SEA TURTLES IN THE WEST AFRICA/EAST ATLANTIC REGION

MTSG Regional Report 2020

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REGIONAL OVERVIEW

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General remarks

The Regional Reporting Initiative of the Marine Turtle Specialist Group aims to gather information from all all Regional Management Units (RMUs) updating on the current status and knowledge for all sea turtle populations (RMUs) in such a manner that it is presented in a standardized form and made available to the public.

The present Report is an update of the previous report, published in 2018 (https://www.iucn-mtsg.org/regional-reports), and covers 19 countries out of 25 of the West Africa/East Atlantic Region (Table 2).

Here we provide a summary (Table 1) of the main information from the individual chapters, in order to allow the reader to easily locate where to find a specific information.

Table 2. Overview of the 25 West Africa Countries/Territories and the information included in this Report.

ALL COUNTRIES/TERRITORIES OF THE REGION	CODE	INCLUDED IN THE PRESENT REPORT AND YEAR OF UPDATE
ANGOLA	AGO	2020
ASCENSION ISLAND (UK)	AI	2019
BENIN	BEN	2020
CABO VERDE	CPV	2020
CAMEROON	CMR	2020
CANARY ISLANDS (SPAIN)	CI	2020
DEMOCRATIC REPUBLIC OF CONGO	COD	2020
EQUATORIAL GUINEA	GNQ	2018
GABON	GAB	2020
GAMBIA	GMB	2018
GHANA	GHA	2020
GUINEA	GIN	Not included
GUINEA-BISSAU	GNB	2020
IVORY COAST	CIV	2020
LIBERIA	LBR	2019
MAURITANIA	MRT	Not included
MOROCCO	MAR	2020
NAMIBIA	NAM	2018
NIGERIA	NGA	Not included
REPUBLIC OF CONGO	COG	2019
SAO TOME & PRINCIPE	STP	2020
SENEGAL	SEN	Not included
SIERRA LEONE	SLE	2020
TOGO	TGO	Not included
WESTERN SAHARA	ESH	Not included

Table 1. Summary of key biological and conservation data for sea turte Regional Management Units (RMUs) in the West Africa/East Atlantic Region, extracted from Tables 1 of individual country chapters.

RMU	**LO-ATLANTIC-EAST**	Country Chapters	**EI - ATLANTIC-EAST**	Country Chapters	**CC-Atlantic Northeast**	Country Chapters	**CM-Atlantic**	Country Chapters
Occurrence								
Nesting sites	Y	AGO, BEN, CMR, COD, GNQ, GAB, GHA, GNB, CIV, LBR, COG, STP, SLE	Y	CMR, GNQ, GMB, GNB, LBR, STP, SLE	Y	AGO, CPV, GHA, SLE	Y	AGO, AI, BEN, CMR, GNQ, GMB, GHA, GNB, CIV, LBR, COG, STP, SLE
Pelagic foraging grounds	Y	COD, GAB	n/a		Y	AGO, CPV, CI	Y	GHA, CIV
Benthic foraging grounds	Y	COG, STP	Y	AGO, AI, GNB, COG, STP	Y	CPV, CI, MAR, STP	Y	AGO, BEN, CI, GAB, GMB, GNB, CIV, NAM, COG, STP
Key biological data								
Nests/yr: recent average (range of years)	12753	AGO, BEN, CMR, COD, GNQ, GAB, GMB, GHA, GNB, CIV, COG	86	GNQ, GMB	43501	CPV, GHA	24500	AGO, AI, BEN, CMR, GNQ, GMB, GHA, CIV, COG
Nests/yr: recent order of magnitude							51500	AGO, AI, BEN, CMR, GNQ, GMB, GHA, GNB, CIV, COG

Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	40	AGO, CMR, COD, GAB, GMB, GHA, GNB, CIV, COG, STP	8	GMB, STP	79	CPV	49	AI, GNQ, GMB, GHA, GNB, STP
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	27	BEN, CMR, COD, GNQ, COG, STP	14	GNQ, GNB, STP	66	CPV	31	AGO, BEN, CMR, GHA, CIV, COG, STP
Nests/yr at "major" sites: recent average (range of years)	3939	AGO, CMR, COD, GAB, GMB, GHA, CIV	n/a		15000	CPV	676	GNQ, GMB, GHA, GNB
Nests/yr at "minor" sites: recent average (range of years)	650	AGO, BEN, CMR, COD, GNQ	n/a		150	CPV	75	BEN, CMR, GHA, CIV
Total length of nesting sites (km)	1126	AGO, BEN, CMR, COD, GNQ, GAB, GMB, GHA, COG, STP	116	GNQ, GMB, STP	169	CPV, GHA	424.4	AGO, AI, CMR, GNQ, GMB, GHA, GNB, CIV, COG, STP
Nesting females / yr	3538	BEN, CMR, GNQ, GAB	n/a		3501	CPV, GHA	33211	AI, CMR, GNQ, GNB
Nests / female season (N)	103	CMR	n/a		4-6	CPV	3-6	AI, CMR, GNQ, GNB
Female remigration interval (yrs) (N)	n/a		n/a		2-4	CPV	3.75	AI
Sex ratio: Hatchlings (F / Tot) (N)	n/a		n/a		0.79-0.93	CPV	0.55-0.75	AI, GNB
Sex ratio: Immatures (F / Tot) (N)	n/a		n/a		n/a		n/a	
Sex ratio: Adults (F / Tot) (N)	n/a		n/a		n/a		n/a	
Min adult size, CCL or SCL (cm)	40.5 CCL	BEN, COD, GHA, GNB, CIV, COG	81 CCL	GNB	67 CCL	CPV	85 CCL	AI, GNQ, GHA, GNB, CIV
Age at maturity (yrs)	n/a		n/a		n/a		n/a	
Clutch size (n eggs) (N)	118	AGO, BEN, COD, GHA, GNB, COG	163.8	GNB	85.2	CPV	128.7	GHA, GNB

Emergence success (hatchlings/egg) (N)	0.82	AGO, BEN, COD, GHA	n/a		0.47	CPV	0.597	GNB
Nesting success (Nests/ Tot emergence tracks) (N)	0.94	COD, GHA	n/a		0.27	CPV	0.34-0.813	AI, GNB
Trends								
Recent trends (last 20 yrs) at nesting sites (range of years)	Up	BEN, CIV, COD, GNQ, GAB, COG	Down	GMB	Up	CPV	Up, Stable	AI, CIV, GNQ, GNB, STP
Recent trends (last 20 yrs) at foraging grounds (range of years)	Up	COG	n/a		n/a		Up	BEN
Oldest documented abundance: nests/yr (range of years)	Y	AGO, GMB, GHA, STP	Y	GMB, STP	Y	CPV	Y	AI, GNB, GMB, STP
Published studies								
Growth rates	N		N		N		N	
Genetics	N		Y	AI, STP	Y	CPV	Y	AI, CMR, GNB, STP
Stocks defined by genetic markers	N		N		Y	CPV	Y	GNB, STP
Remote tracking (satellite or other)	Y	GAB, GHA	Y	AI	Y	CPV	Y	AI, GNQ, GNB
Survival rates	N						Y	GNQ
Population dynamics	Y	GNQ, STP	Y	GNQ			Y	AI, GNQ, GNB, STP
Foraging ecology (diet or isotopes)	N		Y	STP	Y	CPV	Y	STP
Capture-Mark-Recapture	Y	COD	Y	AI	Y	CPV	Y	AI, GNQ, STP
Threats								

Bycatch: presence of small scale / artisanal fisheries?	Y	CIV, GNQ, GAB, GHA, GMB, GNB, COD, COG, STP, SLE	Y	GNQ, GMB, GNB, COG, STP, SLE	Y	CI, CPV, STP, SLE, MAR	Y	CI, CIV, GNQ, GAB, GMB, GHA, GNB, COG, STP, SLE
Bycatch: presence of industrial fisheries?	Y	CIV, GAB, GMB, GNB, COD,COG, STP, SLE	Y	AI, GMB, GNB, COG, STP, SLE	Y	CPV, STP, SLE, MAR	Y	AI, CIV, GMB, GNB, COG, STP, SLE
Bycatch: quantified?	Y	GHA, COG, SLE	Y	COG, SLE	Y	CPV, SLE, MAR	Y	GHA, COG, SLE
Take. Intentional killing or exploitation of turtles	Y	CMR, CIV, GNQ, GAB, GMB, GHA, GNB, LBR, COG, STP, SLE	Y	GNQ, GMB, GNB, LBR, COG, STP, SLE	Y	CPV, STP, SLE	Y	CMR, CIV, GMB, GHA,GNB, LBR, COG, STP, SLE
Take. Egg poaching	Y	BEN, CMR, CIV, GNQ, GAB, GMB, GHA, GNB, LBR, COG, STP	Y	BEN, CMR, GNQ,LBR, GMB, STP	Y	CPV	Y	BEN, CMR, CIV, GAB, GMB, GHA, LBR, COG, STP
Coastal Development. Nesting habitat degradation	Y	BEN, CMR, CIV, GNQ, GAB, GMB, GHA,GNB, COD, COG, SLE	Y	AI, BEN, GNQ, GMB, SLE	Y	CPV, SLE	Y	BEN, CMR, CIV, GMB, GHA, COG, SLE

Coastal Development. Photopollution	Y	BEN, GNQ, GAB, GMB, GNB, COD	Y	AI, BEN, CMR, GNQ, GMB, COG, STP	Y	CPV	Y	BEN, COG, GMB,
Coastal Development. Boat strikes	Y	CMR, GAB, Nigeria,	Y	CMR, COG	Y		Y	CMR, COG
Egg predation	Y	BEN, CMR, CIV, GNQ, GAB, GHA, GNB, LBR, COD, COG, STP	Y	BEN, CMR, GNQ, GNB, LBR, STP	Y	CPV, CI	Y	BEN, CMR, CI, CIV, GNQ, GHA, LBR, STP
Pollution (debris, chemical)	Y	AGO, BEN, CMR, GAB, GHA, LBR, COG, STP, SLE	Y	BEN, CMR, LBR, COG, STP, SLE	Y	CPV, CI, STP, SLE, MAR	Y	BEN, CMR, CI, GAB, GHA, GNB, LBR, COG, STP, SLE
Pathogens	Y	BEN, COG	Y	BEN, COG	Y	CI, SLE	Y	BEN, CI, GAB, COG, STP, SLE
Climate change	Y	CMR, CIV, GAB, GNB, COG, SLE	Y	AI, CMR, GNB, COG, SLE	Y	CPV, CI, SLE	Y	CMR, CI, CIV, GAB, GNB, COG, SLE
Foraging habitat degradation	Y	CMR, GAB, COG, SLE	Y	CMR, COG, SLE	Y	CI, SLE	Y	CMR, CI, GAB, COG, SLE
Other	Y	GAB, COD, STP	Y	STP	Y	CPV, CI	Y	CI, STP
Long-term projects (>5yrs)								
Monitoring at nesting sites (period: range of years)	Y	AGO, COD, GNQ, GAB, GNB, CIV, LBR, COG, STP, SLE	Y	AGO, GNQ, GNB, LBR, STP, SLE	Y	AGO, CPV, STP, SLE	Y	AGO, AI, GNQ, GNB, CIV, LBR, COG, STP, SLE

Number of index nesting sites	43	AGO, COD, GNQ, GAB, LBR, COG, STP, SLE	23	AGO, GNQ, LBR, STP, SLE	26	AGO, CPV, SLE	38	AGO, AI, GNQ, GNB, LBR, COG, STP, SLE
Monitoring at foraging sites (period: range of years)	Y	GMB, GHA, COG	Y	GMB, GHA, COG, STP	Y	CI, GHA	Y	GAB, GMB, GHA, COG, STP, SLE
Conservation								
Protection under national law	Y	BEN, CMR, COD, GNQ, GAB, GHA, GNB, CIV, LBR, COG, STP, SLE	Y	AI, BEN, CMR, GNQ, GNB, LBR, COG, STP, SLE	Y	AGO, CPV, CI, MAR, STP, SLE	Y	AI, BEN, CMR, GNQ, GAB, GHA, GNB, CIV, LBR, MAR, COG, STP, SLE
Number of protected nesting sites (habitat preservation) (% nests)	15	AGO, COD, GNB, CIV, LBR	4	GNB, LBR	n/a		15+	AGO, AI, GNB, CIV, LBR, COG
Number of Marine Areas with mitigation of threats	19	COD, GNQ, GAB, NAM, COG, SLE	14	AI, GNQ, NAM, COG, SLE	8	NAM, SLE	45	AI, GNQ, GAB, NAM, COG, SLE
N of long-term conservation projects (period: range of years)	16	AGO, GNQ, GAB, GNB, CIV, LBR, COG, STP, SLE	9	AGO, GNQ, GNB, LBR, COG, STP, SLE	9	AGO, CPV, SLE	17+	AGO, AI, GNQ, GAB, GNB, CIV, LBR, COG, STP, SLE
In-situ nest protection (eg cages)	Y	AGO, BEN, CMR, GHA, CIV, LBR, SLE	Y	GHA, LBR, STP, SLE	Y	GHA, SLE	Y	AGO, CMR, GNQ, GHA, CIV, LBR, STP, SLE
Hatcheries	Y	AGO, BEN, COD, GAB, GHA, CIV, STP	Y	BEN, GHA, STP	Y	CPV, GHA	Y	AGO, BEN, GHA, CIV, STP
Head-starting	Y	COD	n/a		Y	CI	n/a	

By-catch: fishing gear modifications (eg, TED, circle hooks)	Y	COD, GAB	n/a		Y	CPV	n/a	
By-catch: onboard best practices	Y	COD, GAB	n/a		n/a		n/a	
By-catch: spatio-temporal closures/reduction	Y	GAB	n/a		n/a		Y	GAB
Other	Y	COD, GNQ, LBR, COG	Y	GNQ, LBR, COG	Y	CPV	Y	GNQ, LBR, COG

Table 1. (Cont.)

RMU	**DC-Atlantic**	Country Chapters	**CC-NW ATL**	Country Chapters	**CM-SC ATL**	Country Chapters
Occurrence						
Nesting sites	Y	AGO, BEN, CMR, COD, GNQ, GAB, GMB, GHA, GNB, CIV, LBR, COG, STP, SLE	N	CI	N	
Pelagic foraging grounds	Y	CI, NAM, STP	J	CI	N	CI
Benthic foraging grounds	Y	COG	J	CI	J	CI
Key biological data						
Nests/yr: recent average (range of years)	80535	AGO, BEN, CMR, COD, GNQ, GAB, GMB, GHA, CIV, COG	n/a		n/a	
Nests/yr: recent order of magnitude	n/a		n/a		n/a	

Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	25	CMR, GNQ, GAB, GMB, GHA, CIV, COG	n/a		n/a	
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	31	AGO, BEN, CMR, GNB, COG, STP	n/a		n/a	
Nests/yr at "major" sites: recent average (range of years)	1556	AGO, GNQ, GMB, GHA, CIV	n/a		n/a	
Nests/yr at "minor" sites: recent average (range of years)	20	AGO, BEN	n/a		n/a	
Total length of nesting sites (km)	979.6	AGO, BEN, CMR, COD, GNQ, GAB, GMB, GHA, CIV, COG, STP	n/a		n/a	
Nesting females / yr	14176	BEN, CMR, GNQ, GAB	n/a		n/a	
Nests / female season (N)	5.5	GNQ	n/a		n/a	
Female remigration interval (yrs) (N)	3.27	GNQ	n/a		n/a	
Sex ratio: Hatchlings (F / Tot) (N)	n/a		n/a		n/a	
Sex ratio: Immatures (F / Tot) (N)	n/a		n/a		n/a	
Sex ratio: Adults (F / Tot) (N)	n/a		n/a		n/a	
Min adult size, CCL or SCL (cm)	125 CCL	COD, GNQ, GMB, GHA, CIV, COG	n/a		n/a	
Age at maturity (yrs)	n/a		n/a		n/a	
Clutch size (n eggs) (N)	85.6	BEN, COD, GNQ, GHA, COG	n/a		n/a	
Emergence success (hatchlings/egg) (N)	0.6	BEN, COD, GHA	n/a		n/a	

Nesting success (Nests/ Tot emergence tracks) (N)	0.78	COD, GHA, COG	n/a		n/a	
Trends						
Recent trends (last 20 yrs) at nesting sites (range of years)	Up, Down	BEN, CIV, COD, GNQ, COG	n/a		n/a	
Recent trends (last 20 yrs) at foraging grounds (range of years)	n/a		n/a		n/a	
Oldest documented abundance: nests/yr (range of years)	Y	GMB, GHA, STP	n/a		n/a	
Published studies						
Growth rates	N		N		N	
Genetics	Y	GAB, GHA	Y	CI	Y	CI
Stocks defined by genetic markers	N		Y	CI	Y	CI
Remote tracking (satellite or other)	Y	GAB, GHA	Y	CI	Y	CI
Survival rates	Y	GNQ	N		N	
Population dynamics	Y	GNQ	N		N	
Foraging ecology (diet or isotopes)			N		Y	CI
Capture-Mark-Recapture	Y	COD, GNQ, GAB	N		N	
Threats						

Bycatch: presence of small scale / artisanal fisheries?	Y	CI, BEN, CIV, GNQ, GAB, GMB, GHA, GNB, COD,COG, STP, SLE, MAR	Y	CI	Y	CI
Bycatch: presence of industrial fisheries?	Y	BEN, CIV, GAB, GMB, GNB, COD, COG, STP, SLE, MAR	n/a		n/a	
Bycatch: quantified?	Y	GAB, GHA, COG, SLE, MAR	N		N	
Take. Intentional killing or exploitation of turtles	Y	CMR, CIV, GNQ, GAB,GMB, GHA, GNB, LBR, COG, SLE	N		N	
Take. Egg poaching	Y	BEN, CMR, CIV, GNQ, GAB, GMB, GHA, GNB, LBR, COG, STP	n/a		n/a	
Coastal Development. Nesting habitat degradation	Y	BEN, CMR, CIV, GNQ, GAB, GMB, GHA, GNB, COD, COG, SLE	n/a		n/a	

Coastal Development. Photopollution	Y	BEN, GNQ, GAB, GMB, GNB, COD, COG	n/a		n/a	
Coastal Development. Boat strikes	Y	CMR, GAB, COG	Y		Y	
Egg predation	Y	BEN, CMR, CIV, GNQ, GAB, GNB, GHA, LBR, COD, STP	n/a		n/a	
Pollution (debris, chemical)	Y	BEN, CMR, CI, GAB, GHA, LBR, COG, STP, SLE	Y	CI	Y	CI
Pathogens	Y	BEN, CI, COG	Y	CI	Y	CI
Climate change	Y	CMR, CI, CIV, GAB, GNB, COG, SLE	Y	CI	Y	CI
Foraging habitat degradation	Y	CMR, CI, COG, SLE	Y	CI	Y	CI
Other	Y	CI, GAB, COD, STP	Y	CI	Y	CI
Long-term projects (>5yrs)						
Monitoring at nesting sites (period: range of years)	Y	AGO, COD, GNQ, GAB, GNB, CIV, LBR, COG, STP, SLE	n/a		n/a	

Number of index nesting sites	38	AGO, COD, GNQ, GAB, LBR, COG, STP, SLE	n/a		n/a	
Monitoring at foraging sites (period: range of years)	Y	GMB, GHA	Y	CI	N	
Conservation						
Protection under national law	Y	AI, BEN, CMR,COD, GNQ, GAB, GHA, GNB, CIV, LBR, MAR, COG, STP, SLE	Y	CI	Y	CI
Number of protected nesting sites (habitat preservation) (% nests)	17+	AGO, COD, GAB, GNB, CIV, LBR, COG	n/a		n/a	
Number of Marine Areas with mitigation of threats	43	COD, GNQ, GAB, NAM, COG, SLE	N		N	
N of long-term conservation projects (period: range of years)	17+	AGO, COD, GNQ, GAB, GNB, CIV, LBR, COG, STP, SLE	N		N	
In-situ nest protection (eg cages)	Y	AGO, BEN, CMR, GNQ, GHA, CIV, LBR, SLE	n/a		n/a	
Hatcheries	Y	AGO, BEN, COD, GAB, GHA, CIV	n/a		n/a	
Head-starting	Y	COD	N		N	

By-catch: fishing gear modifications (eg, TED, circle hooks)	Y	COD, GAB	N		N	
By-catch: onboard best practices	Y	COD, GAB	N		N	
By-catch: spatio-temporal closures/reduction	Y	GAB	N		N	
Other	Y	COD, GNQ, GAB, LBR, COG	n/a		0	

ANGOLA

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Introduction
Several reports point to the presence of sea turtles and the hazards to which they are subject along the coast of Angola (Ref # 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14, 16, 18, 19, 20, 21, 22, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 36, 37, 38). However, the published data on the actual nesting areas and their numbers are scarce. It should be noted that most of these historical references are based on one-off surveys, or monitoring with a short time horizon. More exhaustive and current works have been carried out along the coast between 2003 and 2020, by the Kitabanga Project based on the Faculty of Sciences of the Agostinho Neto University, and there is a collection of information that is in preparation for its publication but not yet totally available.

1. RMU: Olive ridley turtle (*Lepidochelys olivacea*) – Atlantic East

1.1. Distribution, abundance, trends

1.1.1. Nesting Sites
See Table 1.
Given the available and historic information, the coast of Angola was considered to be of great importance for the nesting of the olive ridley (*Lepidochelys olivacea*) (Ref # 4), especially the beaches in Cabinda (Ref # 6, 7, 22), Soyo (Ref # 9), Ambriz (Ref # 3), Luanda / Palmeirinhas (Ref # 12, 21, 23, 26) and River Longa and Quicombo (Ref # 7). Old data revealed a density of 75 nests per km (Ref # 16).
Current data include olive turtles in the region of Cabinda, Soyo, Kissembo, Palmeirinhas, Sangano, Longa, Cuio and Manono (Ref # 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32).

1.1.2. Marine areas
See Table 1.

1.2. Other biological data
See Table 1.
Based on a study carried out in the region of Palmeirinhas between 2004 and 2009 (Ref # 23), was determined that the mean of annual nesting of olive ridley was 132 nests in 3.5 km, the average size of the postures being 114.6 eggs and the success of emergence was 82%.

Data from 2018, evidenced a total of 3685 nests of olive ridley in an extension of 56.5 km. Between 2014 and 2018, the average number of registrations of the most relevant site of the Kitabanga Project was 1469 nests of olive ridley and the average number of registrations in the site of minor importance was 146 nests of olive ridley (Ref # 30, 31, 32, 33).

1.3. Threats

1.3.1. Nesting sites

See Table 1.

Among the threats mentioned in nesting beaches is predation of nests and death of animals when nesting by man, as well as the presence of natural predators (Ref # 7, 10, 26, 5, 27, 18). On the other hand, the circulation with motor vehicles in nesting areas is another aspect pointed out as impacting on nesting turtles and their postures (Ref # 17, 18).

Another impact observed along many beaches, is the waste that is deposited on the coastline and that somehow overlap on the nests, blocking the rise of neonates on the surface and preventing them from reaching the sea. This contain the remains of fishing nets and in many cases were observed neonates trapped in them (Ref # 17).

1.3.2. Marine areas

See Table 1.

The presence of numerous fishing gear next to the nesting beaches has been the cause of many animal shoulders (Ref # 17, 18, 26)), where the presence of olive ridleys, leatherbacks and green turtles is evident, these last mostly being juvenile animals.

On the other hand, an extrapolation of data indicates that up to 120600 turtles are caught annually in the Angola coast region by longline fishing gear (Ref # 11).

A work conducted by the Kitabanga Project on two nesting beaches, Palmeirinhas and Longa, over a year, and with artisanal fishermen, it was found that out of 1357 bids (use with gill nets), 147 had interaction with sea turtles and resulting in the capture of 405 animals (Ref # 39).

1.4. Conservation

See Table 1.

Since 1972, sea turtles have been listed as protected species under the hunting regulations currently in force at the base of Legislative Decree 107/72 of 13 November and reinforced by Decree 14/84 of 27 February 1984 (Ref # 13, 10). In 2004 the conservation of sea turtles was reinforced with the Law of Aquatic Biological Resources, in its article No.71 that gives them total protection. In 2006 sea turtles were still considered by the National Strategy for Biodiversity of the Ministry of the Environment (NBSAP) as priority conservation species. However, a lapse in the new Joint Executive Decree No. 201/16 of 26 April regards only the protection of the leatherback (*Dermochelys coriacea*) and the loggerhead (*Caretta caretta*), rather than all species.

Within the scope of the International Conventions, Angola is part of the Convention on Biological Diversity (CBD), since 01/04/1998, signed the Abijan Memorandum of the Convention on Migratory Species (CMS) in 2002 and entered into force on 12 / 2006, is

also a signatory to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), ratified on 14/02/2007, of the Convention on Wetlands of International Importance (RAMSAR), with a letter of accession No. 4/16 of 23 August, and is part of the United Nations Framework Convention on Climate Change (UNFCCC) ratified on 05.05.2000 (Ref # 10, 15).
There is currently a study and conservation project for sea turtles (T4.1), Project Kitabanga, of the Faculty of Sciences of Agostinho Neto University, which counts with the consent of the Ministry of the Environment. This project has been implemented since 2003 to date, constantly monitoring 55.5 km distributed by different latitudes of the coast. This project has also carried out annual aerial and land surveys along the coast and has collaborated in the dissemination of information and conservation in nesting areas of sea turtles. To date, the project has protected more than 35.000 postures and allowed more than 3,500,000 neonates to be sent to the sea (Ref # 23).

1.5. Research
See Table 1.
Key knowledge gaps
- Climate change studies
- Fisheries interaction and bycatch
- Foraging ecology

Existing but unpublished data that should be urgently published
There are some works carried out at the Kitabanga Project at UAN / Faculty of Sciences, which are expected to be published in the near future. These data include:
- Current record of distribution and abundance along the entire coast of Angola;
- Population dynamics and hatching successes;
- Migration and movements; and
- Genetic variability of the olive ridley population on the coast of Angola

2. RMU: Green turtle (*Chelonia mydas*) – Atlantic East

2.1. Distribution, abundance, trends

2.1.1. Nesting Sites
See Table 1.
The nesting of green turtles (*Chelonia mydas*) is documented for some coastal regions (Ref # 7, 12, 21), especially in Cabinda (Ref # 7), Luanda (Ref # 2, 7), Quicombo, and Tigers Bay (Ref # 16).
Also note the presence of the green turtle in Soyo, Kissembo, Cuio and Bentiaba, and are absent in the central part of the coast of Angola.

