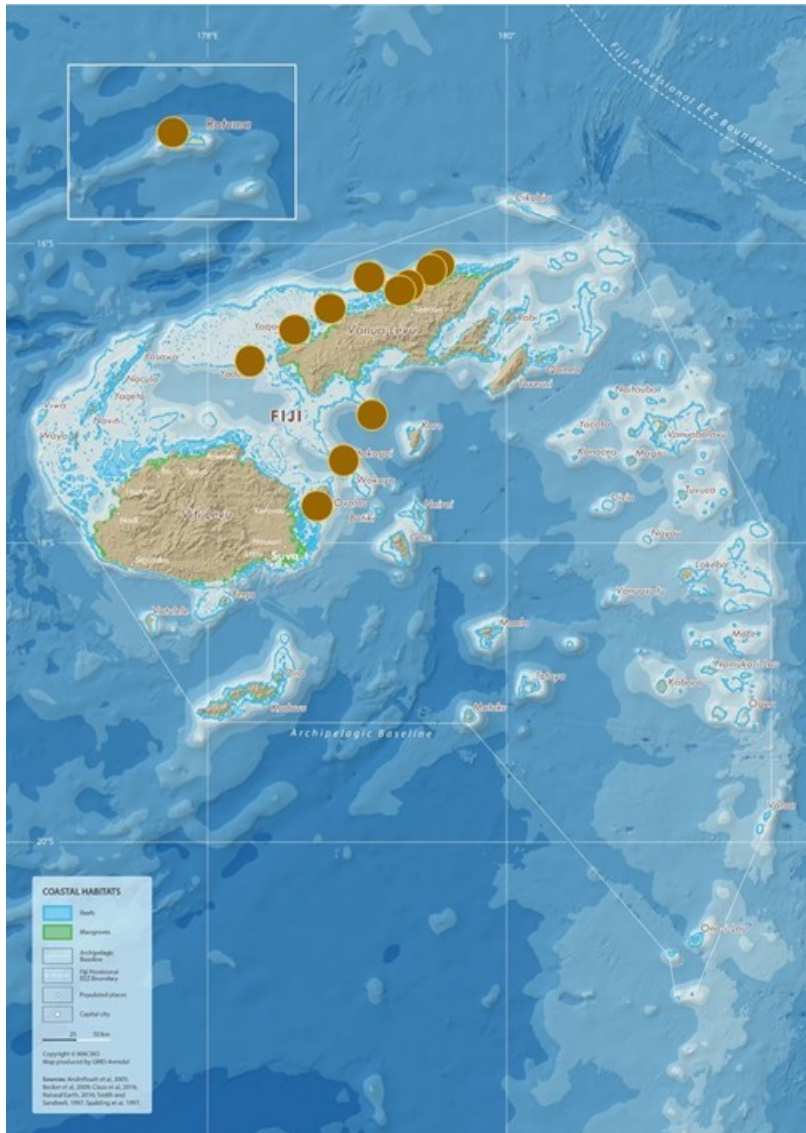
**Table 3.** International conventions that have a nexus to sea turtle conservation.

<b>International Conventions</b>	<b>Signed</b>	<b>Binding</b>	<b>Compliance measured and reported</b>	<b>Species</b>	<b>Conservation actions</b>	<b>Relevance to sea turtles</b>
Convention on Migratory Species	Y	N	n/a	ALL	Protection of all the migratory species in Fiji waters.	Sea turtles are one of the migratory species that CMS ensures is protected by different range states as well.
Convention on International Trade of Endangered Species	Y	Y	Y	ALL	Scheduling of the EPS Act 2002 and Amended Act of 2017 as a national legislation which included species that trade was regulated for.	Turtles are listed under the Act, thus trade was not allowed and illegal exports or imports of any turtle product has been monitored.
Convention on Biological Diversity	Y	Y	n/a	ALL	The establishment of the National Biodiversity Strategic Action Plan Working Groups. One of the thematic areas was Species which looked at all the protection and management of all species under threat. The compilation and implementation of the Fiji Sea Turtle Recovery Plan.	All species of turtles are protected in Fiji and the working group under the NBSAP looked at protection and management of sea turtles.
Convention for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean	Y	Y	Y	ALL	Regulatory measures in place such as the use of specific types of gears that ensures, effective management and the long-term conservation and sustainable use of highly migratory fish stocks in the western and central Pacific Ocean.	Turtles are one of the by-catch species that are frequently caught and having observers on vessels and certain regulated hooks to be used minimizes the bycatch of turtles and enhances reporting.

United Nations Framework Convention on Climate Change	Y	Y	n/a	ALL	The Convention looks at reducing the emission of harmful gasses by nations that alters the composition of the global atmosphere in a destructive manner, which is aimed at reducing temperatures and sea level rise.	The rise in beach temperature, which is nesting grounds for turtles, will affect the gender of the hatchlings that are produced causing an imbalance. The rise in sea temperatures might also affect the seagrass production which is green turtle diet.
United Nations Convention on the Law of the Sea	Y	Y	n/a	ALL	UNCLOS looks at defining boundaries for national countries to govern and manage their marine resources and Fiji declared a Turtle Moratorium in its waters.	The Moratorium regulates any harvest or engagement of turtle or turtle products.



**Figure 1.** Green turtle active nesting sites, as per literature review (from 27 MacBio).



**Figure 2.** Hawksbill turtle active nesting sites, as per literature review (from 27 MacBio).



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