2.1.2. Marine areas
See Table 1.
For the green turtle, the Bay of Mussulo and the mouth of the Cunene River seem to be important areas for feeding and growing turtles of this species (Ref # 1, 7, 8, 10, 15, 21, 29), having observed mating in Baia do Mussulo (Ref # 1, 31, 32).

2.2. Other biological data
See Table 1.
Data from 2018, evidenced a total of 6 green turtles in an extension of 56.5 km.

2.3. Threats

2.3.1. Nesting sites
See Table 1.
See 1.3.1

2.3.2. Marine areas
See Table 1.
See 1.3.2.

2.4. Conservation
See Table 1.
See 1.4.

2.5. Research
See Table 1.
See 1.5.

3. RMU: Leatherback turtle (*Dermochelys coriacea*) – Atlantic Southeast

3.1. Distribution, abundance, trends

3.1.1. Nesting Sites
See Table 1.
Leatherbacks (*Dermochelys coriacea*) were considered abundant in Angola, where nesting was documented between Quicombo and Luanda, and on the coast of Cabinda (Ref # 7, 12, 21, 22).
Presence of leatherback in the same regions of olive ridleys (Cabinda, Soyo, Kissembo, Palmeirinhas, Sangano, Longa, Cuio and Manono; Ref # 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32).

3.1.2. Marine areas
See Table 1.
Specimens of leatherback, both adult and sub-adult animals can be observed along the coast during the reproductive period (Ref # 7).

3.2. Other biological data
See Table 1.

Data from 2018, evidenced a total of 71 leatherbacks in an extension of 56.5 km. Between 2014 and 2018, the average number of registrations of the most relevant site of the Kitabanga Project was 25 nests of leatherback, and the average number of registrations in the site of minor importance was only 2 nests of leatherback (Ref # 30, 31, 32, 33).

3.3. Threats
3.3.1. Nesting sites
See Table 1.
See 1.3.1.

3.3.2. Marine areas
See Table 1.
See 1.3.2.

3.4. Conservation
See Table 1.
See 1.4.

3.5. Research
See Table 1.
See 1.5.

4. RMU: Hawksbill turtle (*Eretmochelys imbricata*) – Atlantic East

4.1. Distribution, abundance, trends

4.1.1. Nesting Sites
See Table 1.
As far as the hawksbill (*Eretmochelys imbricate*) is concerned, very little is known about it, and there is only a record of its presence along the coast (Ref # 7, 10, 12).

4.1.2. Marine areas
See Table 1.

4.2. Other biological data
See Table 1.

4.3. Threats
4.3.1. Nesting sites
See Table 1.
See 1.3.1.

4.3.2. Marine areas
See Table 1.
See 1.3.2.

4.4. Conservation
See Table 1.
See 1.4.

4.5. Research
See Table 1.
See 1.5.

5. RMU: Loggerhead turtle (*Caretta caretta*) – Indian Southwest (?)

5.1. Distribution, abundance, trends

5.1.1. Nesting Sites
See Table 1.
The condition of the loggerhead (*Caretta caretta*), according to some authors, does not seem to go beyond sporadic presence in the region, without using the coast for nesting (Ref # 2, 4, 7, 10, 12, 38).
For the loggerhead, only one record was found in the Palmeirinhas region (Ref # 15).

5.1.2. Marine areas
See Table 1.
It is reported the presence of loggerhead in territorial waters of Angola, presuming to be feeding areas for this species (Ref # 38).

5.2. Other biological data
See Table 1.

5.3. Threats
5.3.1. Nesting sites
See Table 1.
See 1.3.1.

5.3.2. Marine areas
See Table 1.
See 1.3.2.

5.4. Conservation
See Table 1.
See 1.4.

5.5. Research
See Table 1.
See 1.5.

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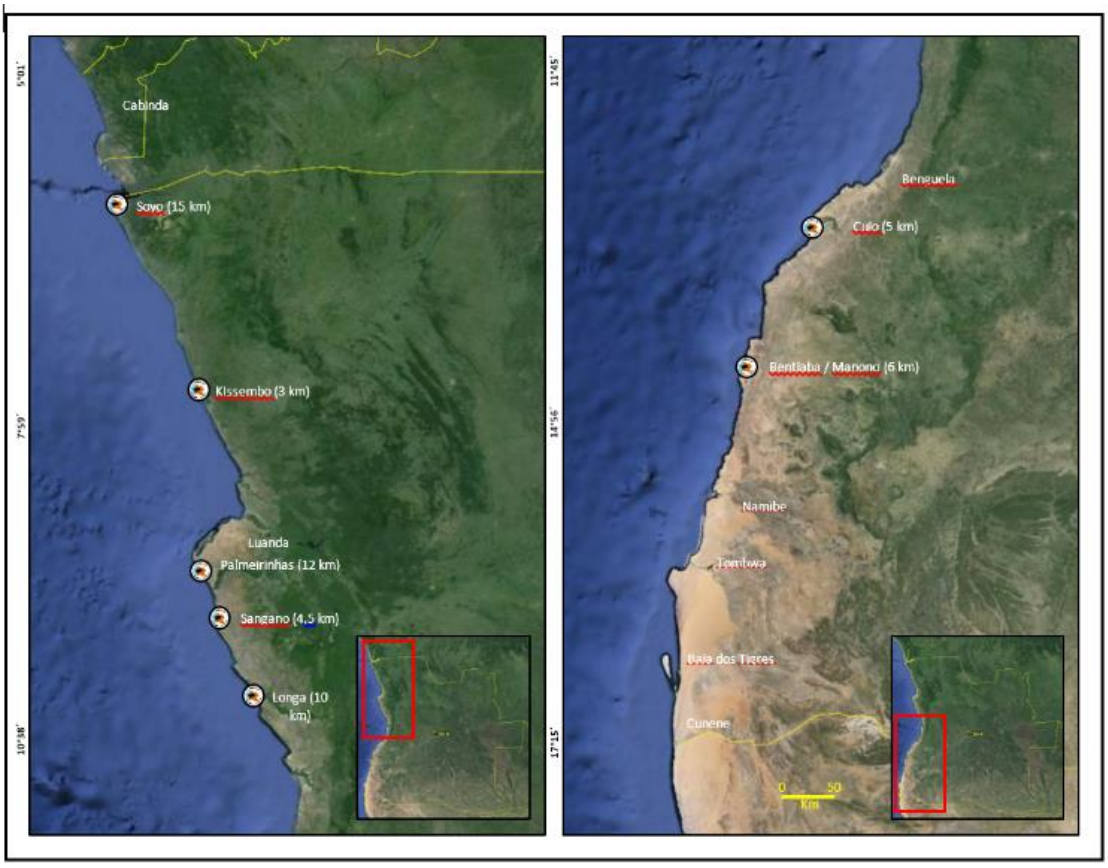

Figure 1. Relevant sites for sea turtle RMUs in Angola.

Table 1. Biological and conservation information about sea turtle Regional Management Units in Angola.

RMU	CC	Ref #	CM	Ref #	DC	Ref #	LO	Ref #	EI	Ref #
Occurrence										
Nesting sites	y	15, 23, 30, 31, 32	Y	23, 30, 31, 32	Y	23, 30, 31, 32	Y	23, 30, 31, 32	N	23, 30, 31, 32
Pelagic foraging grounds	A	38	n/a		n/a		n/a		n/a	
Benthic foraging grounds	n/a		JA	8, 27, 29	n/a		n/a		J	21, 31
Key biological data										
Nests/yr: recent average (range of years)	n/a		6 (2018)	32	71 (2018)	32	3685 (2018)	32	n/a	
Nests/yr: recent order of magnitude	n/a		n/a		n/a		n/a		n/a	
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	n/a		n/a		n/a		8	30, 31, 32	n/a	
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	n/a		8	32	8	32	n/a		n/a	

Nests/yr at "major" sites: recent average (range of years)	n/a		n/a		25 (2014-2018)	30, 31, 32	1469 (2014-2018)	30, 31, 33	n/a	
Nests/yr at "minor" sites: recent average (range of years)	n/a		n/a		2 (2014-2018)	30, 31, 33	146 (2014-2018)	30, 31, 34	n/a	
Total length of nesting sites (km)	n/a		56.5	32	56.5	32	56.5	32	n/a	
Nesting females / yr	n/a		n/a		n/a		n/a		n/a	
Nests / female season (N)	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	
Sex ratio: Hatchlings (F / Tot) (N)	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	
Sex ratio: Adults (F / Tot) (N)	n/a		n/a		n/a		n/a		n/a	
Min adult size, CCL or SCL (cm)	n/a		n/a		n/a		n/a		n/a	
Age at maturity (yrs)	n/a		n/a		n/a		n/a		n/a	
Clutch size (n eggs) (N)	n/a		n/a		n/a		114,6 (130)	19	n/a	
Emergence success (hatchlings/egg) (N)	n/a		n/a		n/a		0.82 (119)	19	n/a	
Nesting success (Nests/ Tot emergence tracks) (N)	n/a		n/a		n/a		n/a		n/a	
Trends										
Recent trends (last 20 yrs) at nesting sites (range of years)	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	
Oldest documented abundance: nests/yr (range of years)	n/a		n/a		n/a		75/km (1992)	16, 25	n/a	

Published studies										
Growth rates	N		N		N		N		N	
Genetics	N		N		N		N		N	
Stocks defined by genetic markers	N		N		N		N		N	
Remote tracking (satellite or other)	N		N		N		N		N	
Survival rates	N		N		N		N		N	
Population dynamics	N		N		N		N		N	
Foraging ecology (diet or isotopes)	N		N		N		N		N	
Capture-Mark-Recapture	N		N		N		N		N	
Threats										
Bycatch: presence of small scale / artisanal fisheries?	n/a		Y (SN)	30, 31, 32, 39	Y (SN)	30, 31, 32, 39	Y (SN, PLL)	30, 31, 32, 39	Y (SN)	30, 31, 32, 39
Bycatch: presence of industrial fisheries?	n/a		n/a		n/a		n/a		n/a	
Bycatch: quantified?	n/a		n/a		n/a		n/a		n/a	
Take. Intentional killing or exploitation of turtles	n/a		Y	25, 26, 27, 28, 29	Y	25, 26, 27, 28, 29	Y	25, 26, 27, 28, 29	n/a	
Take. Egg poaching	n/a		Y	19, 27, 29	Y	19, 27, 29	Y	19, 27, 29	n/a	
Coastal Development. Nesting habitat degradation	n/a		n/a		n/a		n/a		n/a	

Coastal Development. Photopollution	n/a		Y	20, 24	Y	20, 24	Y	20, 24	Y	20, 24
Coastal Development. Boat strikes	n/a		Y	29, 30, 31	Y	29, 30, 31	Y	29, 30, 31	n/a	
Egg predation	n/a		Y	5, 7, 10, 26, 27	Y	5, 7, 10, 26, 27	Y	5, 7, 10, 26, 27	n/a	
Pollution (debris, chemical)	Y	20	Y	20	Y	20	Y	20	Y	20
Pathogens	n/a		n/a		n/a		n/a		n/a	
Climate change	n/a		n/a		n/a		n/a		n/a	
Foraging habitat degradation	n/a		n/a		n/a		n/a		n/a	
Other	n/a		N		N		N		N	
Long-term projects (>5yrs)										
Monitoring at nesting sites (period: range of years)	Y (2003-ongoing)	35	Y (2003-ongoing)	35	Y (2003-ongoing)	35	Y (2003-ongoing)	35	Y (2003-ongoing)	35
Number of index nesting sites	7	35	7	35	7	35	7	35	7	35
Monitoring at foraging sites (period: range of years)	N		N		N		N		N	
Conservation										
Protection under national law	Y	40	N	40	Y	40	N	40	N	40
Number of protected nesting sites (habitat preservation) (% nests)	n/a		7 (100%)	32	7 (100%)	32	7 (100%)	32	n/a	
Number of Marine Areas with mitigation of threats	0		0		0		0		0	

N of long-term conservation projects (period: range of years)	>1 (2003-2018)	35	>1 (2003-2017)	35	>1 (2003-2017)	35	>1 (2003-2017)	35	>1 (2003-2017)	35
In-situ nest protection (eg cages)	n/a		Y	32	Y	32	Y	32	n/a	
Hatcheries	n/a		Y	32	Y	32	Y	32	n/a	
Head-starting	n/a		n/a		n/a		n/a		n/a	
By-catch: fishing gear modifications (eg, TED, circle hooks)	n/a		n/a		n/a		n/a		n/a	
By-catch: onboard best practices	n/a		n/a		n/a		n/a		n/a	
By-catch: spatio-temporal closures/reduction	n/a		n/a		n/a		n/a		n/a	
Other	N		N		N		N		N	

Table 2. Nesting beaches of sea turtle Regional Management Units in Angola.

RMU / Nesting beach name	Index site	Nests/yr: recent average (range of years)	Crawls/yr: recent average (range of years)	Western limit		Eastern limit		Central point		Length (km)	% Monitored	Reference #
CM-Angola Coast				Long	Lat	Long	Lat	Long	Lat			

Cabinda	Y	n/a	n/a									7
Soyo	Y	2(2018)	n/a					6°06'35,78"	12°16'31,15"	15	100	32
Kissembo	Y	2(2018)	n/a					7°42'38,96"	12°03'18,09"	3	100	32
Luanda	Y	n/a	n/a									2, 7
Palmeirinhas	Y	0(2018)	n/a					9°12'23,81"	13°04'03,47"	12	100	32
Sangano	Y	0(2018)	n/a					9°33'50,41"	13°11'51,24"	4.5	100	32
Longa	y	0(2018)	n/a					10°15'22,74"	13°30'34,58"	10	100	32
Quicombo	Y	n/a	n/a									7
Cuio	Y	0(2018)	n/a					12°57'19,50"	12°58'36,02"	5	100	32
Manono	Y	4(2018)	n/a					14°08'06,97"	12°22'02,18"	6	100	32
Tiger Bay	Y	n/a	n/a									16
DC-Angola Coast			n/a									
Cabinda	Y	n/a	n/a									12, 7, 17, 18
Soyo	Y	4(2018)	n/a					6°06'35,78"	12°16'31,15"	15	100	32
Kissembo	Y	9(2018)	n/a					7°42'38,96"	12°03'18,09"	3	100	32

Luanda	Y	n/a	n/a									12, 7, 17, 18
Palmeirinhas	Y	28(2018)	n/a					9°12'23,81"	13°04'03,47"	12	100	32
Sangano	Y	3(2018)	n/a					9°33'50,41"	13°11'51,24"	4.5	100	32
Longa	Y	13(2018)	n/a					10°15'22,74"	13°30'34,58"	10	100	32
Quicombo	Y	n/a	n/a									12, 7, 17, 18
Cuio	Y	8(2018)	n/a					12°57'19,50"	12°58'36,02"	5	100	32
Manono	Y	6(2018)	n/a					14°08'06,97"	12°22'02,18"	6	100	32
LO-Angola Coast			n/a									
Cabinda	Y	n/a	n/a									7, 6, 18
Soyo	Y	1023(2018)	n/a					6°06'35,78"	12°16'31,15"	15	100	9
Kissembo	Y	288(2018)	n/a					7°42'38,96"	12°03'18,09"	3	100	32
Ambriz	Y	n/a	n/a									3
Palmeirinhas	Y	734(2018)	n/a					9°12'23,81"	13°04'03,47"	12	100	32
Sangano	Y	132(2018)	n/a					9°33'50,41"	13°11'51,24"	4.5	100	32
Longa	Y	1210(2018)	n/a					10°15'22,74"	13°30'34,58"	10	100	7, 32

Quicombo	Y	n/a	n/a									7
Cuio	Y	93(2018)	n/a					12°57'19,50"	12°58'36,02"	5	100	32
Manono	Y	194(2018)	n/a					14°08'06,97"	12°22'02,18"	6	100	32

Table 3. International conventions relevant to sea turtle Regional Management Units in Angola.

International Conventions	Signed	Binding	Compliance measured and reported	Species	Conservation actions	Relevance to sea turtles
CDB	Y	Y				
CMS	Y	Y				
CITES	Y	Y				
RAMSAR	Y	Y				
UNFCCC	Y	Y				

Table 4. Projects and databases relevant to sea turtle Regional Management Units in Angola.

#	RMU	Country	Region / Location	Project Name or descriptive title	Key words	Start date	End date	Leading organisation	Public/Private
T4.1		Angola	Angola Coast	Projecto Kitabanga	Distribuition, abundance, hatching successes, movements, genetic variability, Angola coast	2003	Ongoing	Faculdade de Ciencias / UAN	Public

Table 4. (cont.)

#	Collaboration with	Reports / Information material	Current Sponsors	Primary Contact (name and Email)	Other Contacts (name and Email)
T4.1	Fundação Kissama	www.facebook.com/Kitabanga	BP, Angola Cables, LNG, Holisticos	Miguel Morais - dikunji@yahoo.com.br	Vladimir Russo - fundacao.kissama@gmail.com

Table 4. (cont.)

#	Database available	Name of Database	Names of sites included (matching Table B, if appropriate)	Beginning of the time series	End of the time series	Track information	Nest information	Flipper tagging	Tags in STTI-ACCSTR?	PIT tagging	Remote tracking	Ref #
T4.1	Y	Projecto Kitabanga		2003	2020	Y	Y	Y		Y		32

ASCENSION ISLAND (UK)

[last update: 2019]

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1. **RMU:** South Atlantic: Chelonia mydas, Eretmochelys imbricata

1.1.Distribution, Abundance, Trends

As part of the Ascension Island Biodiversity Action Plan, the Green turtle Species Action Plan[21] is available to view at the link below. This plan details the current knowledge of this species, the threats and management actions.

http://www.ascension-island.gov.ac/wp-content/uploads/2012/12/GREEN-TURTLE-SAP.pdf

Ascension Island has a long history of the harvest of green turtles as an important source of meat for those stationed on the island and for passing ships to carry live turtles on the journeys for fresh meat[6]. Admiralty records show that at its peak in the year 1845, 1,506 females were taken and by the 1930s the harvest became untenable owing to the small number of females nesting[6]. In 1944 green turtles were protected at Ascension Island.

Nesting of green turtles has been recorded at 31 beaches around the coasts of Ascension Island[1] (Figure 1.), totaling 5.8 km in length. These beaches are clustered into four groups although over 75% of nesting is recorded on just three beaches: Long Beach (Beach 12); SW Bay (Beach1) and North East Bay (Beach 27). Long Beach is monitored each week throughout the nesting season on two consecutive days, with tracks erased the day before each count. SW Bay and North East Bay are monitored using the same methodology every two weeks and the minor beaches monitored every five years with one count every two weeks[1]. These island wide assessments provide data on the proportion of nests laid at each of the 31 beaches allowing estimates to be made for the intervening years.

For the period 2010-2013, it is estimated that between 22,510-24,938 clutches were laid annually[1]. Research has shown that females at Ascension lay on average six clutches per year[2], and breed on average every 3.75[3] yrs, thus there are estimated to be 13,525-16,149 breeding females in this population[1]. From historical harvest records it is estimated that in1822 there must have been at least 17,660 breeding females in order for the population to have survived the level of harvest experienced and thus it would seem that this population has recovered to pre-exploitation levels. This population is the largest in the South Atlantic, and the third largest in the Atlantic behind Tortuguero, Costa Rica and Poilao, Guinea Bissau.

Green turtles at Ascension are the largest in the world, maximum CCL recorded is 131cm although in recent decades maxima of 124cm CCL and evidence that the size of females have declined over historical times, likely a result of the extensive harvest of the past[1].

1.1.2 Marine Areas

Hawksbill turtles are found foraging in the waters of Ascension Island with sightings recorded around the majority of the coastline, although concentrated around the English Bay and Georgetown areas (Fig 1) which are also the most frequented by the public[7]. There has been no record of nesting by this species at Ascension Island. A capture-mark–recapture tagging program together with satellite tracking has recorded home ranges of individuals and residency in Ascension waters for up to 7.3 yrs. Hawksbill turtles at this site are mostly of sub-adult size with a mean of 48.8cm, ranging from 33.5-85cm CCL[7]. It is thought that this is an important mid-Atlantic stopover site for this species.

Green turtles inhabit coastal waters during the inter-nesting intervals, where mating is observed in large numbers, particular the Clarence Bay area offshore from Long Beach (Beach 12 Fig 1)[20]. Green turtles nesting at Ascension Island migrate to the coast of Brazil to forage. This takes around six weeks. There are no known foraging sites at Ascension Island for this species.

1.2 Other biological data

All previously published papers from Ascension Island are included in a collection of papers titles: Ascension; at the following site http://www.seaturtle.org/library/

Research at Ascension started in the 1970s with Mortimer and Carr's[3] work that still provides valuable data on the remigration and reproduction of green turtles. In the 1990s migration and navigation studies were initiated[12-18] before the annual monitoring program was initiated in 1998. Subsequently studies into fasting and weight loss[19], diving[17], sex ratios[4] amongst others have been conducted at this site.

1.3 Threats

The Green Turtle Species Action Plan[21] for Ascension Island specifies the following threats as of medium impact according to the IUCN-CMP Unified Classification of Direct Threats: the unquantified threat from climate change, through rising temperatures but also loss of habitat and erosion and inundation of clutches from increases storminess and sea level rise; industrial fisheries are present and pose a threat, although current plans to designate a large scale MPA have closed 50% of AI waters to fishing activity; invasive rodents, and nesting habitat degradation by invasive plant species[21]. This plan also lists the following low impact threats; light pollution; industrial and military effluent (oil spills); recreational activities; residential and commercial development.

1.4. Conservation

A full list of management actions are included in the Green Turtle Species Action Plan[21] for Ascension Island. These include actions in relation to policy and legislation, management, research and monitoring and communication and awareness raising actions.

Ascension Island is signatory to CMS, CITES and CBD. At Ascension Island, green turtles are protected under the Wildlife Protection Ordinance 2013, which prohibits the killing, capture or taking of turtles or their eggs on Ascension Island without license.

The major green turtle nesting beaches of Long Beach, Pan Am Beach and North East Bay as well as their hinterlands and adjacent near shore waters are designated as Nature Reserves under the National Protected Areas Order 2014 and National Protected Areas Regulations 2014. The regulations restrict all forms of development within beach reserves and contain provisions to control pets, open fires, vehicles and motor craft, beach hut use and other forms of recreation.

1.5. Research

Research into the sex ratios of green turtle offspring at Ascension Island is ongoing building on the work of Godley et al 2002[4] that estimated 75% of offspring produced are female.

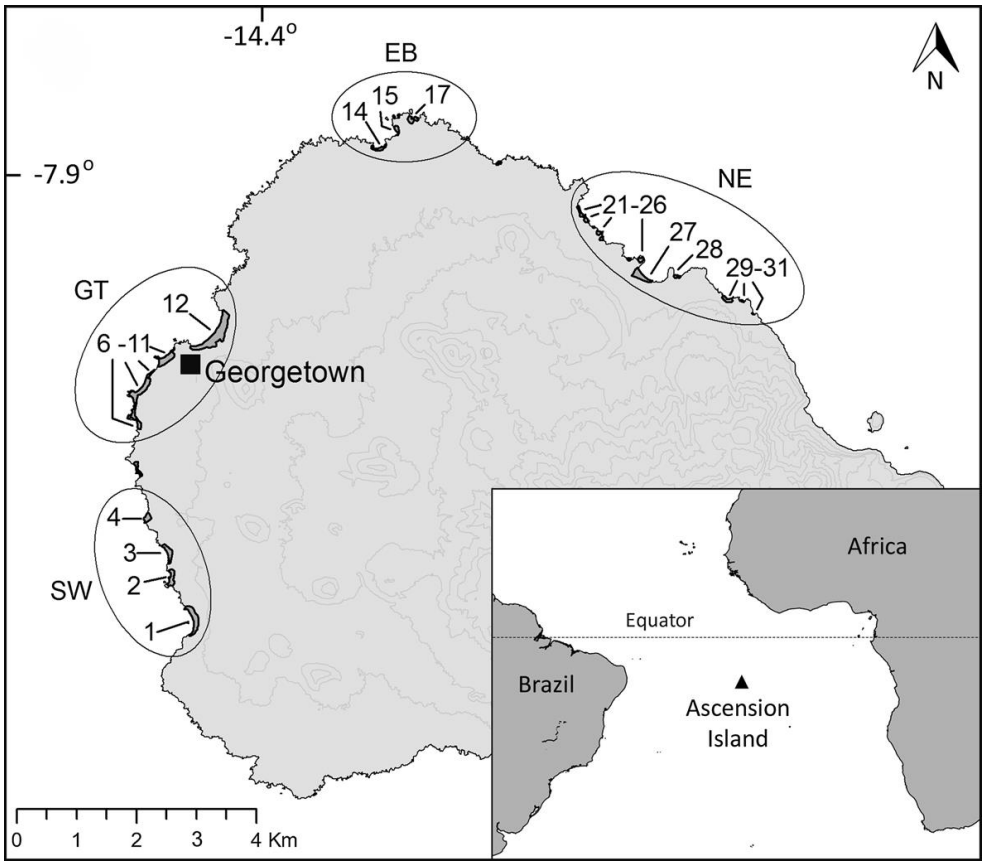

Fig. 1 Locations of green turtle nesting beaches and beach clusters at Ascension Island. Major nesting beach clusters are circled (SW South Western Cluster; GT Georgetown Cluster; EB English Bay Cluster; NE North Eastern Cluster). The location of the main human settlement of Georgetown, which served as the base for historic turtle harvesting operations, is also shown (Figure and legend from Weber et al 2014)

Table 1.

Table 1. Biological and conservation information about sea turtle Regional Management Units in Ascension Island.

	C.mydas - South Atlantic	Ref #	**E.imbricata - South Atlantic**	Ref #
Occurrence				
Nesting sites	Y		N	
Pelagic foraging grounds	N		N	
Benthic foraging grounds	N		Y	7,8
Key biological data				
Nests/yr: recent average (range of years)	22,510–24,938 (2010-2013)	1	n/a	
Nests/yr: recent order of magnitude	n/a		n/a	
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	25	9	n/a	
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)			n/a	
Nests/yr at "major" sites: recent average (range of years)	n/a		n/a	
Nests/yr at "minor" sites: recent average (range of years)	n/a		n/a	
Total length of nesting sites (km)	5.8	9	n/a	
Nesting females / yr	3,752–4,158 (2010-2013)	1	n/a	
Nests / female season (N)	6	2	n/a	
Female remigration interval (yrs) (N)	3.75 years	3	n/a	
Sex ratio: Hatchlings (F / Tot) (N)	75% F	4	n/a	
Sex ratio: Immatures (F / Tot) (N)	N		n/a	
Sex ratio: Adults (F / Tot) (N)	N		n/a	
Min adult size, CCL or SCL (cm)	97cm CCL	1		
Age at maturity (yrs)	N		n/a	
Clutch size (n eggs) (N)			n/a	
Emergence success (hatchlings/egg) (N)			n/a	
Nesting success (Nests/ Tot emergence tracks) (N)	0.34	1	n/a	

Trends				
Recent trends (last 20 yrs) at nesting sites (range of years)	632% (1982-2013)	1	N	
Recent trends (last 20 yrs) at foraging grounds (range of years)	n/a		n/a	
Oldest documented abundance: nests/yr (range of years)	3,598–3,907 (1977-1982)	1	n/a	
Published studies				
Growth rates	N		N	
Genetics	Y	5	Y	7
Stocks defined by genetic markers	N		N	
Remote tracking (satellite or other)	Y	2, 12-18	Y	7
Survival rates	N		N	
Population dynamics	Y	1,6	N	
Foraging ecology (diet or isotopes)	N		N	
Capture-Mark-Recapture	Y	2,3	Y	8
Threats				
Bycatch: presence of small scale / artisanal fisheries?	N		N	
Bycatch: presence of industrial fisheries?	Y (PLL)	21	Y	21
Bycatch: quantified?	N		N	
Take. Intentional killing or exploitation of turtles	N		N	
Take. Egg poaching	N		n/a	
Coastal Development. Nesting habitat degradation	Y	21	n/a	
Coastal Development. Photopollution	N		n/a	
Coastal Development. Boat strikes	N		n/a	
Egg predation	Y		n/a	
Pollution (debris, chemical)	N	21	N	

Pathogens	N		N	
Climate change	Y	21	Y	21
Foraging habitat degradation	n/a		N	
Other	N		N	
Long-term projects (>5yrs)				
Monitoring at nesting sites (period: range of years)	Y (1998-ongoing)		n/a	
Number of index nesting sites	All		n/a	
Monitoring at foraging sites (period: range of years)	n/a		N	
Conservation				
Protection under national law	Y	11	Y	11
Number of protected nesting sites (habitat preservation) (% nests)	3 (73% of nests)	1,10	n/a	
Number of Marine Areas with mitigation of threats	4	10, 11, 21	4	10, 11, 21
N of long-term conservation projects (period: range of years)	1 (1998-2017)			
In-situ nest protection (eg cages)	N		n/a	
Hatcheries	N		n/a	
Head-starting	N		n/a	
By-catch: fishing gear modifications (eg, TED, circle hooks)	N		n/a	
By-catch: onboard best practices	N		n/a	
By-catch: spatio-temporal closures/reduction	N		n/a	
Other			N	

Table 2. Sea turtle nesting beaches in Ascension Island.

RMU / Nesting beach name	Index site	Nests/yr: recent average (range of years)	Crawls/yr: recent average (range of years)	Western limit		Eastern limit		Central point		Length (km)	% Monitored	Reference #	Monitoring Level (1-2)	Monitoring Protocol (A-F)
CM-SA				Long	Lat	Long	Lat	Long	Lat					
Ascension Island	Y	22,510–24,938 (2010-2013)		-14.421	-7.99329	-14.295	-7.88922						1	D1 (D2 every 5 years)

Table 3. International conventions protecting sea turtles and signed by Ascension Island.

International Conventions	Signed	Binding	Compliance measured and reported	Species	Conservation actions	Relevance to sea turtles
CMS	Y	N	Y	ALL		
CITES	Y	Y	Y	ALL		
CBD	Y	N	n/a	ALL		

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BENIN

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[1] Nature Tropicale ONG, Lot 4477 "R" Yagbe 06 BP 1015 Akpakpa PK 3 Cotonou (Republique du Benin)
[2]Action Plus, BP287 Ouidah

1. RMU: Olive Ridley (*Lepidochelys olivacea*) East Atlantic

1.1. Distribution, abundance, trends

1.1.1. Nesting sites
Nesting sites include Grand-Popo, Ouidah, Abomey-Calavi, Cotonou and Sèmè-Podji.

1.1.2. Marine areas
There are no current abundance indexes for the Marine Protected Area.

1.2. Other biological data
See Table 1.

Additional information per nesting site is as follows (see also Table 2):

RMU / Nesting beach name	Index site	Nests/yr: recent average (range of years)	Crawls/yr: recent average (range of years)	Length (km)	% Monitored	Monitoring Protocol (A-F)
Grand-Popo	N	105 (2017 - 2019)	n/a	32	70%	D
Ouidah	Y	40 (2017 - 2019)	n/a	42	100%	D
Abomey-Calavi	N	30 (2017 -2019)	n/a	12	25%	D
Cotonou		75 (2017 -2019)	n/a	22	70%	D
Sèmè-Podji		50 (2017 -2019)	n/a	17	40%	D

Projects and data bases are referenced in Table 4.

1.3. Threats

1.3.1. Nesting sites
Threats at the nesting site include take/ egg poaching, coastal development (nesting habitat degradation, photopollution), egg predation, pollution (debris, chemical) and pathogens (See Table 1).

1.3.2. Marine areas
Threats in Marine areas include bycatch by small scale/artisanal fisheries/industrial fisheries. At these sites both pollution (Debris, chemical) and pathogens seem to be also threats (See Table 1).

1.4. Conservation
Conservation actions taken include: Education and outreach, Awareness projects, Community alternatives and fight against wildlife crimes.

Olive ridley turtles are protected under international (Table 3) and national laws. The nesting sites are not protected. However, there is a hatchery that provides protection for nests and there is in-situ nest protection (see Table 1).

1.5. Research
Research in all fields is needed.

2. RMU: Green turtle (*Chelonia mydas*) EAE/SCAE

2.1. Distribution, abundance, trends

2.1.1. Nesting sites
Nesting sites include Grand-Popo, Ouidah, Abomey-Calavi, Cotonou and Sèmè-Podji.

2.1.2. Marine areas
There are no current abundance indexes for the Marine Protected Area.

2.2. Other biological data
See Table1.

Additional information per nesting site is as follows (see also Table 2):

RMU / Nesting beach name	Nests/yr: recent average (range of years)	Crawls/yr: recent average (range of years)	Length (km)	% Monitored	Monitoring Protocol (A-F)
Grand-Popo	1 en 2019 (Very rare)	n/a	32	70%	D
Ouidah	n/a	n/a	42	100%	D
Abomey-Calavi	n/a	n/a	12	25%	D
Cotonou	n/a	n/a	22	70%	D
Sèmè-Podji	n/a	n/a	17	40%	D

Projects and data bases are referenced in Table 4.

2.3. Threats

2.3.1. Nesting sites
Threats at the nesting site include take/ egg poaching, coastal development (nesting habitat degradation, photopollution), egg predation, pollution (debris, chemical) and pathogens (See Table 1).

2.3.2. Marine areas
Threats in Marine areas include bycatch by small scale/artisanal fisheries/industrial fisheries. At these sites both pollution (Debris, chemical) and pathogens seem to be also threats (See Table 1).

2.4. Conservation
Conservation actions taken include: Education and outreach, Awareness projects, Community alternatives and fight against wildlife crimes.

Green turtles are protected under international (see Table 3) and national laws. The nesting sites are not protected. However, there is a hatchery that provides protection for nests (see Table 1).

2.5. Research
Research in all fields is needed.

3. RMU: Leatherback (*Dermochelys coricea*) NEA/SAE

3.1. Distribution, abundance, trends

3.1.1. Nesting sites
Nesting sites include Grand-Popo, Ouidah, Abomey-Calavi, Cotonou and Sèmè-Podji.

3.1.2. Marine areas
There are no current abundance indexes for the Marine Protected Area.

3.2. Other biological data
See Table1.

Additional information per nesting site is as follows (see also Table 2):

RMU / Nesting beach name	Nests/yr: recent average (range of years)	Crawls/yr: recent average (range of years)	Length (km)	% Monitored	Monitoring Protocol (A-F)
Grand-Popo	4 (2018 -2019)	4	32	70%	D
Ouidah	1 (2018 -2019)	1	42	100%	D
Abomey-Calavi	n/a	n/a	12	25%	D
Cotonou	1 (2018 - 2019)	1	22	70%	D
Sèmè-Podji	n/a	n/a	17	40%	D

Projects and data bases are referenced in Table 4.

3.3. Threats

3.3.1. Nesting sites
Threats at the nesting site include take/ egg poaching, coastal development (nesting habitat degradation, photopollution), egg predation, pollution (debris, chemical) and pathogens (See Table 1).

3.3.2. Marine areas
Threats in Marine areas include pollution (Debris, chemical) and pathogens (See Table 1).

3.4. Conservation
Conservation actions taken include: Education and outreach, Awareness projects, Community alternatives and fight against wildlife crimes.

Leatherback turtles are protected under international and national laws (See Table 3). The nesting sites are not protected. However, there is a hatchery that provides protection for nests and there is in-site nest protection (see Table 1).

3.5. Research
Research in all fields is needed.

4. RMU: Hawksbill turtle (*Eretmochelys imbricata*) East Atlantic

4.1. Distribution, abundance, trends

4.1.1. Nesting sites
Nesting sites include Grand-Popo, Ouidah, Abomey-Calavi, Cotonou and Sèmè-Podji.

4.1.2. Marine areas
There are no current abundance indexes for the Marine Protected Area.

4.2. Other biological data
See Table1.

Additional information per nesting site is as follows (see also Table 2):

RMU / Nesting beach name	Nests/yr: recent average (range of years)	Crawls/yr: recent average (range of years)	Length (km)	% Monitored	Monitoring Protocol (A-F)
Grand-Popo	n/a	n/a	32	70%	n/a
Ouidah	n/a	n/a	42	100%	n/a
Abomey-Calavi	n/a	n/a	12	25%	n/a
Cotonou	n/a	n/a	22	70%	n/a
Sèmè-Podji	n/a	n/a	17	40%	n/a

Projects and data bases are referenced in Table 4.

4.3. Threats

4.3.1. Nesting sites
Threats at the nesting site include take/ egg poaching, coastal development (nesting habitat degradation, photopollution), egg predation, pollution (debris, chemical) and pathogens (See Table 1).

4.3.2. Marine areas
Threats in Marine areas include pollution (Debris, chemical) and pathogens (See Table 1).

4.4. Conservation
Conservation actions taken include: Education and outreach, Awareness projects, Community alternatives and fight against wildlife crimes.

Hawksbill turtles are protected under international and national laws (See Table 3). The nesting sites are not protected. However, there is a hatchery that provides protection for nests and there is in-site nest protection (see Table 1).

4.5. Research
Research in all fields is needed.

References
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Table 1. Biological and conservation information about sea turtle Regional Management Units in Benin.

RMU (all RMUs of all species occurring in a Country or Region)	Olive ridley - AE	Green turtle - EAE/ CM-SCAE	Leatherback- NEA/ DC-SAE	Hawksbill - AE
Occurrence				
Nesting sites	Y(ref 1)	Y	Y	n/a
Pelagic foraging grounds	n/a	n/a	n/a	n/a
Benthic foraging grounds	n/a	Y (ref 2)	n/a	n/a
Key biological data				
Nests/yr: recent average (range of years)	300 (2017-2019)	1 (2018 - 2019)	6 (2018 - 2019)	n/a
Nests/yr: recent order of magnitude	n/a	n/a	n/a	n/a
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	0	0	0	0
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	5	3	3	0
Nests/yr at "major" sites: recent average (range of years)	n/a	0	0	0
Nests/yr at "minor" sites: recent average (range of years)	300 (2017-2019)	1	6	0
Total length of nesting sites (km)	125Km	n/a	10Km	n/a
Nesting females / yr	> 200 (2017-2019)	0	6 (2018 - 2019)	0
Nests / female season (N)	n/a	n/a	n/a	n/a
Female remigration interval (yrs) (N)	n/a	n/a	n/a	n/a
Sex ratio: Hatchlings (F / Tot) (N)	n/a	n/a	n/a	n/a

Sex ratio: Immatures (F / Tot) (N)	n/a	n/a	n/a	n/a
Sex ratio: Adults (F / Tot) (N)	n/a	n/a	n/a	n/a
Min adult size, CCL or SCL (cm)	72 Cm	n/a	n/a	n/a
Age at maturity (yrs)	n/a	n/a	n/a	n/a
Clutch size (n eggs) (N)	110	n/a	80	n/a
Emergence success (hatchlings/egg) (N)	80%	n/a	65%	n/a
Nesting success (Nests/ Tot emergence tracks) (N)	n/a	n/a	n/a	n/a
Trends				
Recent trends (last 20 yrs) at nesting sites (range of years)	Up since 2015	Green turtles are observed in Benin at the juvenile stage. Since 2018, their number has increased and we see them more and more, and even at more advanced stages of growth. Generally, nests of green turtles are not frequently encountered in the field.	Increase between 2018 and 2019	n/a

Recent trends (last 20 yrs) at foraging grounds (range of years)	n/a	Increasing since 2018	n/a	n/a
Oldest documented abundance: nests/yr (range of years)	n/a	n/a	n/a	n/a
Published studies				
Growth rates	N	N	N	N
Genetics	N	N	N	N
Stocks defined by genetic markers	N	N	N	N
Remote tracking (satellite or other)	N	N	N	N
Survival rates	N	N	N	N
Population dynamics	N	N	N	N
Foraging ecology (diet or isotopes)	N	N	N	N
Capture-Mark-Recapture	N	N	N	N
Threats				
Bycatch: presence of small scale / artisanal fisheries?	Y	Y	N	N
Bycatch: presence of industrial fisheries?	Y	Y	N	N
Bycatch: quantified?	N	N	n/a	n/a
Take. Intentional killing or exploitation of turtles	n/a	n/a	n/a	n/a
Take. Egg poaching	Y	Y	Y	Y
Coastal Development. Nesting habitat degradation	Y	Y	Y	Y
Coastal Development. Photopollution	Y	Y	Y	Y
Coastal Development. Boat strikes	n/a	n/a	n/a	n/a
Egg predation	Y	Y	Y	Y
Pollution (debris, chemical)	Y	Y	Y	Y
Pathogens	Y	Y	Y	Y
Climate change	n/a	n/a	n/a	n/a

Foraging habitat degradation	n/a	n/a	n/a	n/a
Other	n/a	n/a	n/a	n/a
Long-term projects (>5yrs)				
Monitoring at nesting sites (period: range of years)	n/a	n/a	n/a	n/a
Number of index nesting sites	n/a	n/a	n/a	n/a
Monitoring at foraging sites (period: range of years)	N	N	N	N
Conservation				
Protection under national law	Y	Y	Y	Y
Number of protected nesting sites (habitat preservation) (% nests)	0%	0%	0%	0%
Number of Marine Areas with mitigation of threats	n/a	n/a	n/a	n/a
N of long-term conservation projects (period: range of years)	n/a	n/a	n/a	n/a
In-situ nest protection (eg cages)	Y	N	Y	n/a
Hatcheries	Y	Y	Y	Y
Head-starting	n/a	n/a	n/a	n/a
By-catch: fishing gear modifications (eg, TED, circle hooks)	n/a	n/a	n/a	n/a
By-catch: onboard best practices	n/a	n/a	n/a	n/a
By-catch: spatio-temporal closures/reduction	n/a	n/a	n/a	n/a
Other				

Table 2. Sea turtle nesting beaches in Benin.

RMU / Nesting beach name	Index site	Nests/yr: recent average (range of years)	Crawls/yr: recent average (range of years)	Western limit		Eastern limit		Central point		Length (km)	% Monitored	Reference #	Monitoring Level (1-2)	Monitoring Protocol (A-F)
LO - AE				Long	Lat	Long	Lat	Long	Lat					
Grand-Popo	N	105 (2017 - 2019)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	32	70%			D
Ouidah	Y	40 (2017 - 2019)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	42	100%			D
Abomey-Calavi	N	30 (2017 - 2019)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	12	25%			D
Cotonou		75 (2017 - 2019)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	22	70%			D
Sèmè-Podji		50 (2017 - 2019)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	17	40%			D
CM - EAE/ CM-SCAE				Long	Lat	Long	Lat	Long	Lat					
Grand-Popo		1 in 2019 (very rare)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	32	70%			D

Ouidah		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	42	100%			D
Abomey-Calavi		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	12	25%			D
Cotonou		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	22	70%			D
Sèmè-Podji		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	17	40%			D
DC - NEA/ DC-SAE														
Grand-Popo		4 (2018 - 2019)	4	n/a	n/a	n/a	n/a	n/a	n/a	32	70%			D
Ouidah		1 (2018 - 2019)	1	n/a	n/a	n/a	n/a	n/a	n/a	42	100%			D
Abomey-Calavi		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	12	25%			D
Cotonou		1 (2018 - 2019)	1	n/a	n/a	n/a	n/a	n/a	n/a	22	70%			D
Sèmè-Podji		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	17	40%			D
EI - AE														
Grand-Popo		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	32	70%			n/a
Ouidah		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	42	100%			n/a
Abomey-Calavi		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	12	25%			n/a

Cotonou		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	22	70%			n/a
Sèmè-Podji		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	17	40%			n/a

Table 3. International conventions protecting sea turtles and signed by Benin.

International Conventions	Signed	Binding	Compliance measured and reported	Species	Relevance to sea turtles
Memorandum of Understanding concerning Conservation Measures for Marine Turtles of the Atlantic Coast of Africa	Y	Y	n/a	ALL (LC, CM, CC, EI)	XX
Convention on Biological Diversity	Y	Y	n/a	ALL	XX
Convention on Migratory Species (CMS)	Y	Y	n/a	ALL	XX
CITES	Y	Y	n/a	ALL	XX
Ramsar Convention on Wetlands	Y	Y	n/a	ALL	XX
UN Framework Convention on Climate Change (UNFCCC)	Y	Y	n/a	ALL	
African Convention on the Conservation of Nature and Natural Resources	Y	Y	n/a	ALL	
Cartagena Protocol on Biosafety to the CBD	Y	Y	n/a	ALL	
Montreal Protocol on substances that Deplete the Ozone Layer	Y	Y	n/a	ALL	
Stockholm Convention on Persistent Organic Pollutants	Y	Y	n/a	ALL	

Convention Concerning the Protection of World Cultural and Natural Heritage	Y	Y	n/a	ALL	
United Nation Convention to Combat Desertification (UNCCD)	Y	Y	n/a	ALL	

Table 4. Projects and databases on sea turtles in Benin.

RMU	**Country**	**Region / Location**	**Project Name or descriptive title**	**Key words**	**Start date**	**End date**	**Leading organization**	**Public/ Private**	**Collaboration with**	**Reports / Information material**	**Current Sponsors**	**Primary Contact (name and Email)**	**Other Contacts (name and Email)**

LO - AE; CM - EAE / CM-SCAE; DC - NEA / DC-SAE; EI - AE	Benin	Littoral du Bénin	Sauvegarde communautaire des espèces ménacées (Cas des Tortues Marines) au Bénin	Education, Communatés locales, Tortues marines, baleines, Dauphins, Application des Lois	2017	2019	NATURE TROPICALE ONG	Privé / ONG	Communes cotières, Ministères du Cadre de Vie et du Développement Durable	www.naturetropicale.org;	IUCN-NL, CeBIOS	** S. Joséa DOSSOU BODJRENOU Nature Tropicale ONG Lot 4477 "R" YAGBE 06 BP 1015 AKPAKPA PK 3 COTONOU (REPUBLIQUE DU BENIN) ntongmu@yahoo.com (+229)96100837	** T. Josias MADOGOTCHA, Benin josiasmat_777@yahoo.fr (+229)97051270 ** D. Marie DOSSOU BODJRENOU, mariedossoubodjrenou@yahoo.fr (+229)97324250 ** M. Danielle SOSSOU, danielle.sossou@yahoo.fr (+229)96122135 ** P. Patrice SAGBO, Benin psagbo@yahoo.fr (+229)95955583

Database available	Name of Database	Names of sites included (matching Table B, if appropriate)	Beginning of the time series	End of the time series	Track information	Nest information	Flipper tagging	Tags in STTI-ACCSTR?	PIT tagging	Remote tracking	Ref #
Y	DB-Turtle	Sèmè Podji, Cotonou, Abomey-Calavi, Ouidah, Grand-Popo	2017	2019	Y	Y	Y	N	N	N	n/a

CABO VERDE

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General remarks
The information presented here are from available published data. Internal reports or gray literature were not included.

1. RMU: Loggerhead sea turtle (*Caretta caretta*) Northeast Atlantic

1.1. Distribution, abundance, trends

1.1.1. Nesting sites

The loggerhead sea turtle (*Caretta caretta*) has only one significant nesting site in the North-East Atlantic in the Archipelago of Cabo Verde. This subpopulation is characterized as a single RMU (Ref. 1), and identified as an isolated genetic stock (Ref. 2, 3, 41, 42). The Archipelago consists of ten islands (Santo Antão, São Vicente, Santa Luzia, São Nicolau, Sal, Boa Vista, Maio, Santiago, Fogo and Brava), and several islets (Figure 1). Loggerhead nesting activity occurs on all islands and the Branco and Rombos islet (Ref. 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14; 43, 45, 47, 52, 53, 54).

The number of nests in the Archipelago is poorly known, and some important islands don´t have this available information (Table 2). Last census, in each island, Santa Luzia was 289 nests in 2011 and 1,810 nests in 2012 (11). In Sal Islands during 2008-2017 was recorded a total of 21,938 nests (7, 54). In Boa Vista Islands from 2007-2009 was estimated a total of 13,955,

12,028 and 19,950 nests in the 3 years, respectively (10). On Maio Islands was 382 nests in 2008 (8) and 2,000 in 2012 (52). In Santiago islands was 39 nests in 2008 (6).
Nest counts on the majority of islands and beaches have been conducted for less than 10 years and no clear trends have been detected yet. Only on 3 beaches of Boa Vista Island, within the Sea Turtle Natural Reserve, a turtle protection program and extensive nest counts have been conducted for more than 20 years (Fig.1; Nest site 23) and suggest an increasing trend in the number of nests (Ref. 14; 43, 44, 49, 55). A clear decreasing trend in hunting pressure on the beach of nesting females has also been detected on Boa Vista Island (Ref. 10, 51, 55).
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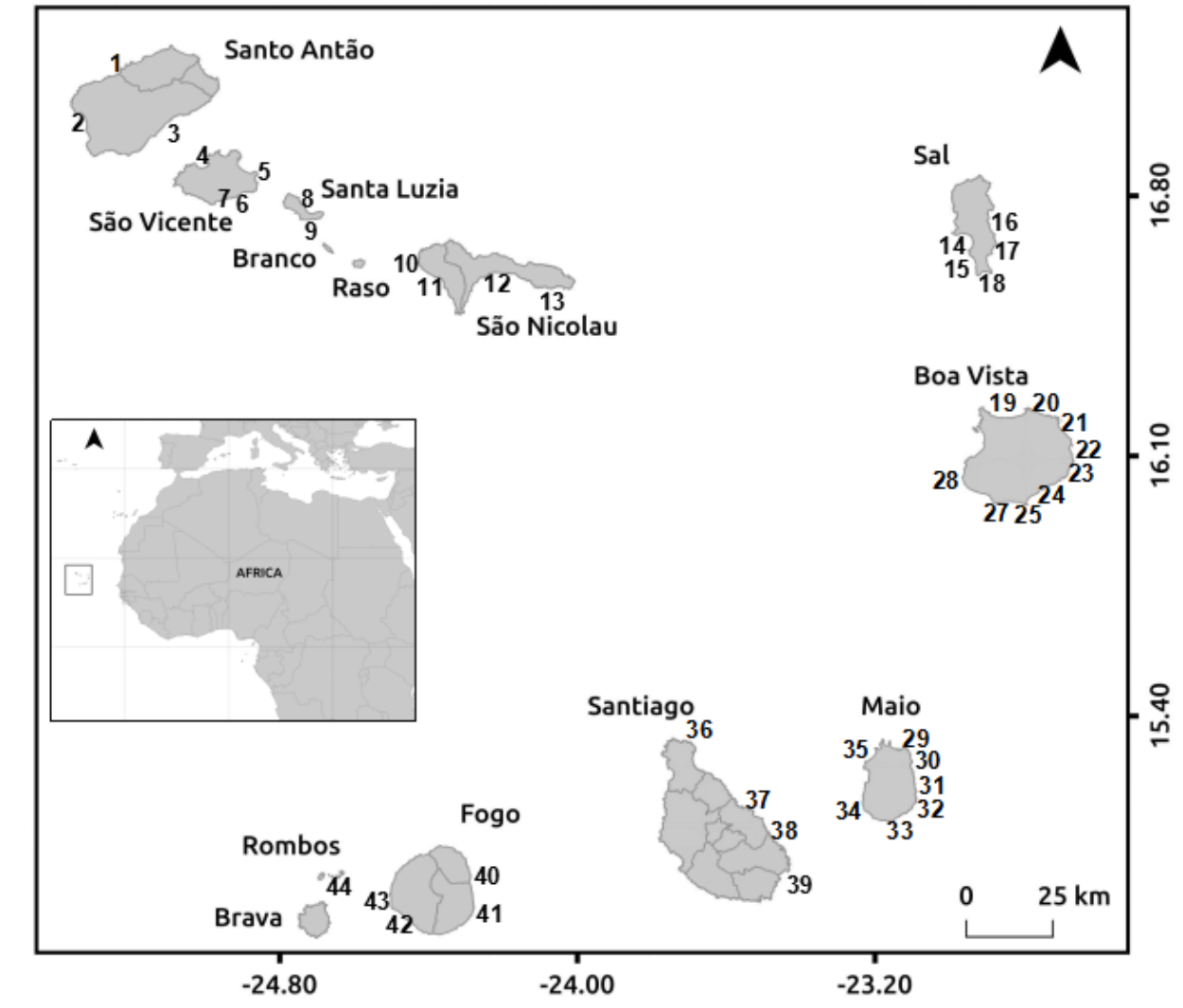

Figure 1. Map of Cabo Verde coastline and major important nesting beaches for each island. 1 – Cruzinha ; 2 - Tarrafal de Monte Trigo; 3 - Porto Novo; 4 - Lazareto, 5 - Praia Grande; 6 - Sandy beach; 7 - Calheta; 8 - Praia dos Achados; 9 - Francisca; 10 - Broco; 11 - Baixo Rotcha; 12 - Porto da Lapa; 13 - Carriçal; 14 - Murdeira; 15 - Algodoeiro; 16 - Costa Leste; 17 - Serra Negra and Costa Fragata; 18 - Santa Maria; 19 - Boa Esperança; 20 - Lancha; 21 - Simon Nho Narda,

22 - Porto Ferreira zone; 23 - Ervatão zone; 24 - João Barrosa zone; 25 - Curral Velho zone; 26 - Lacação zone; 27 - Santa Mônica zone; 28 - Varandinha; 29 - Santo António; 30 - Praia Gonçalo; 31 - Ribeira Baía; 32 - Flamengo; 33 - Djanpadja; 34 - Moro; 35 - Santana; 36 - Medronho; 37 - Praia Grande; 38 - Achada Baleia; 39 - São Francisco; 40 - Praia Cais; 41 - Praia Grande; 42 - Praia de Nossa Senhora; 43 - Fonte Vila; 44 - Rombo Islet.

1.1.2. Marine areas

Satellite tracking studies and remotely sensed environmental data analyses have allowed the mapping of migratory routes of adults and the main foraging grounds between Cabo Verde and the continental African coast, from Mauritania to Sierra Leone (Ref. 15, 16, 17, 18). The population present a trophic dichotomy with the majority of adult females living in the open ocean in pelagic habitats meanwhile around 20 % of adult females live in neritic areas closer to the coast (Ref. 15, 57, 58). The pelagic females are smaller than neritic females (Ref. 15, 57, 58). Juvenile feeding grounds of this loggerhead population have been identified using genetic markers in the eastern Atlantic, and include the waters of France, Azores, Madeira and Canary Islands, as well as the western Mediterranean (Ref. 2, 3, 38, 39, 40, 41) and the southeast coast of USA (Ref. 56). The presence of loggerhead juveniles (except hatchlings) in the waters of Cabo Verde are extremely rare.

1.2. Other biological data

Loggerhead turtles nesting at Cabo Verde present a mean curve carapace length of 81.8 cm (SD = 4.3, range = 67.0-106.0, n = 2882, 1998-2002), the clutch size range from 24-143 (mean = 85.2, SD = 16.3, n = 1523, 1998-2002), lay on average five clutches per breeding season and breeding approximately every 2-3 years (Ref. 43).
Incubation times range from 45 to 74 days (mean = 58.1, SD = 4.3, n = 318, 1998-2002) (Ref. 43). The mean hatching success has been lower than 50 % (Ref. 9, 43) and the main causes of embryonic death have been predation by ghost crabs and beach flooding by high tides (Ref. 26, 36). Hatchling sex ratio estimated suggest a female biased sex ratio (Ref. 33, 34, 35, 61). The average mean growth rate of adult females recorded in this population was 0.34 cm/year (SD = 0.60) (Ref. 62).

1.3. Threats

Despite extensive conservation initiatives developed in the Archipelago over more than two decades, Cabo Verde´s turtles are still subject to a variety of threats (Table 1).

1.4. Conservation

The loggerhead turtle is fully protected by international (Ref. 23) and Cabo Verde´s national legislation (Legislative Decree nº1/2018). Most of the main important nesting beaches are fully or partially protected during the nesting season (Table 1), mainly by NGOs and Local Associations supported by the government of Cabo Verde and international Foundations.

1.5. Research

Key knowledge gaps

Detailed knowledge of the at population size and demographic profile
Mortality rate of adults, juveniles, hatchlings and eggs
Threats in foraging and internesting habitats of adults
Industrial fisheries bycatch, especially in adult feeding grounds, between Cabo Verde and Africa
Migration/movement studies of hatchlings and juveniles
Marine debris impacts on adults and nesting beaches
Impact of tourism and coastal development on nesting, incubation and hatchlings
Temperature sex-determination in this population
Impact of nest relocation programs on survival and hatching phenotype
Degree of connectivity of adult females among islands, within the archipelago
Marine transport and trade of poached turtles from nesting grounds to the main markets
Impact of stray dogs on nest predation and attacks on nesting turtles

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Table 1. Biological and conservation information about sea turtle Regional Management Units in Cabo Verde.

RMU	CC-NE ATL	Ref #
Occurrence		
Nesting sites	Y	4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 43, 45, 47, 52, 53, 54
Pelagic foraging grounds	JA	15, 38, 40, 58
Benthic foraging grounds	JA	15, 58
Key biological data		
Nests/yr: recent average (range of years)	43,500 (2007-2017)	54
Nests/yr: recent order of magnitude	6,400-31,000	9, 10, 11, 12, 54, 55
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	79	4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 43, 45, 47, 52, 53, 54
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	66	4, 6, 7, 8, 9, 10, 11, 13, 52, 53, 54
Nests/yr at "major" sites: recent average (range of years)	15,000 (2007-2013, Boa Vista Island); 7,771 (2008 - 2017, Sal Island)	10, 12, 54
Nests/yr at "minor" sites: recent average (range of years)	150	12
Total length of nesting sites (km)	160	13
Nesting females / yr	3,500	6, 7, 8, 10, 11, 52, 54
Nests / female season (N)	4--6	43
Female remigration interval (yrs) (N)	2.4	12, 43

Sex ratio: Hatchlings (F / Tot) (N)	0.79 (71) - 0.93 (24)	33, 34, 35, 61
Sex ratio: Immatures (F / Tot) (N)	n/a	
Sex ratio: Adults (F / Tot) (N)	n/a	
Min adult size, CCL or SCL (cm)	mean = 81.8 (SD = 4.3, min = 67, max = 106) CCL	43
Age at maturity (yrs)	n/a	
Clutch size (n eggs) (N)	85.2 (450)	43
Emergence success (hatchlings/egg) (N)	0.47 (542)	9, 43
Nesting success (Nests/ Tot emergence tracks) (N)	0.27 (9415)	43
Trends		
Recent trends (last 20 yrs) at nesting sites (range of years)	Up (1998-2018)	44, 49
Recent trends (last 20 yrs) at foraging grounds (range of years)	n/a	
Oldest documented abundance: nests/yr (range of years)	5,396 (2005)	5
Published studies		
Growth rates	y	62
Genetics	Y	2, 3, 38, 39, 40, 41, 42, 56
Stocks defined by genetic markers	Y	3
Remote tracking (satellite or other)	Y	15, 16, 17, 18
Survival rates	n/a	
Population dynamics	n/a	
Foraging ecology (diet or isotopes)	Y	57, 58
Capture-Mark-Recapture	Y	43
Threats		

Bycatch: presence of small scale / artisanal fisheries?	Y	19, 20, 21
Bycatch: presence of industrial fisheries?	Y (PLL)	22, 48
Bycatch: quantified?	Y	20, 21
Take. Intentional killing or exploitation of turtles	Y (4,500 LH)	7, 8, 9, 10, 47, 51, 63
Take. Egg poaching	Y	19, 23, 52
Coastal Development. Nesting habitat degradation	Y	6, 10, 12, 23, 24, 54, 60
Coastal Development. Photopollution	Y	24, 25, 54
Coastal Development. Boat strikes	n/a	
Egg predation	Y	26
Pollution (debris, chemical)	Y	27, 28, 29, 30, 50, 59
Pathogens	Y	31, 32
Climate change	Y	33, 34, 35, 61
Foraging habitat degradation	n/a	
Other	Y	36
Long-term projects (>5yrs)		
Monitoring at nesting sites (period: range of years)	Y	
Number of index nesting sites	3 in Boa Vista Island, 1 in Maio Island, 1 in Sal Island, 2 in Santiago Island, 1 in Rombos Islet, 1 in Santa Luzia Island, 1 in Fogo Island, 1 in São Nicolau Island, 1 in Santo Antão Island and 1 in São Vicente Island,	
Monitoring at foraging sites (period: range of years)	N	

Conservation		
Protection under national law	Y	9, 23
Number of protected nesting sites (habitat preservation) (% nests)	All islands (>99%)	7, 10, 11, 13, 24, 52, 53, 54, 55, 63
Number of Marine Areas with mitigation of threats	N	
N of long-term conservation projects (period: range of years)	3 - (1998-2019 in Boa Vista Island), 1 - (2007-2019 in Sal Island), 1 - (2011-2019 in Maio Island), 1 - (2011-2019 in Santa Luzia), 1 - (2006-2019 in São Vicente)	7, 8, 10, 11, 43, 45, 46, 53, 54, 55
In-situ nest protection (eg cages)	N	
Hatcheries	Y	7, 9, 10, 11, 54
Head-starting	N	
By-catch: fishing gear modifications (eg, TED, circle hooks)	Y	22
By-catch: onboard best practices	N	
By-catch: spatio-temporal closures/reduction	N	
Other	Y	

Table 2. Sea turtle nesting beaches in Cabo Verde.

RMU / Nesting beach name	**Index site**	**Nests/yr: recent average (range of years)**	**Crawls/yr: recent average (range of years)**	**Western limit**		**Eastern limit**		**Central point**		**Length (km)**	**% Monitored**	**Reference #**	**Monitoring Level (1-2)**	**Monitoring Protocol (A-F)**
CC-NE ATL				Long	Lat	Long	Lat	Long	Lat					
Santa Luzia Island														

Palmo Tostão		13 (2011)	n/a	-24.776771°	16.766940°	-24.745908°	16.747063°	-24.759040°	16.758257°	2.1	100	2, 55	1	B
Francisca		469 (2011-2013)	n/a	-24.739651°	16.736604°	-24.704915°	16.737527°	-24.722331°	16.735637°	4.6	100	2, 55	1	B
Achados		415 (2011-2013)	n/a	-24.727527°	16.758353°	-24.708272°	16.751716°	-24.718604°	16.752379°	2.1	100	2, 55	1	B
Sal Island														
Algodeiro		180 (2008-2010)	410 (2008-2010)	-22.935167°	16.632704°	-22.928777°	16.607876°	-22.929859°	16.622245°	3.1	100	37,41, 55	1	B
Ponta Preta		33 (2008-2010)	89 (2008-2010)	-22.928036°	16.594135°	-22.927674°	16.603426°	-22.927715°	16.598820°	1.4	100	37,41, 55	1	B
Costa Fragata		230 (2008-2010)	330 (2008-2010)	-22.899361°	16.636875°	-22.886847°	16.595772°	-22.896958°	16.613591°	5	100	37,41, 55	1	B
Serra Negra		171 (2008-2010)	335 (2008-2010)	-22.889025°	16.643318°	-22.886766°	16.654471°	-22.887121°	16.648055°	1.5	100	37,41, 55	1	B
Monte Leão		23 (2008-2010)	78 (2008-2010)	-22.970144°	16.700163°	-22.943854°	16.692180°	-22.953447°	16.696678°	3.5	100	37,41, 55	2	D
Norte e Murdeira		14 (2008-2010)	77 (2008-2010)							9.2	50	37,41, 55	2	E
Prainhas & Calheta Funda		30 (2008-2010)	103 (2008-2010)	-22.945760°	16.651252°	-22.935453°	16.632891°	-22.944061°	16.640997°	2.9	80	37,41, 55	2	D

Santa Maria		34 (2008-2010)	76 (2008-2010)	-22.928055°	16.593758°	-22.895176°	16.595248°	-22.915750°	16.592106°	4.8	100	37,41,55	1	B
Boa Vista Island														
Chaves, Estoril, Cabral		60 (2007-2009)	n/a	-22.9381	16.0970	-22.9151	16.1898	n/a	n/a	12.15	100	7, 55	1	B
Ponta do Sol, Boa Esperanza		399 (2007-2009)	n/a	-22.9102	16.2259	-22.8595	16.2022	n/a	n/a	3.4	100	7, 55	1	B
Lancha, Abrolhal, Agostinho, Caletinha, Gatas		361 (2007-2009)	n/a	-22.8041	16.2100	-22.7087	16.1929	n/a	n/a	5.2	100	7, 55	1	B
Canto, Cruz do Morto, Simon Nho Narda, Ponta de Rife		676 (2007-2009)	n/a	-22.7083	16.1862	-22.6737	16.1458	n/a	n/a	4.15	100	7, 55	1	B
Figura, Flor, Porto Ferreira, Pedra Fernanda, Mosquito, Nho Martin		1179 (2007-2009)	n/a	-22.6737	16.1458	-22.6729	16.1080	n/a	n/a	4.55	100	7, 55	1	B
Ponta do Roque,		745 (2007-2009)	n/a	-22.6709	16.1015	-22.6690	16.0841	n/a	n/a	1.55	100	7, 55	1	B

Carreto, Praiona														
Ladjedo Teixeira, Caletha, Ervatao, Ponta Cosme, Joao Barrosa		9714 (2007-2009)	n/a	-22.7599	16.0052	-22.6731	16.0749	n/a	n/a	10.3	100	7, 55	1	B
Curralvelho, Ponta Pesquera		999 (2007-2009)	n/a	-22.8034	15.9720	-22.7653	15.9991	n/a	n/a	4.75	100	7, 55	1	B
Lacacao, Santa Monica, Varandinha		1229 (2007-2009)	n/a	-22.9594	16.0599	-22.8040	15.9735	n/a	n/a	21.6	100	7, 55	1	B
Maio Island														
North (Calhetinha, Santana, Porto Cais, Ponta Cais, Farol, Praia Real, Galeão, Lage Branca, Pedrenau)		63 (2008-2009)	68 (2009)	-23.229131°	15.267576°	-23.129922°	15.309451°	n/a	n/a	9.5	80	10, 55	2	B

East (Santo António, Praia Gonçalo, Pau Joana, Praia Pedro Vaz, Boca Ribeira, Guarda, Santa Clara, Lomba Greija, Ribeira Baia, Flamengo, Ribeira Don João ll, Ribeira Don João)		42 (2008-2009)	3 (2009)	-23.106475°	15.291498°	-23.123185°	15.138747°	n/a	n/a	5.2	80	10, 55	2	B
West (Moro, Baixona, Calheta de Cima, Soxa, Calheta Branca, Soca)		80 (2008-2009)	34 (2009)	-23.233451°	15.163986°	-23.218158°	15.254347°	n/a	n/a	7.3	80	10, 55	2	B
South (João Martinho, Boca Lagoa, Djanpadja, Ponta Preta, Bitchirotcha, Salina)		96 (2008-2009)	69 (2009)	-23.233451°	15.163986°	-23.128284°	15.136452°	n/a	n/a	12.4	80	10, 55	2	B
Santiago Island														

Mangue		3 (2007)	n/a	-23.491928°	15.089650°	-23.490294°	15.088806°	-23.491135°	15.089180°	0.19	30	34, 55	2	E
Achada Baleia		18 (2007)	n/a	-23.463574°	15.054834°	-23.461848°	15.052946°	-23.462919°	15.053721°	0.31	80	34, 55	2	B
Praia Baixo		18 (2007)	n/a	-23.474029°	15.064657°	-23.471524°	15.061392°	-23.473790°	15.062410°	0.56	80	34, 55	2	B

Table 3. International conventions protecting sea turtles and signed by Cabo Verde.

International Conventions	**Signed**	**Binding**	**Compliance measured and reported**	**Species**	**Conservation actions**	**Relevance to sea turtles**
Convention on Biological Diversity (CBD)	Y	Y	Y	ALL	Conservation of species and nestings beaches	Y
Convention on International Trade in Endangered Species (CITES)	Y	Y	N	ALL		Y
Convention on Migratory Species	Y	Y	N	ALL		Y
United Nations Convention on the Law of the Sea	Y	Y	Y	ALL		Y

Table 4. Projects and databases on sea turtles in Cabo Verde.

#	RMU	Country	Region / Location	Project Name or descriptive title	Key words	Start date	End date	Leading organisation	Public/Private
T4.1	CC-NE ATL	Cape Verde	West Africa	Monitoring loggerhead nesting in Cape Verde	Nest counts; PIT tagging; Female protection; Conservation; Boa Vista; Eastern Atlantic; Cape Verde	1998	Ongoing	Cabo Verde Natura 2000, BIOS.CV, Turtle Fundation	Private
T4.2	CC-NE ATL	Cape Verde	West Africa	Census and protection of loggerhead nesting beach in Sal Island	Mortality, poachers, patrols, rangers, threats, tracks, loggerhead, Caretta caretta, conservation, Sal Island, Cape Verde Islands	2007	Ongoing	Projecto Biodiversidade	Private
T4.3	CC-NE ATL	Cape Verde	West Africa	Monitoring loggerhead nesting in Santa Luzia island, Cape Verde	Population assessment; Nest activity; Conservation; Carretta caretta; Atlantic Ocean; Santa Luzia; Cape Verde	2011	Ongoing	Biosfera 1	Private

T4.4	CC-NE ATL	Cape Verde	West Africa	Marine turtle conservation project in Fogo island and Rombo islet, Cape Verde	Nest counts; PIT tagging; Female protection; Conservation; Fogo; Eastern Atlantic; Cape Verde	2009	Ongoing	Projecto Vitó-Fogo	Private
T4.5	CC-NE ATL	Cape Verde	West Africa	Iniciativa para a Gestão Integrada de Tartarugas Marinhas na Ilha de Santiago, Cabo Verde	Nest counts; PIT tagging; Conservation; Santiago; Cape Verde	2007	2007	Universidade do Algarve	Private
T4.6	CC-NE ATL	Cape Verde	West Africa	Marine turtle conservation project in Santa Cruz, Santiago island, Cape Verde	Nest counts; PIT tagging; Conservation; Santiago; Cape Verde	2012	Ongoing	Caretta caretta	Private
T4.7	CC-NE ATL	Cape Verde	West Africa	Marine turtle conservation project in São Francisco, Santiago island, Cape Verde	Nest counts; PIT tagging; Conservation; Santiago; Cape Verde	2008	Ongoing	Djunta Mon/Associação Flora e Fauna de São Francisco	Private

T4.8	CC-NE ATL	Cape Verde	West Africa	Marine turtle conservation project in Tarrafal, Santiago island, Cape Verde	Nest counts; PIT tagging; Conservation; Santiago; Cape Verde	2006	Ongoing	Câmara Municipal de Tarrafal, Santiago	Public
T4.9	CC-NE ATL	Cape Verde	West Africa	Monitoring loggerhead nesting in Cape Verde	Nest counts; PIT tagging; Female protection; Conservation; Maio; Eastern Atlantic; Cape Verde	2009	2012	SOS Tartaruga, FMB (Fundação Maio Biodiversidade), BIOS.CV	Private
T4.10	CC-NE ATL	Cape Verde	West Africa	Monitoring loggerhead nesting in Maio Island, Cape Verde	Nest counts; PIT tagging; Female protection; Conservation; Maio; Eastern Atlantic; Cape Verde	2013	Ongoing	FMB	Private
T4.11	CC-NE ATL	Cape Verde	West Africa	Monitoring loggerhead nesting in Rombo islet, Cape Verde	Nest counts; PIT tagging; Female protection; Conservation; Rombos; Eastern Atlantic; Cape Verde	2013	Ongoing	Projecto Vitó-Fogo, Biflores	Private

T4.12	CC-NE ATL	Cape Verde	West Africa	Monitoring loggerhead nesting in São Vicente islet, Cape Verde	Nest counts; PIT tagging; Female protection; Conservation; São Vicente; Eastern Atlantic; Cape Verde	2006	Ongoing	INDP/ Ponta de Pon	Public/Private
T4.13	CC-NE ATL	Cape Verde	West Africa	Monitoring loggerhead nesting in Santo Antão islet, Cape Verde	Nest counts; PIT tagging; Female protection; Conservation; São Vicente; Eastern Atlantic; Cape Verde	2006	Ongoing	INDP/ Projecto Vitó-Porto Novo	Public/Private

Table 4. (Cont.)

#	**Collaboration with**	**Reports / Information material**	**Current Sponsors**	**Primary Contact (name and Email)**	**Other Contacts (name and Email)**
T4.1	DNA (National Direction of the Environment) Cabo Verde, CSIC		MTCF-USFWS, MAVA, DNA	Adolfo Marco (amarco@ebd.csic.es)	Ana Liria (carettana@gmail.com), Thomas Reischig (reischig@turtle-foundation.org)
T4.2	DNA		MTCF-USFWS, DNA	Berta Renon (ningal.berta@gmail.com)	

T4.3	DNA		Rufford Small Grant, CEPF, MAVA Foundation, FCT Portugal	Tommy Melo (tommymelo@hotmail.com)	Patricia Rocha (patricia.rendall.rocha@hotmail.com)
T4.4	DNA, BIOS.CV, Projecto Biodiversidade		DNA	Herculano Dinis (pnfogo.segecol@gmail.com)	
T4.5	DNA		Oceanário de Lisboa	Nuno de Santos Loureiro (nlourei@ualg.pt)	
T4.6	DNA, Projecto Biodiversidade		DNA	João Gomes Pina Lomba (pinalomba1@gmail.com)	
T4.7	DNA		Oceanário de Lisboa	Ilse Drescher (ilsdre@web.de)	
T4.8	DNA		DNA	Vanio Santos (svanio23@gmail.com)	
T4.9	DNA		MTCF-USFWS, MAVA, DNA	Adolfo Marco (amarco@ebd.csic.es)	Juan Patiño-Martinez (juan.patino@fmb-maio.org)
T4.10	DNA		MTCF-USFWS, MAVA, DNA	Juan Patiño-Martinez (juan.patino@fmb-maio.org)	Jairson Varela da Veiga (Jairson.Veiga@fmb-maio.org)
T4.11	DNA, BIOS.CV, Projecto Biodiversidade		DNA	Herculano Dinis (pnfogo.segecol@gmail.com)	Cezinanda Martins (cezy_533@hotmail.com)

T4.12	DNA, Projecto Biodiversidade		DNA	Sandra Correia (Sandra.Correia@indp.gov.cv)	Nelson Lopes (lopesnetchu@gmail.com)
T4.13	DNA		DNA	Silvana Monteiro Roque (silvanamonteiro07@gmail.com)	

Table 4. (Cont.)

#	Database available	Name of Data base	Names of sites included (matching Table B, if appropriate)	Beginning of the time series	End of the time series	Track information	Nest information	Flipper tagging	Tags in STTI-ACCSTR?	PIT tagging	Remote tracking	Ref #
T4.1	Y		Boa Vista Island, Sal Island, Maio Island, Cape Verde	2007	2018	Y	Y	Y	N	Y	Y	7
T4.2	Y		Sal Island	2007	2018	Y	Y	Y	N	Y	n/a	12,37,39,41
T4.3	Y		Santa Luzia Island	2011	2013	Y	Y	Y	N	Y	n/a	2
T4.4	Y		Fogo Island	2009	2018	Y	Y	Y	N	N	n	3.55
T4.5	Y		Praia Baixo, Achada Baleia, Santiago Island	2012	2018	Y	Y	Y	N	Y	n/a	34

T4.6	Y		Santa Cruz, Santiago Island	2007	2007	Y	Y	Y	N	Y	n/a	
T4.7	Y		São Francisco, Santiago Island	2008	2018	Y	Y	Y	N	Y	n/a	
T4.8	Y		Sal Island	2006		n/a	Y	n/a	N	n/a	n/a	
T4.9	Y		Maio Island	2009	2012	Y	Y	Y	N	Y	n/a	10
T4.10	Y		Maio Island	2011	2018	Y	Y	Y	N	Y	n/a	
T4.11	y		Rombos	2013	2018	Y	Y	Y	N	Y	n/a	
T4.12	y		São Vicente	2013	2018	Y	Y	Y	N	Y	n/a	
T4.13	y		Santo Antão	2006	2018	Y	Y	Y	N	Y	n/a	

Table 5. Raw data.

Santa Luzia Island																	
Ref. 2																	
Achados Beach		Francisca Beach		Palmo Tostão Beach													
Year	N	Year	N	Year	N												
2011	137	2011	134	2011	13												
2012	821	2012	996														
2013	286	2013	905														
Sal Island																	
Ref. 37, 41																	
Algodeiro		Ponta Preta		Costa Fragata		Serra Negra		Monte Leão		Norte & Murdeira		Santa Maria					
Year	N	Year	N	Year	N	Year	N	Year	N	Year	N	Year	N				
2008	102	2008	27	2008	106	2008	62	2008	22	2008	16	2008	25				
2009	320	2009	52	2009	417	2009	255	2009	33	2009	50	2009	59				
2010	119	2010	20	2010	166	2010	197	2010	15	2010	23	2010	18				
2011	105	2011	13	2011	197	2011	273	2011	19	2011	23	2011	19				
2012	378	2012	50	2012	740	2012	878	2012	187	2012	312	2012	61				
2013	241	2013	34	2013	572	2013	611	2013	236	2013	271	2013	66				
2014	167	2014	9	2014	478	2014	435	2014	72	2014	301	2014	41				
2015	154	2015	12	2015	388	2015	425	2015	54	2015	140	2015	33				
2016	705	2016	76	2016	1366	2016	1565	2016	47	2016	305	2016	56				
2017	1223	2017	62	2017	3154	2017	1529	2017	866	2017	643	2017	157				

Boa Vista Island																	
Ref. 7																	
Chaves, Estoril, Cabral		Ponta do Sol, Boa Esperança		Lancha, Abrolhal, Agostinho, Calhetinha, Gatas		Canto, Cruz do Morto, Simon Nho Narda, Ponta de Rife		Figura, Flor, Porto Ferreira, Pedra Fernanda, Mosquito, Nho Martin		Ponta do Roque, Carreto, Praiona		Lajedo Teixeira, Calheta, Ervatão, Ponta Cosme, João Barrosa		Curral Velho, Ponta Pesqueiro		Lacacao, Santa Monica, Varandinha	
Year	N	Year	N	Year	N	Year	N	Year	N	Year	N	Year	N	Year	N	Year	N
2007	54	2007	265	2007	364	2007	669	2007	1087	2007	682	2007	8903	2007	1204	2007	727
2008	94	2008	492	2008	306	2008	336	2008	761	2008	532	2008	7599	2008	633	2008	1275
2009	32	2009	440	2009	413	2009	1024	2009	1688	2009	1022	2009	12640	2009	1159	2009	1684
Maio Island																	
Ref. 10																	
North (Calhetinha, Santana, Porto Cais, Ponta Cais, Farol, Praia Real, Galeão, Lage Branca, Pedrenau)		East (Santo António, Praia Gonçalo, Pau Joana, Praia Pedro Vaz, Boca Ribeira, Guarda, Santa Clara, Lomba		West (Moro, Baixona, Calheta de Cima, Soxa, Calheta Branca, Soca)		South (João Martinho, Boca Lagoa, Djanpadja, Ponta Preta, Bitchirotcha, Salina)											

		Greija, Ribeira Baia, Flamengo, Ribeira Don João ll, Ribeira Don João)															
Year	N	Year	N	Year	N	Year	N										
2008	45	2008	36	2008	150	2008	151										
2009	81	2009	48	2009	10	2009	38										
Santiago Island																	
Ref. 34																	
Mangue beach		Praia Baixo beach		Acha da Baleia beach													
Year	N	Year	N	Year	N												
2007	3	2007	18	2007	18												

CAMEROON

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[5]RASTOMA Cameroun, Siège social : Yaoundé Cameroun
[6]RASTOMA, Sièges social : Brazzaville, Congo & Paris, France

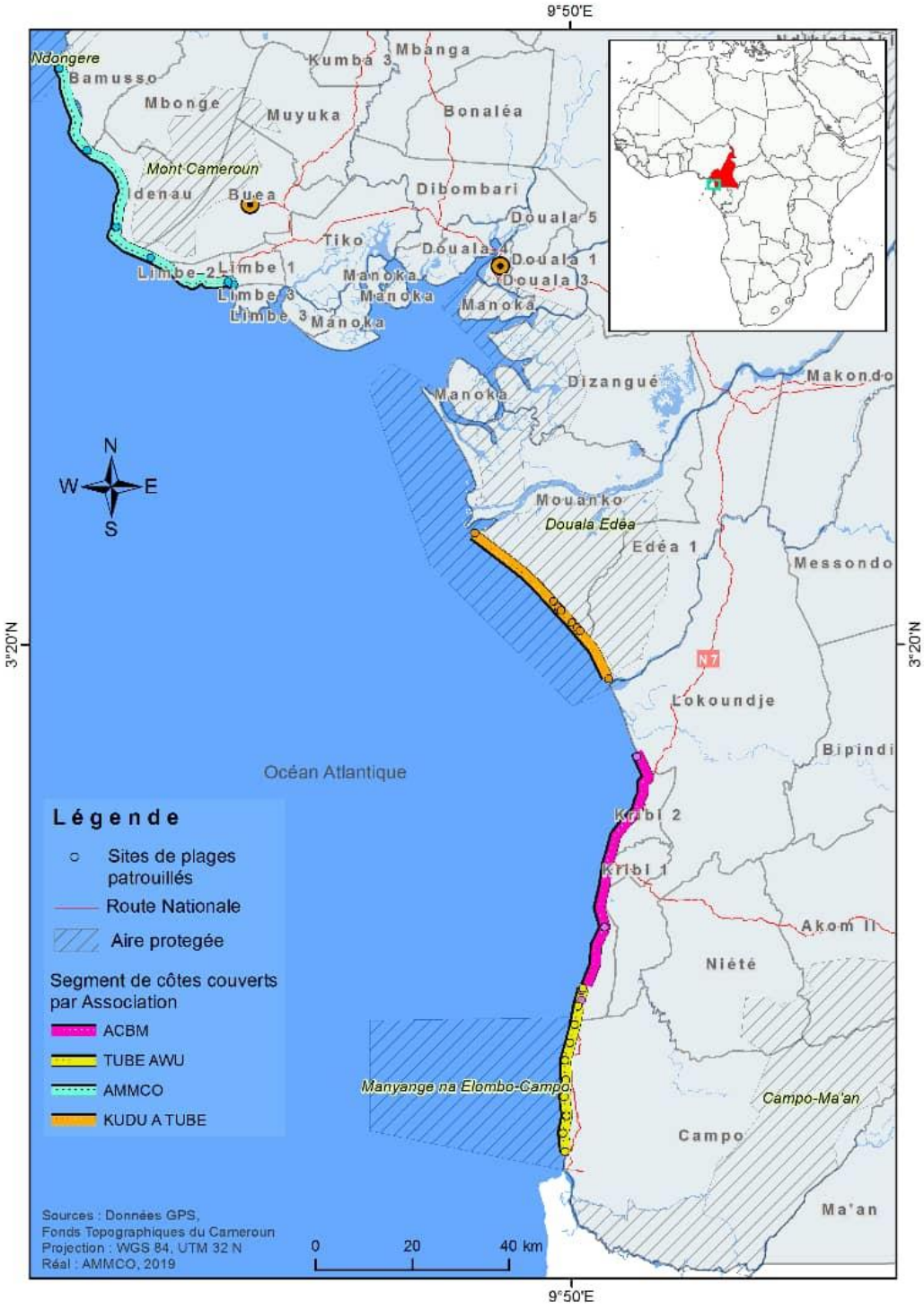
1. RMUs
L. olivacea Atlantic East
D. coriacea Atlantic South East
C. mydas Atlantic East
E. imbricata Atlantic East

1.1. Distribution, abundance, trends

See table 1.

1.1.2. Nesting Sites

See Table 1 and Table 2.
Cameroon, like the rest of Central Africa, is home to 5 of the 7 species of sea turtles found throughout the world. The Cameroonian coastal strip is 402 kilometers long and hosts important beaches for the Nesting of olive ridley and leatherback turtles; a few green turtles have also been observed nesting.



Cameroon's littoral is subdivided into three biogeographical zones: the western, the northern and the southern coasts. Four Cameroonian NGOs are monitoring nesting sites in Cameroon: ACBM (Cameroon Association of Marine Biology), AMMCO (African Marine Mammals Conservation Organization), Tube Awu and Kudu A Tube. In addition to issues related to the conservation of marine turtles, each of these four NGOs is developing several activities adapted to the local context in which they operate.

These four civil society organizations work in a network within the platform “Cameroon’s Marines Turtles”. The objectives of the platform are to 1) harmonize the protection and

monitoring actions taken by the various Cameroonian stakeholders towards the conservation of marine turtles, 2) improve the knowledge on these species and their habitats and 3) work with coastal communities to reduce anthropogenic impact on coastal and marine biodiversity while promoting the sustainable development of these communities.

1.1.2. Marine areas

Cameroon's coastal waters are also feeding sites of regional and even international importance, yet still insufficiently studied: hawksbill turtles and green turtles feed on gorgonian and coral formations, rocky bottoms and in estuaries and lagoons along the Cameroonian coast. The loggerhead turtle is also sporadically observed.
Several feeding sites for green turtles have been identified, particularly in Ebojé (Southern Littoral) and in the Limbé area (Northern Littoral).

1.2. Threats

See table 1.

Main threats in Cameroun

In Cameroon, as in the rest of Central Africa, human development is straining the survival of sea turtles and their natural habitats. Poaching of females and illegal collection of eggs, overfishing, unsustainable exploitation of fisheries and mining resources, rampant urbanization without coherent coastal development, the proliferation of single-use plastics inevitably ending up in waterways then the oceans, maritime traffic and oil and gas operations, port constructions are all threats for populations of marine turtles and their already fragile habitats.

1.2.1. Nesting sites

Nesting female slaughtering, nest harvesting

Coastal development: ports and urbanization (nesting beach destruction, erosion, light pollution)
Waste pollution (plastics)
Sand mining

1.2.2. Foraging grounds

By-catch and opportunistic catch of sea turtles in gillnets, lines, artisanal fisheries and industrial fisheries
Coastal development: ports (Kribi, Douala, Limbe) and urbanization (nesting beach destruction, erosion, light pollution)
The Cameroonian coast is home to several port cities including Douala and Kribi. Douala remains the most important and main gateway to Cameroon. The city of Limbé is an oil port.
Waste pollution (plastics)

1.4. Conservation

1.4.1. International conventions and national laws

International conventions

See Table 3.

Cameroon is a signatory to most of the major regional and international environmental conventions, including:
- the Bonn Convention on Migratory Species of Wild Animals (CMS) (ratified on 07 September 1981);
- The Convention on International Trade in Endangered Species of Fauna and Flora (CITES) adopted in Washington in 1993; Cameroon ratified it on June 5, 1982;
- the Convention on Biological Biodiversity (CBD) adopted in 1992,
- the Convention on the Protection of Cultural and Natural Heritage (CPM) (Paris, 1972);
- the Convention on the Law of the Sea (UNCLOS, 1982)
- the African Convention for the Conservation of Nature and Natural Resources (Algiers Convention, 1968).
- the International Convention on Civil Liability for Pollution Damage (Brussels, 1969);
- the Convention on Wetlands of International Importance Particularly as Waterfowl Habitat (Ramsar Convention, 1971);
- the United Nations Convention on the Law of the Sea (MontegoBay, 1982);
- the Abidjan Convention includes the protocol for cooperation to combat pollution in emergencies, adopted in 1981 and entered into force in 1984;
- the Convention on Climate Change (Rio de Janeiro 1992, ratified on August 8, 1985);
- the Abidjan Memorandum on the protection of marine turtles and their habitats, signed by Cameroon in 2002.

National legislation

National legislation is governed by texts of general scope on the environment and the management of forest resources, and of sectoral scope on wildlife management.

General texts

Framework Law No. 96/12 of August 5, 1996 relating to Environmental Management

This law was taken as a fundamental directive for the implementation of the National Environmental Management Program (PNGE) finalized and adopted by the National Assembly in 1996 and revised in 2008.

Law No. 94/01 of January 20, 1994 establishing the forestry, wildlife and fishing regime

The purpose of this law is to protect and regulate the use of forests, wildlife and fishery resources.

Text on state land tenure

According to Cameroon's land legislation, the coastal zone is a private property of the State, from sandy beaches up to 50 m above high tides.

Sector-specific text

Decree No. 95/466 / PM of July 20, 1995 laying down the terms of application of the wildlife regime

This decree specifies the measures implemented by the wildlife administration to apply the legal recommendations. This is how the protection of fauna and biodiversity is reflected in the creation of Protected Areas (PA), while the exploitation of resources must be carried out in compliance with the restrictions concerning protected species, hunting areas and in

accordance with the permits. Failure to comply with these requirements results in a series of penalties varying according to the extent of the offense.

Legal instruments of interest for the coastal and marine sector in Cameroon
There are several other national texts, which are of interest for the coastal and marine environment in Cameroon.
The most relevant are summarized below:
- Decree No. 77/528 of December 23, 1977 regulating the storage and distribution of petroleum products;
- Law No. 89/027 of December 29, 1989 relating to toxic and dangerous waste;
- Ordinance N ° 74/1 of July 6, 1974 fixing the land and state land regime, supplemented by decree N ° 76/166 of April 27, 1976 fixing the modalities of management of the national domain.

Specific aspects related to the protection of marine turtles
Marine turtles have always been protected in Order No. 1954 / A / MINTOUR / DFAP / SC by the Cameroonian Ministry of Tourism.
Forestry Law No. 94/01 of January 20, 1994 establishing the forestry, wildlife and fishing regime regulates hunting and fishing activities as well as biodiversity conservation activities:
- Class A: fully protected species;
- Class B partially protected species that can be hunted, captured or slaughtered after obtaining an appropriate permit;
- Class C: other species for which slaughter is regulated. The capture and killing of individuals of these species requires the possession of an appropriate permit.
Cameroonian marine turtles including *Lepidochelys olivacea*, *Chelonia mydas*, *Dermochelys coriacea* and *Eretmochelys imbricata* are listed in class A, fully protected species.

1.4.2 Conservation programs

See Table 1.

Cameroon was a pioneer country in the conservation of sea turtles: very early on, actors such as Kudu a Tube acted to preserve and study nesting turtles in Ebodjé. Since then, the number of NGOs in Cameroon has considerably increased. Thus, Cameroon has naturally become one of the leaders in the conservation of marine turtles and a driving force within the RASTOMA Network.
In order to structure marine turtle conservation actions at the national level and strengthen their impacts, Cameroonian NGOs have taken the initiative to create a platform for collaboration and dialogue: the Cameroon platform. This autonomous platform acts as a national relay for the regional network, under the supervision of RASTOMA (www.rastoma.org), a member organization of the International Union for the Conservation of Nature and which federates 12 associations for the conservation of marine turtles, spread over 6 Central African countries. The emergence of the Cameroon platform constitutes an additional step towards the professionalization of civil society actors and the recognition of their central role in the sustainable management of resources and the protection of biodiversity, in collaboration with the public force, academia and the private sector.

1.4.3. Conservation priorities and recommendations

Despite the limited available funding for the monitoring of the 2018-2019 nesting season in Cameroon, the civil society organizations grouped within the platform deployed a monitoring and protection effort, which made it possible to protect a large part of the sites of these endangered species in Cameroon. The results produced an initial state of the nesting activities of marine turtles in Cameroon. Long-term monitoring is necessary to gain information on the trend in spawning activity. This indicator is essential as it makes it possible to know whether the population is constant, increasing or decreasing for each species observed when nesting. In terms of collecting and promoting data on marine turtles, obtaining this trend over 7 to 10 years is therefore the priority in Cameroon.

Beyond monitoring nesting beaches, which must be continuous to protect females and their eggs, the priority now is to focus on environmental awareness and education on one side and to ensure a change in long-term behavior and the promotion of AGRs on the other side, so that the livelihoods of coastal communities that engage in the sustainable management of their resources can improve.

In terms of the knowledge required to act, a priority for the platform is to build a program to characterize the feeding and growth sites of marine turtles in Cameroonian coastal waters. A better knowledge of these habitats is indeed an essential prerequisite for considering a conservation action that can effectively protect these habitats and the turtles that grow and feed there.

Another important priority is the fight against the anthropogenic threats that have the greatest impact on marine turtles. In Cameroon, it is first of all, about better evaluating the accidental catches of marine turtles, which are the result of both traditional artisanal fishing (sleeping net, seines, etc.) and industrial fishing, especially trawling. Once the impact of fishing is clearly identified according to the fishing gear, the platform will be able, in collaboration with the relevant ministries, to propose an action plan to reduce and compensate for the impact of the most impacting techniques and gear. The next step is to fight against plastic pollution, which significantly pollutes rivers, watersheds and then the sea in Cameroon. This plastic waste is a known threat to sea turtles, which ingest plastics floating in the ocean and then die from intestinal obstruction. The actors of the platform will therefore develop as a priority, in short term, a common program to fight against these plastics and their impacts on marine turtles on a national scale. This zero plastic program will take place in a broader, sub-regional dynamic, driven by the RASTOMA network.

Table 1. Main biology and conservation aspects of sea turtle Regional Management Units (RMU) occurring in Cameroon.

RMU	LO-ATL EAST	Ref #	CM-ATL EAST	Ref #	DC-ATL SE	Ref #	EI-ATL EAST	Ref #	CC-ATL EAST	Ref #
Occurrence										
Nesting sites	Y	1,2 (AMMCO) ; 1,3 (TUBE AWU), 1,4 (KUD'A TUBE)	Y	n/a	Y	1,2 (AMMCO) ; 1,3 (TUBE AWU), 1,4 (KUD'A TUBE)	Y	3 (TUBE AWU)	n/a	n/a
Pelagic foraging grounds	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Benthic foraging grounds	n/a	n/a	n/a	n/a	n/a	n/a	Y	n/a	Y	n/a
Key biological data										
Nests/yr: recent average (range of years)	(2018-2020) 03; (2018-2020) 187; (2019-2020) 84	1,2 (AMMCO) ; 1,3 (TUBE AWU), 1,4 (KUD'A TUBE)	(2019-2020) 03	1, 3 (TUBE AWU)	02 (2018-2020) ; 46 (2018-2020) ; 09 (2019-2020)	1,2 (AMMCO) ; 1,3 (TUBE AWU), 1,4 (KUD'A TUBE)	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	n/a	n/a
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	0 ; 03; 02	1,3 (TUBE AWU), 1,4 (KUD'A TUBE)	0	1,2 (AMMCO) ; 1,3 (TUBE AWU), 1,4 (KUD'A TUBE)	1	1, 3 (TUBE AWU)	n/a	n/a	n/a	n/a
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	02; 03; 01	1,2 (AMMCO) ; 1,3 (TUBE AWU), 1,4 (KUD'A TUBE)	1	1, 3 (TUBE AWU)	01; 05; 01	1,2 (AMMCO) ; 1,3 (TUBE AWU), 1,4 (KUD'A TUBE)	n/a	n/a	n/a	n/a
Nests/yr at "major" sites: recent average (range of years)	32 (2018-2020) ; 53 (2019-2020)	1,3 (TUBE AWU), 1,4 (KUD'A TUBE)	n/a	n/a	21 (2018-2020)	1,3 (TUBE AWU)	n/a	n/a	n/a	n/a
Nests/yr at "minor" sites: recent average (range of years)	05 (2018-2020) ; 08 (2018-2020) ; 06 (2019-2020)	1,2 (AMMCO) ; 1,3 (TUBE AWU), 1,4 (KUD'A TUBE)	3	1, 3 (TUBE AWU)	02 (2018-2020) ; 01 (2018-2020) ; 09 (2019-2020)	1,2 (AMMCO) ; 1,3 (TUBE AWU), 1,4 (KUD'A TUBE)	n/a	n/a	n/a	n/a

Total length of nesting sites (km)	15; 28; 44	1,2 (AMMCO) ; 1,3 (TUBE AWU), 1,4 (KUD'A TUBE)	44	1, 3 (TUBE AWU)	(2018-2020) 10; (2018-2020) 28; (2019-2020) 09	1,2 (AMMCO) ; 1,3 (TUBE AWU), 1,4 (KUD'A TUBE)	n/a	n/a	n/a	n/a
Nesting females / yr	n/a	n/a	n/a	n/a	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	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	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	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	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	n/a	n/a
Min adult size, CCL or SCL (cm)	n/a	n/a	n/a	n/a	n/a	n/a	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	n/a	n/a
Clutch size (n eggs) (N)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Emergence success (hatchlings/egg) (N)	n/a	n/a	n/a	n/a	n/a	n/a	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	n/a	n/a
Trends										
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	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	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	n/a	n/a
Published studies	Y	8	n/a	n/a	Y	8	n/a	n/a	n/a	n/a
Growth rates	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Genetics	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Stocks defined by genetic markers	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Remote tracking (satellite or other)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Survival rates	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Population dynamics	1	8	n/a	1	8	n/a	n/a	n/a	n/a	n/a
Foraging ecology (diet or isotopes)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Capture-Mark-Recapture	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Threats										
Bycatch: presence of small scale / artisanal fisheries?	(MT) (PLL; SN); (MT)	1,2 (AMMCO) ; 1,3 (TUBE AWU) ; 1,4 (KUD'A TUBE) ; 6	(MT) (PLL; SN); (MT)	1,2 (AMMCO) ; 1,3 (TUBE AWU) ; 1,4 (KUD'A TUBE) ; 6	PLL; SN	1, 3 (TUBE AWU)	(MT) (PLL; SN); (MT)	1,2 (AMMCO) ; 1,3 (TUBE AWU), 1,4 (KUD'A TUBE)	MT	3 (KUD 'A TUBE)
Bycatch: presence of industrial fisheries?	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Bycatch: quantified?	01 (MT); 17 (SN); 03 (MT)	1,2 (AMMCO) ; 1,3 (TUBE AWU) ; 1,4 (KUD'A TUBE)	02 (MT); 35 (SN); 16 (MT)	1,2 (AMMCO) ; 1,3 (TUBE AWU) ; 1,4 (KUD'A TUBE)	08 (SN)	1, 3 (TUBE AWU)	01 (MT); 11 (SN); 01 (MT)	1,2 (AMMCO) ; 1,3 (TUBE AWU), 1,4 (KUD'A TUBE)	01 (MT)	3 (KUD 'A TUBE)
Take. Intentional killing or exploitation of turtles	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Take. Egg poaching	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Coastal Development. Nesting habitat degradation	Y	6, 7	Y	6, 7	Y	6, 7	n/a	n/a	n/a	n/a
Coastal Development. Photopollution	Y	6, 7	Y	6, 7	Y	6, 7	n/a	n/a	n/a	n/a
Coastal Development. Boat strikes	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Egg predation	60 (Y); Y; 2000 (Y)	1,2 (AMMCO) ; 1,3 (TUBE AWU) ; 1,4 (KUD'A TUBE) ; 6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Pollution (debris, chemical)	Y	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Pathogens	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Climate change	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Foraging habitat degradation	n/a	n/a	Y	1	n/a	n/a	n/a	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	n/a
Long-term projects (>5yrs)										
Monitoring at nesting sites (period: range of years)	1 (2015-2020)	1	1 (2015-2020)	1	1 (2015-2020)	1	n/a	n/a	n/a	n/a
Number of index nesting sites	4	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Monitoring at foraging sites (period: range of years)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Conservation										
Protection under national law	Y	1	Y	1	Y	n/a	Y	n/a	n/a	n/a
Number of protected nesting sites (habitat preservation) (% nests)	4 (30%)	1	4 (30%)	1	4 (50%)	1	Y	1	Y	1
Number of Marine Areas	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

with mitigation of threats										
N of long-term conservation projects (period: range of years)	Y (4)	1, 2, 3, 4	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
In-situ nest protection (eg cages)	n/a	n/a	n/a	n/a	Y	1, 3 (TUBE AWU)	n/a	n/a	n/a	n/a
Hatcheries	Y	1,2 (AMMCO); 1,3 (KUD'A TUBE)	Y	1, 3 (TUBE AWU)	n/a	n/a	n/a	n/a	n/a	n/a
Head-starting	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
By-catch: fishing gear modifications (eg, TED, circle hooks)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
By-catch: onboard best practices	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
By-catch: spatio-temporal closures/reduction	n/a	n/a	n/a	n/a	n/a	n/a	n/a	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	n/a

Table 2. Main nesting beaches in Cameroon

RMU / Nesting beach name	**Index site**	**Nests/yr: recent average (range of years)**	**Crawls/yr: recent average (range of years)**	**Western limit**		**Eastern limit**		**Central point**		**Length (km)**	**% Monitored**	**Reference #**	**Monitoring Level (1-2)**	**Monitoring Protocol (A-F)**
LO-ATL EAST				Long	Lat	Long	Lat	Long	Lat					
Beach A Northern coast	Limbe	3	5	9.050761	4.056958	9.098236	4.02245	9.076058	4.042708	10	100	1 (AMMCO)	weekly	57
Beach B Douala-Edea	Gabon	96	n/a					9.674784	3.518388	44	80	3 (KUD'ATUBE)	Dayly	n/a
Beach C Kribi1-Kribi2	N	n/a	n/a							n/a	n/a	n/a	n/a	n/a
Beach D Elombo-Campo	Campo	106	35	9.845464	2.656870	9.820815	2.349621	9.820940	2.554880	28	100	PS, 2 (TUBE AWU)	weekly	n/a
CM-ATL EAST														
Beach A Northern coast	N	n/a	n/a							n/a	n/a	n/a	n/a	n/a
Beach B Douala-Edea	N	n/a	n/a							n/a	n/a	n/a	n/a	n/a

Beach C Kribi1-Kribi2	N	n/a	n/a							n/a	n/a	n/a	n/a	n/a
Beach D Elombo-Campo	N	n/a	n/a							n/a	n/a	n/a	n/a	n/a
DC-ATL SW														
Beach A Northern coast	Limbe	1	1	9.050761	4.056958	9.098236	4.02245	9.076058	4.042708	10	100	1 (AMMCO)	weekly	57
Beach B Douala-Edea	Mombo	n/a	n/a					9.632714	3.672918	4	80	3 (KUD'ATUBE)	Dayly	n/a
Beach C Kribi1-Kribi2	N	n/a	n/a							n/a	n/a	n/a	n/a	n/a
Beach D Elombo-Campo	Campo	21	5	9.845464	2.656870	9.820815	2.349621	9.820940	2.554880	28	100	PS, 2 (TUBE AWU)	weekly	n/a
EI-ATL EAST														
Beach A Northern coast	N	n/a	n/a							n/a	n/a	n/a	n/a	n/a
Beach B Douala-Edea	N	n/a	n/a							n/a	n/a	n/a	n/a	n/a
Beach C Kribi1-Kribi2	N	n/a	n/a							n/a	n/a	n/a	n/a	n/a
Beach D Elombo-Campo	N	n/a	n/a							n/a	n/a	n/a	n/a	n/a

Table 3. International conventions protecting sea turtles and signed by Cameroon.

International Conventions	Signed	Binding	Compliance measured and reported	Species	Conservation actions	Relevance to sea turtles
UNEP/CMS. ed. (2000). Conservation Measures for Marine Turtles of the Atlantic Coast of Africa. CMS Technical Series Publication No.5, UNEP/CMS Secretariat, Bonn, Germany.	Y	n/a	n/a	LO, DC, EI, CM, CC,	Y	Y
Convention sur les espèces migratrices (CMS), 1983	Y	n/a	n/a	LO, DC, EI, CM, CC,	n/a	Y
Convention d'Abidjan, 1984	Y	n/a	n/a	LO, DC, EI, CM, CC,	n/a	n/a
Convention d'Alger, 1978	Y	n/a	n/a	LO, DC, EI, CM, CC,	n/a	n/a
Convention sur le commerce international des espèces de faune et flore en voie d'extinction (CITES), 1982	Y	n/a	n/a	LO, DC, EI, CM, CC,	n/a	Y
Convention sur la Diversité Biologique (CDB), 1994	Y	n/a	n/a	LO, DC, EI, CM, CC,	n/a	n/a
Convention sur le Patrimoine Mondial (CPM), 1982	Y	n/a	n/a	LO, DC, EI, CM, CC,	n/a	n/a

Convention de Montego Bay (UNCLOS), 1985	Y	n/a	n/a	LO, DC, EI, CM, CC,	n/a	n/a
Convention RAMSAR relative aux zones humides, 2006	Y	n/a	n/a	LO, DC, EI, CM, CC,	n/a	n/a

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2 African Marine Mammal Conservation Organization. 2019. Rapport d'activité annuel, 34 pages.

3 TUBE AWU. Contribution à la gestion du futur parc marin de Campo en vue de la protection des tortues marines (Chelonia mydas et Eretmochelys imbricata) rapport de stage 30 pages

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5 Ayissi I, Aksissou M, Tiwari M & Fretey J. Caractérisation des habitats benthiques et ponte des tortues marines autour du parc national de Campo-Ma'an (Cameroun). Int. J. Biol. Chem. Sci. 7(5): 1820-1828, October 2013

6 Girard A, Guilleux A, Ayissi I, Mbungu S, Ngafack R, Missilou R, Hancock J (2019). Mapping threats and human/sea turtle interaction hotspots in Central Africa through a Civil Society Organization dynamic led by Rastoma (the Central African Network of Sea Turtle Conservation Actors). 39th International Symposium on Sea Turtles Biology and Conservation, Charleston, USA, 3-9 feb 2019.

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CANARY ISLANDS (SPAIN)

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General remarks

The Canaries are a group of volcanic islands, islets and rocky outcrops situated in the Eastern Atlantic Ocean, at subtropical latitude. They are one of the Spanish territorial administrative entities. Six species of sea turtles have been recorded in the waters off this archipelago. The most frequent observations are juveniles of loggerhead sea turtle (*Caretta caretta*) in oceanic waters (1, 3). The second most frequent species is the green turtle (*Chelonia mydas*), with juveniles located in the neritic waters of certain coastal localities (19, 20). Another species considered common, although less frequently observed, is the leatherback turtle (*Dermochelys coriacea*) (1). Hawksbill turtles (*Eretmochelys imbricata*), olive (*Lepidochelys olivacea*) and Kemp's ridley (*Lepidochelys kempii*) are considered rare due to their few sightings (21, 25, CRFS La Tahonilla pers. comm.).

1. RMU: Loggerhead turtle (*Caretta caretta*) North-East Atlantic

1.1. Distribution, abundance, trends

1.1.1. Nesting sites

This RMU does not breed actually in the Canary Islands. Nevertheless, the finding of two small anthropomorphic idols with sea turtle shape in a cave, together with some historians' references have been suggested to indicate that, historically, loggerhead turtle nested on these islands (2). The extinction of this population would have been linked to its use as food by the aborigines as well as the arrival of the Europeans (2).

1.1.2. Marine areas

The waters of the canarian archipelago are part of the feeding and development area for juvenile loggerhead turtles belonging to the North-West Atlantic RMU and North-East Atlantic, being the first one more abundant. Individuals from the Mediterranean RMU rarely occur in this waters (4).

The vast majority of loggerheads recorded in the Canary Islands correspond to juveniles occupying pelagic waters where they feed, using the first meters of the water column (3). These juveniles do not restrict their movements to waters near the archipelago, carrying out extensive movements, with records from Portugal to the north of Cape Verde (Fig. 1). There are also some records in the Canary Islands of loggerhead turtles occupying the neritic habitat –probably associated with a benthic diet–, which also correspond to immature animals (3), although it is not ruled out that there could be some adults. Records are produced throughout the year.

1.2. Other biological data

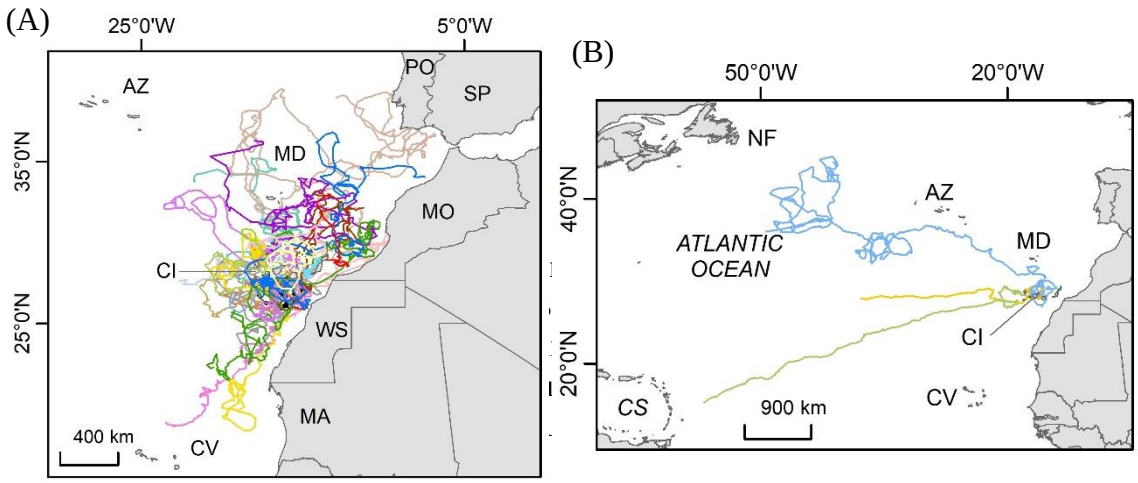

Figure 2 shows the size distribution of loggerheads admitted to a wildlife recovery center of the archipelago (1998-2012, range = 13.0-85.2 cm of SCL, n = 1195). Most of these sizes clearly correspond to juvenile and subadults, but others may correspond to adults, although depending on the origin population.
In addition to highlighting the huge oceanic area (2.5 million km^2) used by these loggerhead turtles, the remote tracking study showed a certain seasonality in the movements. In spring and summer, turtles generally moved further north towards the Iberian Peninsula. Ecological niche modeling identified sea surface temperature as the most important contributory variable to the habitat model (3).

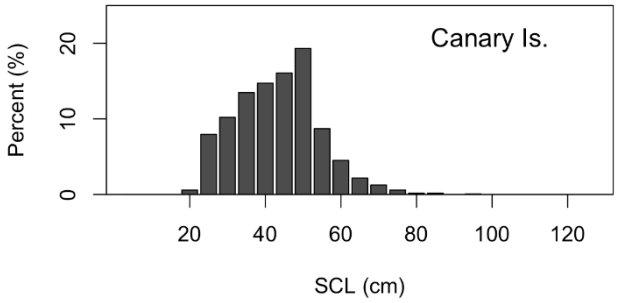

Figure 2. Size-frequency distributions of loggerheads admitted to the Gran Canaria Wildlife Recovery Center. SCL: Straight carapace length (notch to notch). Source: Modified from (3).
T
he available information about sex ratio is limited to died loggerheads, showing a female to male ratio of 7:1 (Orós *et al.* 2016).

1.3. Threats
1.3.1. Nesting sites
Not applicable.

1.3.2. Marine habitats

Up to date, no study has evaluated the impact of fisheries in the area, though the interaction with artisanal fisheries is known. Similarly, foraging habitats exploited by sea turtles may have been deteriorated, due to the huge coastal development together with the increased of marine pollution.

Activities that contribute to coastal degradation include the construction of ports and dredging works, the creation of artificial beaches, the anchoring of boats, the entry of chemical substances from agriculture and the discharge of untreated waste water. In 2017, 72% of the census points of discharges from land to sea in the Canary Islands were unauthorized (26). In the case of oceanic habitats, marine litter, spill and noise pollution contribute to their degradation.

In addition of being ingested, marine litter causes entanglements that can cause strangulation and amputations of limbs. Entanglement has been identified as the first stranding cause for loggerheads in wildlife recovery center of Gran Canaria (8). Furthermore, maritime traffic is an intense activity in the archipelago, especially that related to recreational boats in some tourist areas. In addition, there are several ferry routes and merchant ship corridors. Some loggerhead turtles die or suffer severe damage from boat strikes (8).

1.3.3. Other threats

Recreative fishery is an activity very extended in the archipelago with approximately 90,000 active licenses in 2019[1]. The impact of this activity on loggerhead is unknown, but it should be evaluated.

Finally, climate change is a potential threat to sea turtle populations that has not yet been fully assessed.

1.4. Conservation

Protection under national law

Currently, the sea turtle species recorder in the Canary Islands are protected by national laws. They are included in the List of Wild Species in the Special Protection Regime of Spain[2]. This list includes species that deserve particular attention and protection, as well as those that appear as protected in international conventions and directives.

Furthermore, the loggerhead turtle is considered “vulnerable” in the Spanish Catalog of Threatened Species. These legal rules are applicable throughout the whole Spanish territory and in maritime waters under Spanish sovereignty or jurisdiction. In addition, the Canary Islands have its Canary Catalog of Protected Species[3] where the loggerhead turtle is considered “vulnerable” and leatherback, green and hawksbill turtles are “special protection” species.

On an international level, Spain have ratified several conventions and directives that protected sea turtles and their habitats (Table 3). In the framework of one of them, the Habitats Directive of the European Union, some marine areas have been declared as Special Conservation Areas due to the presence of loggerhead turtle, among other species, including some of them also the presence of green turtle. The first management

[1] https://www.gobiernodecanarias.org/pesca/temas/pesca_recreativa/licencias.html

[2] Royal Decree 139/2011, of 4 February; Order TEC/596/2019, of 8 April.

[3] Law 4/2010, of 4 June; Decree 20/2014, of 20 March.

plans for these protected areas were approved in 2011 and included measures focused on sea turtles, but have not yet been implemented.

About long-term conservation projects

Several awareness campaigns aimed mainly at fishermen and recreational boat (mainly whale-watching) crews have been carried out, showing how to act when catching or finding sick or injured turtles and how to proceed to bring them to the wildlife recovery centers (WRC). The first of these WRC began to recover sea turtles in the early 1990s. Currently, several islands have one and those with any WRC, send injured turtles through agreements with transport companies. Furthermore, dead animals are necropsied, either in the CRFS or in the Veterinary College.

The Sea Turtle Tagging Program (PMT, Programa de Marcado de Tortugas Marinas[4]), created in 2004, gathers the tags (PITs and flipper tags) deployed every year in Spanish waters and beaches.

Since 2008, the Granadilla Environmental Observatory develops the "Monitoring plan of the loggerhead turtle in the Canary Islands", which includes annual census in various Special Conservation Areas, periodic evaluations of the conservation status of this species in the archipelago, and abundance estimates (15, 16). The authors of the reports highlight the limitation of these estimates and the caution in their interpretations.

The "Expansion program of the loggerhead turtle breeding habitat in Macaronesia: Reintroduction of the loggerhead turtle in the Canary Islands" started in 2003. For this, about 4000 eggs were translocated from nesting population of Cape Verde during the years 2006-2010. The hatchlings were kept in captivity (head-starting) and released, about 1300, with 1-3 years of age. Currently, 20 individuals are still being held in captivity for scientific studies (Liria-Loza com. pers.).

In the framework of the EU's Marine Strategy Framework Directive (MSFD), several monitoring programs have been proposed for sea turtles by the Spanish Government. Currently, only some pilot monitoring surveys have been developed in the Canary Islands (27), although it is expected that they will continue to be implemented in the future.

The loggerhead turtle was proposed as a bioindicator of marine litter impacts by the EU's Marine Strategy Framework Directive (MSFD). The projects INDICIT investigate the implementation of indicators of litter impacts on sea turtles (28). Many partners from several Atlantic and Mediterranean countries participate in it.

Conservation Priorities

It is crucial the implementation of monitoring programs to obtain the necessary information to periodically assess the status of sea turtles. In addition to carry out studies to assess the impact of potential threats, it is mandatory to apply mitigation measures and their corresponding evaluations. It is also a priority to promote environmental education, attitudes and actions that allow the conservation of habitats and species. Currently, the Government of Spain is preparing the "Strategic document for the conservation of the loggerhead turtle and other species of sea turtles in Spanish waters".

[4] https://www.miteco.gob.es/es/biodiversidad/temas/inventarios-nacionales/pdf%201%20Programa_de_Marcado_de_Tortugas_Marinas_tcm30-194707.pdf

1.5. Research

There are important knowledge gaps regarding various aspects of the biology and ecology (e.g. growth rates, sex ratio of healthy loggerheads, diet, actualize remote tracking, mortality rate…) of these sea turtle stocks. It is necessary to increase the knowledge about their distribution and evaluate temporal changes in the stock composition due to oceanographic, biological or climate causes.

Furthermore, it is a priority to identify the threats and know how they are affecting to this stocks. The impact of fisheries, including industrial, artisanal and recreational fisheries, should be considered.

2. RMU: Loggerhead turtle (*Caretta caretta*) North-West Atlantic

2.1. Distribution, abundance, trends

2.1.2 Nesting sites

This RMU does not breed in the Canary Islands.

2.1.2. Marine areas

Same of the North-East Atlantic RMU.

2.2. Other biological data

Same of the North-East Atlantic RMU.

2.3. Threats

Due to the mix of individuals from different RMUs in waters of the Canary Islands, and in the absence of a study showing that there are threats that affect differentially to the RMU, the threats described in section 1.3 have also been considered in this section.

2.4. Conservation

Same of the North-East Atlantic RMU.

2.5. Research

Same of the North-East Atlantic RMU.

3. RMU: Green turtle (*Chelonia mydas*) East Atlantic

3.1. Distribution, abundance, trends

3.1.1. Nesting sites

This RMU does not breed in the Canary Islands.

3.1.2. Marine areas

The waters of the canarian archipelago are part of the feeding and development area for juvenile green turtles belonging to the East Atlantic RMU and South Caribbean Atlantic, being Guinea Bissau and Surinam the contributing populations more frequent (19, 20). Based on the available genetic information, contribution from Northwestern Atlantic RMU is negligible since each population of this RMU presented a contribution less than 5% (19, 20).

The vast majority of green turtles recorded in the Canary Islands correspond to juveniles occupying neritic waters (19). Photo-identification and satellite tracking showed high levels of site fidelity to coastal foraging grounds associated with seagrass meadows for several years. Nevertheless, stable isotope analysis indicated an animal-based

omnivorous diet after settlement on the continental shelf, with no increase in the consumption of macrophytes as the turtles grew due to the practice of supplemental feeding (19).

3.2. Other biological data

Figure 3 shows the size distribution of green turtles captured (n = 21) or admitted to a wildlife recovery center of the archipelago (n = 40), ranging in curve carapace length from 26.9 to 81.0 cm. Most of these sizes clearly correspond to juvenile and subadults (20).

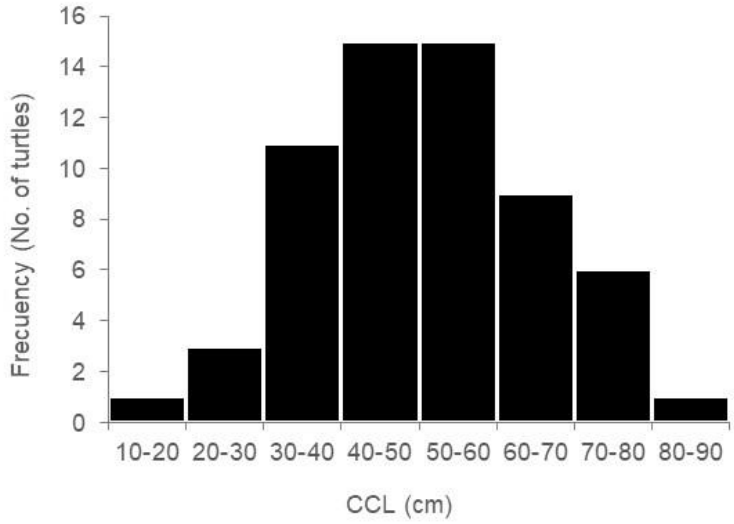

Figure 3. Size-frequency distributions of green turtles captured or admitted to the Wildlife Recovery Center of Gran Canaria Island. CCL: Curve carapace length (notch to notch). Source: Modified from (20).

3.3. Threats

3.3.1. Nesting sites

Not applicable.

3.3.2. Marine habitats

Fish hooks were the most frequent cause (49.0%) of turtles admitted to wildlife recovery centers of the archipelago. It is known that recreational fishery, practiced from both, land and boat, accidentally catches green turtles. The opportunistic behavior of this species together with its location on certain coastal areas where they are fed, possibly favours this interaction when turtle is attracted to the bait. In fact, the presence of hook is their main cause of entry into the Canary Islands CRFS (19). The second more frecuently stranding cause was trauma, including skin wounds and boat strikes (20.4%), follow by entanglement (14.3%), harpooning (6.1%) and natural disease (6.1%; 19). Turtles showed behavioral anomalies due to the supplemental feeding that result into a higher attraction of green turtles to baited longlines and more proximal interactions of the animals with boats (19). Furthermore, all studied turtles showed detectable values of some type of POPs. Interestingly, increased consumption of animal prey, as revealed by stable isotope analysis, was associated with abnormal levels of

some blood biochemical markers (e.g. tryglicerides) and high levels of certain pollutants (19).
Some localities inhabited by turtles showed a high habitat degradation, including ports or coastal waters highly exploited by tourist attractions (19).

3.3.3. Other threats

Climate change is a potential threat to sea turtle populations that has not yet been fully assessed.

3.4. Conservation

Protection under national law
See the section 1.4
About long-term conservation projects
Only two projects about green turtles during less than one year have been developed (2014, 2017). These studies were also limited to certain areas of the archipelago.
Conservation Priorities
It is necessary to implement long-term monitoring programs that allow to obtain the necessary information to periodically assess the status of the green turtle stock in archipelago waters. In addition, there is a necessity of studies to assess the impact of potential threats affecting this species and its habitats and to determine conservation and mitigation measures and apply them where necessary. Specially, it is essential to guarantee the conservation of the known feeding areas, which are currently quite degraded and undergoing major changes, such as the construction of artificial beaches or the construction of ports.
It is also a priority, especially in some tourist areas, the regulation and monitoring of water activities such as intense maritime traffic or diving with bad practices. In this sense, it is essential to promote education in environment among the citizens. In addition, the commitment of the different administrations is also necessary, including a change in the economic model of the Canary Islands that is compatible with the Sustainable Development Goals. Currently, the Government of Spain is preparing the "Strategic document for the conservation of the loggerhead turtle and other species of sea turtles in Spanish waters".

3.5. Research

Studies about this species have been scarce and punctual, so there are many gaps about the biology and ecology of the species in the archipelago. Main gaps that should be addressed in future studies include the identification of other localities where the species is present and its monitoring, including the tracking of turtles to know their movements and the habitats used and the evaluation of temporal changes in the stock composition due to oceanographic, biological or climate causes.
Furthermore, it is a priority to monitory the threats and bad practices that are affect the species during its permanence on waters of this archipelago, especially supplemental feeding. Studies that evaluate the feeding impact through behavioral and biochemical studies are recommended.

4. RMU: Green turtle (*Chelonia mydas*) South Caribbean Atlantic

4.1. Distribution, abundance, trends

4.1.1. Nesting sites

This RMU does not breed in the Canary Islands

4.1.2. Marine areas

Same of the East Atlantic RMU.

4.2. Other biological data

Same of the East Atlantic RMU.

4.3. Threats

Due to the mix of individuals from different RMUs in waters of the Canary Islands, and in the absence of a study showing that there are threats that affect differentially to the RMU, the threats described in section 3.3 have also been considered in this section.

4.4. Conservation

Same of the East Atlantic RMU.

4.5. Research

Same of the East Atlantic RMU.

5. RMU: Leatherback turtle (*Dermochelys coriacea*) Atlantic (unknown)

5.1. Distribution, abundance, trends

Leatherback turtles encountered in the Canary Islands originate from the Atlantic RMUs but no genetic studios have been conducted so far. They constitute a regular visitor to these waters, but not frequently observed (1). The records correspond to live or dead animals observed in the sea and stranded (7, 21).

5.1.1. Nesting sites

There are occasional reports of two adult females that were observed in two different beaches of Fuerteventura island, but any nest (22, 23).

5.1.2. Marine areas

No specific marine areas are known. No estimates of abundance or trends are available.

5.2. Other biological data

Not available.

5.3. Threats

5.3.1. Nesting sites

Not applicable.

5.3.2. Marine areas

Leatherback turtles are expected to share the same threats as loggerhead turtles as they also use pelagic habitats. Although records of stranded animals are compiled in each island, there is not a common database for the archipelago, so sample sizes are reduced.

Nevertheless, pictures of dead animals entangled in ghost gear are frequent on social networks.

5.3.3. Other threats

Climate change is a potential threat to sea turtle populations that has not yet been fully assessed.

5.4. Conservation

Protection under national law

See the section 1.4

About long-term conservation projects

There has not been carried out any specific study about leatherback turtles.

5.5. Research

It is necessary to implement studies that allow to obtain information about the biology and ecology of this species in the archipelago.

Table 1. Main biology and conservation aspects of the Regional Management Units (RMU) occurring in the Canary Islands.

TOPIC	REGIONAL MANAGEMENT UNIT									
	CC-NW ATL	Ref #	CC-NE ATL	Ref #	CM-E ATL	Ref #	CM-SC ATL	Ref #	DC-ATL	Ref #
Occurrence										
Nesting sites	N	1, 2	N	1, 2	N	1, 19	N	1, 19	N	1, 22, 23
Pelagic foraging grounds	J	1, 2, 3, 24	J	1, 2, 3, 24	N	19	N	19	A	7, 21
Benthic foraging grounds	J	3	J	3	J	19, 20	J	19, 20	N	
Key biological data										
Nests/yr: recent average (range of years)	n/a		n/a		n/a		n/a		n/a	
Nests/yr: recent order of magnitude	n/a		n/a		n/a		n/a		n/a	
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	n/a		n/a		n/a		n/a		n/a	
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	n/a		n/a		n/a		n/a		n/a	
Nests/yr at "major" sites: recent average (range of years)	n/a		n/a		n/a		n/a		n/a	
Nests/yr at "minor" sites: recent average (range of years)	n/a		n/a		n/a		n/a		n/a	
Total length of nesting sites (km)	n/a		n/a		n/a		n/a		n/a	
Nesting females / yr	n/a		n/a		n/a		n/a		n/a	
Nests / female season (N)	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	
Sex ratio: Hatchlings (F / Tot) (N)	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	
Sex ratio: Adults (F / Tot) (N)	n/a		n/a		n/a		n/a		n/a	
Min adult size, CCL or SCL (cm)	n/a		n/a		n/a		n/a		n/a	
Age at maturity (yrs)	n/a		n/a		n/a		n/a		n/a	
Clutch size (n eggs) (N)	n/a		n/a		n/a		n/a		n/a	
Emergence success (hatchlings/egg) (N)	n/a		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	
Trends										
Recent trends (last 20 yrs) at nesting sites (range of years)	n/a		n/a		n/a		n/a		n/a	
Recent trends (last 20 yrs) at foraging grounds (range of years)	N		N		N		N		N	
Oldest documented abundance: nests/yr (range of years)	n/a		n/a		n/a		n/a		n/a	
Published studies										
Growth rates	N		N		N		N		N	
Genetics	Y	4, 5, 6	Y	4, 5, 6	Y	19, 20	Y	19, 20	N	
Stocks defined by genetic markers	Y	4, 5, 6	Y	4, 5, 6	Y	19, 20	Y	19, 20	N	
Remote tracking (satellite or other)	Y	3	Y	3	Y	19	Y	19	N	
Survival rates	N		N		N		N		N	

Population dynamics	N		N		N		N		N	
Foraging ecology (diet or isotopes)	N		N		Y	19	Y	19	N	
Capture-Mark-Recapture	N		N		N		N		N	
Threats										
Bycatch: presence of small scale / artisanal fisheries?	Y	7, 8	Y	7, 8	Y	19, 20	Y	19, 20	Y	
Bycatch: presence of industrial fisheries?	n/a		n/a		n/a		n/a		n/a	
Bycatch: quantified?	N		N		N		N		N	
Take. Intentional killing or exploitation of turtles	N		N		N		N		N	
Take. Egg poaching	n/a		n/a		n/a		n/a		n/a	
Coastal Development. Nesting habitat degradation	n/a		n/a		n/a		n/a		n/a	
Coastal Development. Photopollution	n/a		n/a		n/a		n/a		n/a	
Coastal Development. Boat strikes	Y	7, 8	Y	7, 8	Y	19, 20	Y	19, 20	n/a	
Egg predation	n/a		n/a		n/a		n/a		n/a	
Pollution (debris, chemical)	Y	7, 8, 9, 10, 11, 12, 13	Y	7, 8, 9, 10, 11, 12, 13	Y	19	Y	19	Y	7
Pathogens	Y	7, 8	Y	7, 8	Y	7	Y	7	Y	7
Climate change	Y		Y		Y		Y		Y	
Foraging habitat degradation	Y	14	Y	14	Y	19, 20	Y	19, 20	Y	

Other (recreative fishery)	Y		Y		Y	19, 20	Y	19, 20	n/a	
Long-term projects (>5yrs)										
Monitoring at nesting sites (period: range of years)	n/a		n/a		n/a		n/a		n/a	
Number of index nesting sites	n/a		n/a		n/a		n/a		n/a	
Monitoring at foraging sites (period: range of years)	Y (2008-2012; 2013-2017)	15, 16	Y (2008-2012; 2013-2017)	15, 16	N		N		N	
Conservation										
Protection under national law	Y	17	Y	17	N*	17	N*	17	N*	17
Number of protected nesting sites (habitat preservation) (% nests)	n/a		n/a		n/a		n/a		n/a	
Number of Marine Areas with mitigation of threats	N		N		N		N		N	
N of long-term conservation projects (period: range of years)	N		N		N		N		N	
In-situ nest protection (eg cages)	n/a		n/a		n/a		n/a		n/a	
Hatcheries	n/a		n/a		n/a		n/a		n/a	
Head-starting	N		Y*	18	N		N		N	
By-catch: fishing gear modifications (eg, TED, circle hooks)	N		N		N		N		N	
By-catch: onboard best practices	N		N		N		N		N	
By-catch: spatio-temporal closures/reduction	N		N		N		N		N	

N*: See the text
Y*: Head-starting of the hatchlings from the Reintroduction project

Table 3. The conventions signed by Spain.

International Conventions	Signed	Binding	Compliance measured and reported	Species	Conservation actions	Relevance to sea turtles
Bern Convention	Y	Y				
Bonn Convention	Y	Y				
CITES	Y	Y				
Habitats Directive	Y	Y				
Marine Strategy Framework Directive	Y	Y				
CBD	Y	Y				

Table 4. Long term databases and projects in the Canary Islands

Name of Database	Names of sites included	Beginning of the time series	End of the time series	Track information	Nest information	Flipper tagging	Tags in STTI-ACCSTR?	PIT tagging	Remote tracking	Ref #
Stranded turtles	Canary Islands	1998	2014	N	N	N	N	Y	N	Orós *et al.* 2016

PMT (Programa de Marcado de Tortugas Marinas)	Spain	2004 (Creation of the PMT)	up to date	N	N	Y		Y		Asociación Herpetológica Española

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REPUBLIC OF CONGO

[last update: 2019]

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Table 1. Biological and conservation information about sea turtle Regional Management Units in the Republic of Congo.

RMU (all RMUs of all species occurring in a Country or Region) add or remove columns on the right according to the RMUs	L. olivacea Atlantic East	Ref #	D. coriacea Atlantic South East	Ref #	C. mydas Atlantic East	Ref #	E. imbricata Atlantic East	Ref #
Occurrence								
Nesting sites	Y		Y		Y		N	
Pelagic foraging grounds	na		na		na		na	
Benthic foraging grounds	Y		Y				Y	
Key biological data								
Nests/yr: recent average (range of years)	602		377		5		na	
Nests/yr: recent order of magnitude	na		na		na		na	
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	6		6		0		na	
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	3		3		9		na	
Nests/yr at "major" sites: recent average (range of years)	n/a		n/a		n/a		n/a	
Nests/yr at "minor" sites: recent average (range of years)	n/a		n/a		n/a		n/a	
Total length of nesting sites (km)	79		79		79		n/a	
Nesting females / yr	n/a		n/a		n/a		n/a	
Nests / female season (N)	n/a		n/a		n/a		n/a	
Female remigration interval (yrs) (N)	n/a		n/a		n/a		n/a	
Sex ratio: Hatchlings (F / Tot) (N)	n/a		n/a		n/a		n/a	
Sex ratio: Immatures (F / Tot) (N)	n/a		n/a		n/a		n/a	
Sex ratio: Adults (F / Tot) (N)	n/a		n/a		n/a		n/a	
Min adult size, CCL or SCL (cm)	64 CCL		135 CCL		n/a		n/a	
Age at maturity (yrs)	n/a		n/a		n/a		n/a	

Clutch size (n eggs) (N)	130 (25)		100 (4)		n/a		n/a	
Emergence success (hatchlings/egg) (N)	n/a		n/a		n/a		n/a	
Nesting success (Nests/ Tot emergence tracks) (N)	92,1% (352)		78% (220)		n/a		n/a	
Trends								
Recent trends (last 20 yrs) at nesting sites (range of years)	++		+		n/a		n/a	
Recent trends (last 20 yrs) at foraging grounds (range of years)	+		n/a		n/a		n/a	
Oldest documented abundance: nests/yr (range of years)	n/a		n/a		n/a		n/a	
Published studies								
Growth rates	n/a		n/a		n/a		n/a	
Genetics	n/a		n/a		n/a		n/a	
Stocks defined by genetic markers	n/a		n/a		n/a		n/a	
Remote tracking (satellite or other)	n/a		n/a		n/a	5;7	n/a	
Survival rates	n/a		n/a		n/a		n/a	
Population dynamics	n/a		n/a		n/a		n/a	
Foraging ecology (diet or isotopes)	n/a		n/a		n/a		n/a	
Capture-Mark-Recapture	n/a		n/a		n/a		n/a	
Threats								
Bycatch: presence of small scale / artisanal fisheries?	Y	1; 3; 4	Y	1; 3; 4	Y	1; 3; 4	Y	1; 3; 4
Bycatch: presence of industrial fisheries?	Y		Y		Y		Y	
Bycatch: quantified?	Y	1; 3; 4	Y	1; 3; 4	Y	1; 3; 4	Y	1; 3; 4
Take. Intentional killing or exploitation of turtles	Y	3	Y	3	Y	3	Y	3
Take. Egg poaching	Y	3	Y	3	Y	3	N	3

Coastal Development. Nesting habitat degradation	Y		Y		Y		N	
Coastal Development. Photopollution	Y		Y		Y		Y	
Coastal Development. Boat strikes	Y		Y		Y		Y	
Egg predation	Y	3	Y	3	Y	3	N	3
Pollution (debris, chemical)	Y	1	Y	1	Y	1	Y	1
Pathogens	Y		Y		Y		Y	
Climate change	Y		Y		Y		Y	
Foraging habitat degradation	Y	1	Y	1	Y	1	Y	1
Other								
Long-term projects (>5yrs)								
Monitoring at nesting sites (period: range of years)	2003-2018	3; 2	2003-2018	3; 2	2003-2018	3; 2	na	3; 2
Number of index nesting sites	9	3; 2	9	3; 2	9	3; 2		3; 2
Monitoring at foraging sites (period: range of years)	2005-2018	1; 3		1; 3	2005-2018	1; 3	2005-2018	1
								1; 3
Conservation								
Protection under national law	Y		Y		Y		Y	
Number of protected nesting sites (habitat preservation) (% nests)	80%	3; 3	80%	3; 2	80%	3; 2	na	3; 2
Number of Marine Areas with mitigation of threats	1	1; 3	1	1; 3	1	1; 3	1	1; 3
N of long-term conservation projects (period: range of years)	2 (2003-18)	3	2 (2003-18)	3	2 (2003-18)	3	2 (2003-18)	3
In-situ nest protection (eg cages)	N		N		N		N	
Hatcheries	N		N		N		N	
Head-starting	N		N		N		N	
By-catch: fishing gear modifications (eg, TED, circle hooks)	N	4	N	4	N	4	N	4
By-catch: onboard best practices	N		N		N		N	

By-catch: spatio-temporal closures/reduction	N		N		N		N	
Other	Release program of artisanal fishing net by-catches	1;3;4	Release program of artisanal fishing net by-catches	1;3;4	Release program of artisanal fishing net by-catches	1;3;4	Release program of artisanal fishing net by-catches	1;3;4

Table 2. Sea turtle nesting beaches in the Republic of Congo. All data: Bréheret, N. and J.–G. Mavoungou. 2018. Renatura: Personal Communication.

RMU / Nesting beach name	Index site	Nests/yr: recent average (range of years)	Crawls/yr: recent average (range of years)	Western limit		Eastern limit		Central point		Length (km)	% Monitored	Reference #	Monitoring Level (1-2)	Monitoring Protocol (A-F)
LO AE														
Djeno			109 (2017-2018)					-4.958250	11.961100	10	100%		1	
Mvassa			188 (2017-2018)					-4.889300	11.903600	10	100%		1	
Bellelo			86 (2017-2018)					-4.361740	11.574600	10	100%		1	
Longo-Bondi			7 (2017-2018)					-4.351540	11.563500	4.2	43%		1	
Bas-Kouilou Nord			52 (2017-2018)					-4.432740	11.661800	13	71%		1	
Bas-Kouilou Sud			33 (2017-2018)					-4.514900	11.754547	10	71%		1	
Nkounda			62 (2017-2018)					-4.700278°	11.800742°	10	71%		1	

Pointe Noire			51 (2017-2018)					-4.824000	11.857000	7	71%		1	
Cabinda			15 (2017-2018)					-5.012180	11.998300	4.5	43%		1	
DC SEA														
Djeno			169 (2017-2018)					-4.958250	11.961100	10	100%		1	
Mvassa			41 (2017-2018)					-4.889300	11.903600	10	100%		1	
Bellelo			73 (2017-2018)					-4.361740	11.574600	10	100%		1	
Longo-Bondi			14 (2017-2018)					-4.351540	11.563500	4.2	43%		1	
Bas-Kouilou Nord			39 (2017-2018)					-4.432740	11.661800	13	71%		1	
Bas-Kouilou Sud			1 (2017-2018)					-4.514900	11.754547	10	71%		1	
Nkounda			7 (2017-2018)					-4.700278°	11.800742°	10	71%		1	
Pointe Noire			1 (2017-2018)					-4.824000	11.857000	7	71%		1	
Cabinda			32 (2017-2018)					-5.012180	11.998300	4.5	43%		1	
CM AE														
Djeno			1 (2017-2018)					-4.958250	11.961100	10	100%		1	
Mvassa			4 (2017-2018)					-4.889300	11.903600	10	100%		1	
Bellelo			0 (2017-2018)					-4.361740	11.574600	10	100%		1	
Longo-Bondi			0 (2017-2018)					-4.351540	11.563500	4.2	43%		1	

Bas-Kouilou Nord			0 (2017-2018)					-4.432740	11.661800	13	71%		1	
Bas-Kouilou Sud			0 (2017-2018)					-4.514900	11.754547	10	71%		1	
Nkounda			0 (2017-2018)					-4.700278°	11.800742°	10	71%		1	
Pointe Noire			0 (2017-2018)					-4.824000	11.857000	7	71%		1	
Cabinda			0 (2017-2018)					-5.012180	11.998300	4.5	43%		1	

Table 3. International conventions protecting sea turtles and signed by the Republic of Congo.

International Conventions	Signed	Binding	Compliance measured and reported	Species	Conservation actions	Relevance to sea turtles
CITES	Y	N	n/a	ALL		Species integrally protected in the national law
CMS	Y	N	n/a	ALL		Species integrally protected in the national law
RAMSAR	Y	N	n/a	ALL	Sites classified or in progress	n/a

Table 4. Projects and databases on sea turtles in the Republic of Congo.

#	RMU	Country	Region / Location	Project Name or descriptive title	Key words	Start date	End date	Leading organisation	Public/Private	Collaboration with	Reports / Information material	Current Sponsors	Primary Contact (name and Email)	Other Contacts (name and Email)
T4.1		Republic of Congo	Loango Bay	Marine Protected Area creation in the Loango Bay for sea turtles conservation	Marine Protected Area, Loango Bay, foraging ground, sea turtles conservation	2017	2021	PNUE	Public	UNEP		UNEP	Constantin MBESSA <mbessaconstantin58@gmail.com>	Maidagi Toukour <maidagitoukour@yahoo.fr> ; Marcelin Agnagna <maragnagna@yahoo.fr>; Mireille Moyascko <mireillemoyas@gmail.com>

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6 "Nathalie Bréheret, Gaspar Lutero Mangue & Christian Barrientos. Une tortue verte baguée en République du Congo et retrouvée morte en Guinée Equatoriale. African Sea Turtle Newsletter N°8/2017 : 4-6."

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DEMOCRATIC REPUBLIC OF THE CONGO

[Sea turtle status and protection along the coastline of the Democratic Republic of the Congo Results of four monitoring season (2016-2020)]

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1.1. Distribution, abundance, trends

1.1.1. Nesting sites

See Table 1. & Table 2.
Figure 1 represents the nesting sites monitored by the staff of the National Park Parc "Marin des Mangroves". Four index sites are regularly monitored along the coastline of DRC. A total of 34km of beach is monitored, lengths of each beach sections is detailed in the Table A.
The whole DRC coastline is included in the zone 'B' of the « Parc Marin des Mangroves » National Park. Coastline is made of a sandy beach strip stretching on 37km on Atlantic Ocean from Cabinda border (north) to the Congo River mouth (Angola border, South). The protected area additionally covers a two-kilometer-wide coastal water strip.

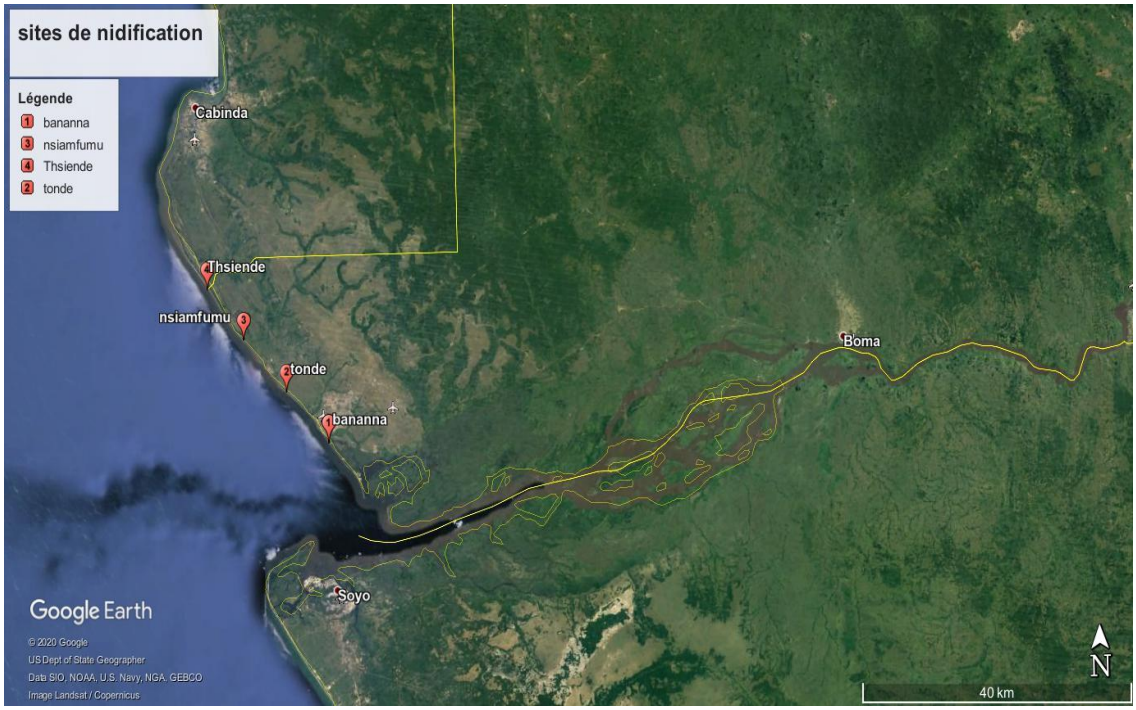

Figure 1. Sea turtle nesting sites LO (and DC) in Democratic Republic of the Congo (Central Africa, East / South East Atlantic)

Table A.

N°	Nesting beach	Length (km)
1	Banana	8
2	Tonde	9
3	Nsiemfumu	9
4	Tshiende	8
Total		34

<u>Monitoring methodology</u>

Night patrols and biological data collection

According to the national laws, protected area surveillance is implemented by the « Institut Congolais pour la Conservation de la Nature" (Congo Institute for the Conservation of Nature). Twelve patroling teams have been trained to monitor the four nesting beaches. Every night during the nesting season (Oct - April), beaches are patrolled on the falling tide. Patroling starts at 7:30 pm et ends at 6:30 am. During one nesting season, a total of 92 patrols are implemented on each index beach, for a Grand total of 368 patrols, for one season on the whole coastline.

When encountered, nesting females are identified, measured and inspected (species, CCL, scute formula, abnormalities and lesions). Nesting females are tagged with Monel tags. Crawls are counted and eggs from fresh nests are transferred to hatchery enclosures. Systematic nest translocation to hatcheries has been chosen as the best half-way technology solution to protect nest from beach erosion and harvesting risks.

Monitoring of nests tranlocated to hatcheries

Hatchery enclosure are closely monitored (24/7) by a dedicated permanent staff during the monitoring season (Oct 1st – April 1st). Essential information: translocation date, species, number of eggs deposited, putative dates of emergence are recorded.

Fishery landing sites surveillance

Beach patrolers also monitor the fishery landing sites and marketplaces to record sea turtles by-catch.

Results

Table B. Trends of the nesting activities monitored during the last four nesting seasons (2017-2020)

RMU	Nesting species	Season	Number of nests	Number of eggs (transferred to hatcheries)	Number of hatchlings (head starting)
LO-EA	*L. olivacea*	2016-2017	118	14360	12469
		2017-2018	321	39120	29807
		2018-2019	423	52427	39826
		2019-2020	766	91806	81520
total			1628	197713	163622
DC-SEA	*D. coriacea*	saison			
		2016-2017	5	825	396
		2017-2018	2	228	41
		2018-2019	3	423	40
		2019-2020	2	160	0

Total		12	1636	477

Monitoring results during the last four seasons shows that the nesting trend is positive (increasing) for *L. olivacea*. Nesting of Dermochelys coriacea have always been rare (during the last ten years) and are currently decreasing (trends on the last four seasons).
The hatchery strategy is productive and successful for olive Ridley turtles. 163 622 LO hatchlings were released to the sea during the last four season and the hatching success was high (>80%).
Results are not satisfactory for Leatherback nests translocation (low incubation success)

1.1.2. Marine areas

No information were collected so far on the possible existence of coastal feeding areas, mating areas and migration corridors within the limit of the Protected area.

1.2. Other biological data

Hatchery monitoring allows for delivering accurate and precise average numbers of eggs per nest for Olive ridley turtle in DRC (see Table)
Tagging efforts and female encountering were not sufficient to establish the number of nests laid per female per season neither the interesting intervals.

1.3. Threats

1.3.1. Nesting sites

Main threats on sea turtles and nesting habitats in DRC are:

- Uncontrolled coastal development
- Nesting beach flooding
- Coastal erosion
- Pollution by solid wates (trash, plastics)
- Increasing human density along the caostline
- Nesting female slaughtering and nest harvesting
- Light pollution in link with coastal construction

1.3.2. Marine areas

- Unreported unregulated fisheries (both artisanal and industrial)
- Pollution by solid wates (trash, plastics)

1.4. Preservation

Convention and laws protecting sea turtles

Laws protecting sea turtles and their habitats in DRC

- Act N° 14-003 of 11 Feb 2014 on Nature Conservation
- Act N° 82-002 of 28 May 1982 concerning hunting regulation
- Act N°11-009 of 9 July 2011 concerning environment protection principles
- Ministerial Decree N° 020-2006 establishing the list of protected wildlife species in DRC
- ICCN Status (Decree defining the mission of the Congo Institute for Nature Conservation)

The law No 014 of 14 Février 2014, enacted by the Head of the Congo State stipulate at article No 41: « the surveillance of the Marine Protected Area is ensured by national staff exclusively supported by the National Police or Army Forces. Without prejudice to provision of article N°36 under the present law, subcontracting is prohibited ».
The PMM Management team is therefore in charge of the surveillance of the sea turtles and habitats in DRC.
The Mangrove Marine Parc has never benefited from a programme dedicated to sea turtles and their habitat, neither from NGOs nor from the Government.

National protection status for sea turtle, their habitats and their nests/eggs

Protection status of sea turtles**: fully protected**
Sea turtle natural habitats, nets and eggs: **fully protected**

Full protection for all the sea turtle species (the sea turtles and their by-products are protected)

International Conventions ratified by DRC in link with sea turtles and their habitats

Convention on Biolocal Diversity (CBD, Convention de Rio 1992)
Convention on Migratory Species (CMS, Convention de Bonn)
Convention International on Trade of Endangered Species (CITES, Convention de Washington)

Conservation priorities

Recommendations:
To National deciders (Congo's government):

- Support financially and accompany the efforts deployed by the ICCN/Mangrove Marin Park (PMM) staff to protect sea turtles and their habitats along the DRC coastline.
- Build a national information system in collaboration with ICCN/PMM to record and follow-up sea turtle populations at the national scale.
- Provide the PMM with equipment and materials for the surveillance of sea turtle nesting habitats and nearshore waters.

To NGOs

- Accompany the PMM by collaborating with PMM management staff to ensure local population awareness and environmental education.
- By providing Tagging material
- By providing material and in kind contribution to support the monitoring efforts of the

PMM staff patrolling the beaches, monitoring the hatcheries and fishery landing sites.

To funders
To fund a long-term program for the sea turtle and habitats conservation along the DRC coastline.
To establish a laboratory equipped for sea turtle researches with the PMM.
Support the reinforcement of the capacities to the benefit of the Park staff to ensure the deployement of good conservation strategy and best practices for sea turtle population and habitat management in DRC.

1.5. Research

To improve knowledge and fill the gaps on biological parameters, genetic and connectivity, coastal feeding/mating habitats and migration corridors, the Parks is looking for further equipment and materials, as well as scientific collaborations:

- ✓ GPS/Argos platforms and partnership to carry out telemetry studies on nesting olive ridleys and leatherbacks.
- ✓ Temperature loggers for hatchery monitoring and sex ratios
- ✓ Motorized boat for coastal surveillance and research
- ✓ Material and partnership for genetic sampling and analysis

Table 1. Main biology and conservation aspects of sea turtle Regional Management Units (RMU) occurring in the Democratic Republic of Congo

RMU	**LO-EA**	**Ref #**	**DC- SEA**	**Ref #**
Occurrence				
Nesting sites	Y	1	Y	1
Pelagic foraging grounds	Y	1	n/a	
Benthic foraging grounds	n/a	1	n/a	
Key biological data				
Nests/yr: recent average (range of years)	407 (2016-2019)	1,2	3(2016-2019)	1,2
Nests/yr: recent order of magnitude	100-800	1,2	1-10	1,2
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	3	1	n/a	0
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	1	1	n/a	4
Nests/yr at "major" sites: recent average (range of years)	517 (2016-2019)	1,2	n/a	
Nests/yr at "minor" sites: recent average (range of years)	82 (2016-2019)	1,2	n/a	
Total length of nesting sites (km)	34	3	34	3
Nesting females / yr	n/a		n/a	
Nests / female season (N)	n/a		n/a	
Female remigration interval (yrs) (N)	n/a		n/a	
Sex ratio: Hatchlings (F / Tot) (N)	n/a		n/a	
Sex ratio: Immatures (F / Tot) (N)	n/a		n/a	
Sex ratio: Adults (F / Tot) (N)	n/a		n/a	
Min adult size, CCL or SCL (cm)	66 CCL	1	12S CCL	1
Age at maturity (yrs)	n/a		n/a	
Clutch size (n eggs) (N)	120 (828)	1	85 (12)	1,2
Emergence success (hatchlings/egg) (N)	88,7 (828)	1	0,4 (12)	1,2
Nesting success (Nests/ Tot emergence tracks) (N)	92,5 (828)	1	0,6 (12)	1,2

Trends				
Recent trends (last 20 yrs) at nesting sites (range of years)	Up (2016-2019)	1,2	Down (2016-2019)	
Recent trends (last 20 yrs) at foraging grounds (range of years)	n/a		n/a	
Oldest documented abundance: nests/yr (range of years)	n/a		n/a	
Published studies	**N**		**N**	
Growth rates	N		N	
Genetics	N		N	
Stocks defined by genetic markers	N		N	
Remote tracking (satellite or other)	N		N	
Survival rates	N		N	
Population dynamics	N		N	
Foraging ecology (diet or isotopes)	N		N	
Capture-Mark-Recapture	Y	1	Y	1
Threats				
Bycatch: presence of small scale / artisanal fisheries?	Y (PLL, SN)	1	Y (PLL, SN)	1
Bycatch: presence of industrial fisheries?	Y (DN, MT)	1	Y (DN, MT)	1
Bycatch: quantified?	Y	1	Y	1
Take. Intentional killing or exploitation of turtles	N		N	
Take. Egg poaching	N		N	
Coastal Development. Nesting habitat degradation	Y	1,2	Y	1
Coastal Development. Photopollution	Y	1	Y	1
Coastal Development. Boat strikes	n/a		n/a	
Egg predation	Y	1	Y	1
Pollution (debris, chemical)	n/a		n/a	
Pathogens	n/a		n/a	

Climate change	n/a		n/a	
Foraging habitat degradation	n/a		n/a	
Other	Y (see text)		Y (see text)	1
Long-term projects (>5yrs)				
Monitoring at nesting sites (period: range of years)	Y (2010-ongoing)	1,2	Y (2010-ongoing)	1,2
Number of index nesting sites	4	1,3	4	1,3
Monitoring at foraging sites (period: range of years)	N		N	
Conservation				
Protection under national law	Y	1	Y	1
Number of protected nesting sites (habitat preservation) (% nests)	4(100%)	3	4	3
Number of Marine Areas with mitigation of threats	3	1	2	1
N of long-term conservation projects (period: range of years)	<1 (2010-2019)	1	<1 (2010-2019)	1
In-situ nest protection (eg cages)	N		N	
Hatcheries	Y	1,2	Y	1
Head-starting	Y	1	Y	1
By-catch: fishing gear modifications (eg, TED, circle hooks)	Y	1	Y	1
By-catch: onboard best practices	Y	1	Y	1
By-catch: spatio-temporal closures/reduction	N		N	
Other	Y (see text)		Y (see text)	

Table 2. Nesting beaches of DRC

RMU / Nesting beach name	Index site	Nests/yr: recent average (range of years)	Crawls/yr: recent average (range of years)	Western limit		Eastern limit		Central point		Length (km)	% Monitored	Reference #	Monitoring Level (1-2)	Monitoring Protocol (A-F)
LO-EA				Long	Lat	Long	Lat	Long	Lat					
BANANA	B	146 (2016-2019)	147 (2016-2019)	12,3866	6,0088	12,3841	5,9888	12,3842	-5,9890	8	100		Level 1	
TONDE	T	182(2016-2019)	199 (2016-2019)	12,3252	5,9355	12,3391	5,9297	12,3332	-5,9240	9	100		Level 1	
NSIAMFU MU	N	20(2016-2019)	24 (2016-2019)	12,2552	5,8744	12,2866	5,8813	12,2794	-5,8713	9	100		Level 1	
TSHIENDE	TS	60(2016-2019)	61 (2016-2019)	12,2094	5,8236	12,2263	5,8108	12,3220	-5,8042	8	100		Level 1	
DC- SEA														
BANANA	B	0,7(2016-2019)	1 (2016-2019)	12,3866	6,0088	12,3841	5,9888	12,3842	-5,9890	8	100		Level 1	
TONDE	T	0,2(2016-2019)	0,7 (2016-2019)	12,3252	5,9355	12,3391	5,9297	12,3332	-5,9240	9	100		Level 1	
NSIAMFU MU	N	1(2016-2019)	1,5 (2016-2019)	12,2552	5,8744	12,2866	5,8813	12,2794	-5,8713	9	100		Level 1	

TSHIENDE	TS	1(2016-2019)	1,7 (2016-2019)	12,2094	5,8236	12,2263	5,8108	12,3220	-5,8042	8	100		Level 1	

Table 3. Conventions

International Conventions	**Signed**	**Binding**	**Compliance measured and reported**	**Species**	**Conservation actions**	**Relevance to sea turtles**
Convention sur la diversité biologique (Convention de Rio)	Y	Y	NA	ALL		Y
Convention relative aux zones humides d'importance internationale (Convention de Ramsar)	Y	Y	NA	ALL		Y
Convention relative à la protection des espèces migratrices (Convention de Bonn)	Y	Y	NA	ALL		Y
Convention sur le commerce international des espèces menacées d'extinction (Convention de Washington)	Y					

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2 Samuel MBUNGU NDAMBA. Rapport d'activité sur la ocnservation au littoral de RDC. Saison de ponte 2016-2017. ACODES reporting for Rufford Small Grant. Aout 2017:19p. Available Online https://www.rufford.org/files/20927-1%20Detailed%20Final%20Report.pdf

3 Marcel Collet and David Mbuli, SWOT Data reporting. 2020

Pictures from the sea turtle project implemented by CBBC and Parc Marin des Mangroves in Democratic Republic of Congo.

Picture 1. Hatcheries at Tondé beach

Picture 2. Release of the newborn sea turtle coordinated by the monitoring supervisor with the participation of tourists (environmental awareness)

Picture 3. Christian Byongo, the ecoguard ensuring the 24/7 surveillance , in charge of the eggs reception and their deposition in the artificial nests.

Picture 4. Newborn olive Ridley turtles from the hatcheries being released to the sea.

Picture 5. Newborn turtle emerging from the artificial nest

Picture 6. Inquiry on sea turtle poaching at Nsiamfumu fishery landing site, PMM, DRC

Picture 7. The monitoring team after the collection of eggs for translocation from a nest laid inland by an Olive ridley female which crossed the road before laying.

Picture 8. Awareness session at Tshiende village

Picture 9. The staff in charge of the monitoring and research programme tagged a leatherback after nesting at Tshiende beach.

EQUATORIAL GUINEA

[last update: 2018]

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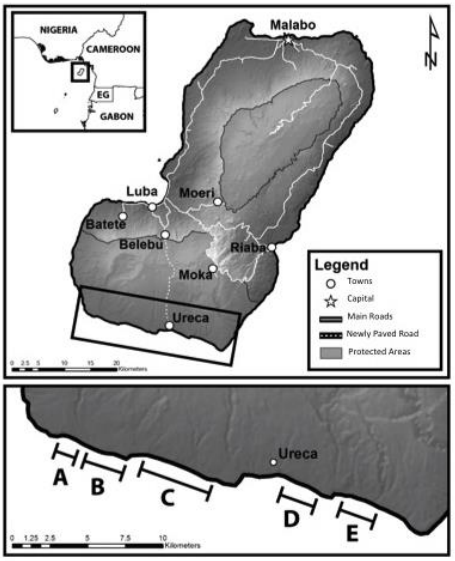
Section 1. RMU: South-Central Atlantic
Bioko Island: D. coriacea, C. mydas, E. imbricate, L. olivacea

1.1 Distribution, abundance, trends

1.1.1 Nesting Sites

There are five sandy beaches (A through E) on the southern coast of Bioko island between Punta Oscura and Punta Santiago. These five nesting beaches are utilized by four species of sea turtles, leatherback, green, olive ridley, and hawksbill turtles (Figure from Ref #1 - Honarvar et al. 2016).



All the data provided in Tables 1, 2 cover data collected between 2000 – 2014 and have been published (see provided reference list). Data from the subsequent three years (2014 – 2017) collected by BBPP using the same methodology, but not yet published.

With minor exceptions, all 5 beaches were surveyed during the nesting seasons from 2000-2017, with the annual number of days patrolled ranging from 83 to 210 (Ref #1 & BBPP unpublished data). Green turtles were encountered mainly on beach A and B while leatherbacks were encountered mainly on beach E followed by C and D (Ref #1 & BBPP unpublished data). Regression of total annual encounters showed that leatherback encounter rates decreased and the total number of olive ridley encounter rates increased annually from the 2000–

2014 nesting seasons. There was no statistically significant linear trend in the number of green and hawksbill turtle encounter rates from the 2000–2014 nesting seasons (Ref #1)

1.1.2 Marine areas

Mating has been observed within the Marine Protected Area.
There are no current abundance indexes for the Marine Protected Area.

1.2 Other biological data

A total of 755 leatherback turtles were PIT tagged between 2008 and 2014 on Beach E. A total of 17 leatherbacks on beach A and 18 on beach B during the 2013–2014 nesting season (Ref #1). A total of 279 green turtles were flipper-tagged on beach A (156 turtles) and Beach B (123 turtles) during the 2013–2014 nesting season (Ref #1).

1.3 Threats

1.3.1 Nesting sites

Construction of a paved road from the town of Luba, through the Gran Caldera Scientific Reserve, to the southern beaches was completed in November 2014. This is the first road connecting the southern beaches to the rest of the island, and it has opened overland access to the protected areas and the southern beaches to individuals outside of the local village of Ureca. The ease of access has resulted in increased turtle take on these nesting beaches (Ref #1 & Ref #4). For instance, from 2007–2014 only three adult leatherback turtles were reported as having been poached on the southern beaches of Bioko Island. However, during the 2014 - 2015 season alone, 12 adult leatherbacks were reportedly taken illegally (Ref #1 & Ref #4). This does not include poaching of other species, such as green turtles, that are usually in high demand.

Supplementary Table 1. Number of poached turtles (all species) recorded at each of the five nesting throughout the field research season (November to March). Over 90% of turtles killed are green or leatherback sea turtles.

Field Season	Beach A	Beach B	Beach C	Beach D	Beach E
2014-2015	0	0	16	12	0
2015-2016	1	1	4	12	0
2016-2017	41	0	2	3	0

In addition, tourism activities have increased drastically on the southern beaches. A total of 454 tourists visited beach D during 2015- 2016 nesting season (numbers were counted from October 10, 2015 to February 5, 2016), with the highest numbers during weekends and holidays (Ref #4). Prior to completion of the Luba – Ureca road, the only access to the southern beaches was on foot or by boat, both of which were challenging, arduous, and potentially dangerous. From 2008 to 2014 fewer than 20 tourists visited the nesting beaches each year. Other issues that have been raised with presence of tourists included the use of bright lights, campfires on the beach, bringing dogs to the beach and trash left on the beach (Ref #4).

1.3.2 Marine areas

Illegal take of turtles within the marine protected area (usually within 500 meters of the coast) occurs both in the water and on the beach (anecdotal data). In addition, turtles caught in nets, lines of small scale/artisanal fisheries are often taken as by catch (Honarvar et al. unpublished data).

1.4 Conservation

The government of Equatorial Guinea has issued law 8/1988 (regulating hunting of wildlife) and presidential decree 183/87 (regulating fishing), which offer protection for sea turtles. Consistent enforcement of the current legislations by the government of Equatorial Guinea is urgently needed if the threats to this nesting population are to be reduced (Ref #1,2,3,4).

External marine turtle conservation programs operating on Bioko Island are limited to two USA university-based organizations:

The Bioko Biodiversity Protection Program (BBPP), an academic partnership between Drexel University and The National University of Equatorial Guinea (UNGE), was established in 1997. The BBPP's ongoing projects focus on research, education, and conservation of Bioko Island's wildlife. The BBPP collaborates with the Instituto Nacional de Desarrollo Forestal y Gestión del Sistema de Áreas Protegidas (INDEFOR-AP) and Tortugas Marinas de Guinea Ecuatorial (TOMAGE) for marine turtle data collection and conservation activities.

Conservation priorities are focused on increase presence of government officials within the reserve (INDEFOR-AP) and have successful increased the number of eco-guards from zero to 4 in the past two years. The BBPP's highly successful education and outreach program teachings young school children about the importance of wildlife conservation using the children's book *Moon Over Bioko* and an accompanying conservation activity performed in local schools.

The BBPP continues to recommend increased protection within the GCSR by employment of additional eco-guards and increased involvement of government officials. Continued collaboration between INDEFOR-AP, UNGE, Purdue University Fort
Wayne's Bioko Marine Turtle Program and the BBPP is recommended in order to provide more extensive monitoring of the southern beaches and to expand public awareness through educational campaigns.

The *Bioko Marine Turtle Program,* established in 2014 under Purdue University Fort Wayne (PFW), conserves and protects sea turtles through the development and implementation of research programs, educational programs (both for university students and elementary school children), and outreach activities on Bioko Island, Equatorial Guinea. It facilitates collaboration among key stakeholders to increase the local capacity and provide alternative occupations and sustainable income streams for people in coastal villages, where sea turtles nest, thereby decreasing reliance on and threats to wildlife and the habitat shared with them. The Bioko Marine Turtle Program collaborates with the Instituto Nacional de Desarrollo Forestal y Gestión del Sistema de Áreas Protegidas (INDEFOR-AP) and Universidad Nacional de Guinea Ecuatorial (UNGE) for all research, education and conservation activities.

Conservation strategies that are endorsed by all authors of this report:

1. Improve the conservation status of sea turtles on Bioko Island through the development of research programs that increase our knowledge of the abundance, biology, and distribution of sea turtle populations on Bioko Island.
2. Improve conservation status of Bioko Island's marine turtles by reducing illegal poaching of nesting turtles on the southern beaches.

    a) Work with regulatory agencies and governance of Equatorial Guinea to increase consistent enforcement of the legislation already in place. For example, confiscate IUCN red listed species from poachers and imposition of fines on anyone in possession of sea turtles or their eggs.
    b) Place dedicated personnel with knowledge of protected species and legislation at the pre-existing barricades on the main roads, which are used to transport illegally taken wildlife.
    c) Increase the number of forest guards in the protected areas.
3. Increase local capacity and training opportunities by investing in environmental education and hands on field study training that is accessible to both local and international university level students and young professionals.
4. Develop new and institute existing environmental education outreach programs for elementary school children to engage and educate them about the world around them and inspire the next generation of conservation leaders.
5. Increase in country capacity by furthering the knowledge and skills of key personnel who will be expected to implement on-the-ground conservation projects in the future.
6. Enhance self-sustaining micro-enterprising projects that help local women in small villages generate income by handcrafting jewelry from recycled and indigenous materials.
7. Raise awareness on the conservation of sea turtles through outreach campaigns, workshops and distribution of informational materials in villages and towns.
8. Inform and involve local institutions and stakeholders, including local and national authorities and the international conservation community in protection of Bioko Island's marine turtles.
9. Collaborate to develop and implement a tourism and visitor management plan for the protected areas, including the southern beaches and marine protected areas.
    a) Evaluate current tourism and related activities in order to develop realistic management guidelines and safety precautions for tourists interacting with wildlife and the local environment.
    b) Work toward establishing clear regulations and rules for all visitors (tourists and researchers) in the protected area.
    c) Work toward establishing a consistent tariff system for all visitors staying in the protected area, including national and international tourists, international researchers and students.
    d) All funds generated from tourism and related activities in the protected area should be funneled through the government of Equatorial Guinea (INDEFOR-AP) for reinvestment in the protected area.

1.5 Research

Key knowledge gaps
Migration/movement studies
Climate change studies
Marine debris studies
Fisheries interaction and bycatch
Foraging ecology (use of stable isotopes)
Population genetics
Impact of tourism and coastal development (baseline analysis prior to further development)

Existing but unpublished data that should be urgently published

The *Bioko Biodiversity Protection Program* recognizes that knowledge of the genetic characteristics and migratory patterns of the nesting populations on Bioko's southern beaches is essential to conservation efforts. Although genetic studies have not yet been performed, the BBPP will work

with TOMAGE and Wildlife Conservation Society (WCS) in the future to provide tissue samples for analysis.

BBPP will continue to census Bioko Island's southern beaches for nesting marine turtles by training (currently in conjunction with Angela Formia, Sea Turtle Partnership Coordinator & Regional Sea Turtle Coordinator, Wildlife Conservation Society) and employing local people. Consistent methodology, both across years and across all Equatorial Guinea's beaches is being developed. Data from these surveys will be published at approximately 5-year intervals. BBPP has not yet published the nesting ecology or tagging data except for a recent publication containing a small portion of the data from the previous 17 years.

The *Bioko Marine Turtle Program* has collected data for the following studies and are currently analyzing data and preparing manuscript: climate change studies, marine debris studies, migratory patterns of the nesting populations, fisheries interaction and bycatch.

Dr. Shaya Honarvar collected and submitted tissue samples from leatherbacks on these nesting beaches to NOAA fisheries in 2013, as part of a collaborative endeavor overseen by NOAA fisheries for both genetic and stable isotope analysis. Other nesting ecology data collected by Dr. Honarvar under BBPP during 2008 – 2014 remains to be published.

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Table 1. Biological and conservation information about sea turtle Regional Management Units in Equatorial Guinea.

RMU	D. coriacea Bioko Island	Ref #	C. mydas Bioko Island	Ref #	E. imbricata Bioko Island	Ref #	L. olivacea Bioko Island	Ref #
Occurrence								
Nesting sites	Y	1,2,3, 4,5,7	Y	1,2,3, 4,5,7	y	1,2,3, 4,5,7	y	1,2,3, 4,5,7
Pelagic foraging grounds	Data Deficient		Data Deficient		Data Deficient		Data Deficient	
Benthic foraging grounds	Data Deficient		Data Deficient		Data Deficient		Data Deficient	
Key biological data								
Nests/yr: recent average (range of years)	1233 (2008-2014)	1	622(2008-2014)	1	85 encounters (2000 - 2014)	1	103 (2008 - 2014)	1
Nests/yr: recent order of magnitude								
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	5	1	5	1	n/a		n/a	n/a
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	n/a	n/a	n/a	n/a	5	1	5	1
Nests/yr at "major" sites: recent average (range of years)	1233 (2008-2014)	1	622(2008-2014)	1	n/a		n/a	n/a
Nests/yr at "minor" sites: recent average (range of years)	n/a	n/a	n/a	n/a			103 (2008 - 2014)	1
Total length of nesting sites (km)	19 (10.6km surveyed)	1,6	19 (10.6km surveyed)	1,6	19 (10.6km surveyed)	1,6	19 (10.6km surveyed)	1,6
Nesting females / yr	967	1	237	1	n/a	n/a	35	1

Nests / female season (N)	5.5 (48)	1	3	1	n/a		n/a	
Female remigration interval (yrs) (N)	3.27 (48)	1	n/a		n/a		n/a	

Table 1. (Cont.)

Sex ratio: Hatchlings (F / Tot) (N)	n/a		n/a		n/a		n/a	
Sex ratio: Immatures (F / Tot) (N)	n/a		n/a		n/a		n/a	
Sex ratio: Adults (F / Tot) (N)	n/a		n/a		n/a		n/a	
Min adult size, CCL or SCL (cm)	150 CCL & 108 CCW	2	109 SCL (2017)	PS	n/a		n/a	
Age at maturity (yrs)	n/a		n/a		n/a		n/a	
Clutch size (n eggs) (N)	78 (11)	2	n/a		n/a		n/a	
Emergence success (hatchlings/egg) (N)	n/a		n/a		n/a		n/a	
Nesting success (Nests/ Tot emergence tracks) (N)	n/a		n/a		n/a		n/a	
Trends								

Recent trends (last 20 yrs) at nesting sites (range of years)	Down (2000-2014)	1	Stable (2000-2014)	1	Low encounter numbers (trend unknown)	1	Up (2007-2014)	1
Recent trends (last 20 yrs) at foraging grounds (range of years)	n/a		n/a		n/a		n/a	
Oldest documented abundance: nests/yr (range of years)	n/a		n/a		n/a		n/a	
Published studies								
Growth rates	N		N		N		N	
Genetics	N		N		N		N	
Stocks defined by genetic markers	N		N		N		N	
Remote tracking (satellite or other)	N		Y	9,10	N		N	
Survival rates	Y	5	Y	5	N		N	
Population dynamics	Y	1	Y	1	Y	1	Y	1
Foraging ecology (diet or isotopes)	N		N		N		N	
Capture-Mark-Recapture	Y	1	Y	1	N		N	
Threats								
Bycatch: presence of small scale / artisanal fisheries?	Y	Unpublished data	Y	Unpublished data	Y	Unpublished data	Y	Unpublished data
Bycatch: presence of industrial fisheries?	Y		Y		Y		Y	
Bycatch: quantified?	Y	Unpublished data	Y	Unpublished data	Y	Unpublished data	Y	Unpublished data

Take. Intentional killing or exploitation of turtles	Y	3,4	Y	3,4	Y	3,4	Y	3,4
Take. Egg poaching	Y	3,4	Y	3,4	Y	3,4	Y	3,4
Coastal Development. Nesting habitat degradation	Y	4	Y	4	Y	4	Y	4
Coastal Development. Photopollution	N (it will be a threat in the future)		N (it will be a threat in the future)		N (it will be a threat in the future)		N (it will be a threat in the future)	
Coastal Development. Boat strikes	N		N		N		N	
Egg predation	Y	1,3,4	Y	1,3,4	Y	1,3,4	Y	1,3,4
Pollution (debris, chemical)	Y (plastics)	Unpublished data	Y (plastics)	Unpublished data	Y (plastics)	Unpublished data	Y (plastics)	Unpublished data
Pathogens	y	5	y	5	n/a		n/a	
Climate change	Y	5,11	Y	5,11	Y	5,11	Y	5,11
Foraging habitat degradation	n/a		n/a		n/a		n/a	
Other	Y (Pollution (blood chemistry baseline established)	2	Y (Pollution (blood chemistry baseline established)	2	Y (Pollution (blood chemistry baseline established)	2	Y (Pollution (blood chemistry baseline established)	2
Long-term projects (>5yrs)								
Monitoring at nesting sites (period: range of years)	Y (1997-ongoing)	1,6,7,8	Y (1997-ongoing)	1,6,7,8	Y (1997-ongoing)	1,6,7,8	Y (1997-ongoing)	1,6,7,8
Number of index nesting sites	5		5		5		5	
Monitoring at foraging sites (period: range of years)	N		N		N		N	

Conservation								
Protection under national law	Y		Y		Y		Y	
Number of protected nesting sites (habitat preservation) (% nests)	0		0		0		0	
Number of Marine Areas with mitigation of threats	1		1		1		1	
N of long-term conservation projects (period: range of years)	2 (1996-1998)(2000-present)	1,6,7,8	2 (1996-1998)(2000-present)	1,6,7,8	2 (1996-1998)(2000-present)	1,6,7,8	2 (1996-1998)(2000-present)	1,6,7,8
In-situ nest protection (eg cages)	Y (10-20 nests/season)		Y (10-20 nests/season)		N		N	
Hatcheries	N		N		N		N	
Head-starting	N		N		N		N	
By-catch: fishing gear modifications (eg, TED, circle hooks)	N		N		N		N	
By-catch: onboard best practices	N		N		N		N	
By-catch: spatio-temporal closures/reduction	N		N		N		N	
Other	Y (see text)		Y (see text)		Y (see text)		Y (see text)	

Table 2. Sea turtle nesting beaches in Equatorial Guinea.

RMU / Nesting beach name	Index site	Nests/yr: recent average (range of years)	Crawls/yr: recent average (range of years)	Western limit		Eastern limit		Central point		Length (km)	% Monitored	Reference #	Monitoring Level (1-2)	Monitoring Protocol (A-F)
DC-SC ATL				Long	Lat	Long	Lat	Long	Lat					
Beach A		50 (2008 - 2014)	237 (2000 - 2014)	8.4583	3.2571	8.4739	3.2636	n/a	n/a	1.6	100	1	1	B
Beach B		44 (2008 - 2014)	160 (2000 - 2014)	8.4779	3.2619	8.4939	3.2579	n/a	n/a	1.6	100	1	1	B
Beach C		241 (2008 - 2014)	696 (2000 - 2014)	8.5192	3.2529	8.5457	3.2422	n/a	n/a	3.2	100	1	1	B
Beach D		381 (2008 - 2014)	847 (2000 - 2014)	8.5918	3.2464	8.6114	3.2361	n/a	n/a	2.4	100	1	1	B
Beach E		517 (2008 - 2014)	1227 (2000 - 2014)	8.6299	3.2331	8.645	3.2284	n/a	n/a	1.8	100	1	1	B
CM-SC ATL														
Beach A		211 (2008 - 2014)	485 (2000 - 2014)	8.4583	3.2571	8.4739	3.2636	n/a	n/a	1.6	100	1	1	B

Beach B		152 (2008 - 2014)	374 (2000 - 2014)	8.4779	3.2619	8.4939	3.2579	n/a	n/a	1.6	100	1	1	B
Beach C		171 (2008 - 2014)	288 (2000 - 2014)	8.5192	3.2529	8.5457	3.2422	n/a	n/a	3.2	100	1	1	B
Beach D		17 (2008 - 2014)	17 (2000 - 2014)	8.5918	3.2464	8.6114	3.2361	n/a	n/a	2.4	100	1	1	B
Beach E		71 (2008 - 2014)	105 (2000 - 2014)	8.6299	3.2331	8.645	3.2284	n/a	n/a	1.8	100	1	1	B
LO-SC ATL														
Beach A		16 (2008 - 2014)	18 (2000 - 2014)	8.4583	3.2571	8.4739	3.2636	n/a	n/a	1.6	100	1	1	B
Beach B		21 (2008 - 2014)	24 (2000 - 2014)	8.4779	3.2619	8.4939	3.2579	n/a	n/a	1.6	100	1	1	B
Beach C		24 (2008 - 2014)	41 (2000 - 2014)	8.5192	3.2529	8.5457	3.2422	n/a	n/a	3.2	100	1	1	B
Beach D		16 (2008 - 2014)	16 (2000 - 2014)	8.5918	3.2464	8.6114	3.2361	n/a	n/a	2.4	100	1	1	B
Beach E		27 (2008 - 2014)	27 (2000 - 2014)	8.6299	3.2331	8.645	3.2284	n/a	n/a	1.8	100	1	1	B
EI-SC ATL														
Beach A		n/a	1 (2000 - 2014)	8.4583	3.2571	8.4739	3.2636	n/a	n/a	1.6	100	1	1	B
Beach B		n/a	0.7 (2000 - 2014)	8.4779	3.2619	8.4939	3.2579	n/a	n/a	1.6	100	1	1	B

Beach C		n/a	4 (2000 - 2014)	8.5192	3.2529	8.5457	3.2422	n/a	n/a	3.2	100	1	1	B
Beach D		n/a	0.4 (2000 - 2014)	8.5918	3.2464	8.6114	3.2361	n/a	n/a	2.4	100	1	1	B
Beach E		n/a	0 (2000 - 2014)	8.6299	3.2331	8.645	3.2284	n/a	n/a	1.8	100	1	1	B

Table 3. International conventions protecting sea turtles and signed by Equatorial Guinea.

International Conventions	Signed
Convention on Migratory Species of Wildlife	2009
Ramsar Convention on Wetlands of International Importance	1997
International Union for the Conservation of Nature	1997
Convention on Biological Diversity	1994
Marine Turtles of the Atlantic Coast of Africa	1999
African Convention on the Conservation of Nature and Natural Resources	2003
Convention on the International Trade of Endangered Species	1992
Kyoto Protocol on Climate Change	2000
Convention on Climate Change	2005
Central Africa Forest Commission (COMIFAC)	2005

Table 4. Projects and databases on sea turtles in Equatorial Guinea.

#	RMU	Country	Region / Location	Project Name or descriptive title	Keywords	Start date	End date	Leading organization	Public/Private	Collaboration with	Reports / Information material	Current Sponsors	Primary Contact (name and Email)	Other Contacts (name and Email)
T4.1	CM-SCATL	Equatorial Guinea	Central Africa, Bioko Island, Gran Caldera Scientific Reserve (Bioko Sur)	Verde - Bioko Island	Population Status; PIT tags; Nesting turtles; Conservation; Bioko Island;	2000	ongoing	Bioko Biodiversity Protection Program	Private	Drexel University, National University of Equatorial Guinea, Instituto Nacional de Desarrollo	REF #1/www.bioko.org	US Fish and Wildlife Service and others	Dr. Mary Katherine Gonder, BBPP Director & Drexel Associate Professor, for original data 2000-2017 (mkg62@drexel.edu) and Dr. Shaya Honarvar, Director, Bioko Marine	BBPP: Dana Venditti (Ph.D. Student) - dmv52@drexel.edu & Dr. Demetrio Bocuma Mene (BBPP Post-doctoral research fellow) - bocumademe@gmail.com

					Eastern Atlantic Ocean					Forestal y Gestión del Sistema de Áreas Protegidas, Tortugas Marinas de Guinea Ecuatorial			Turtle Program, University of Hawaii at Manoa for data 2008-2014 (honarvar@hawaii.edu)	BMTP: Lisa Sinclair (Program Manager)-esincla2@gmail.com;
T4.2	DC-SCATL	Equatorial Guinea	Central Africa, Bioko Island, Gran Caldera Scientific Reserve	Laud - Bioko Island	Population Status; PIT tags; Nesting turtles; Conservation	2000	ongoing	Bioko Biodiversity Protection Program	Private	Drexel University, National University of Equatorial Guinea, Institu	REF #1/www.bioko.org	US Fish and Wildlife Service and others	Dr. Mary Katherine Gonder, BBPP Director & Drexel Associate Professor, for original data 2000-2017 (mkg62@drexel.edu) and Dr.	BBPP: Dana Venditti (Ph.D. Student) - dmv52@drexel.edu & Dr. Demetrio Bocuma Mene (BBPP Post-doctoral

			(Bioko Sur)		; Bioko Island; Eastern Atlantic Ocean					to Nacional de Desarrollo Forestal y Gestión del Sistema de Áreas Protegidas, Tortugas Marinas de Guinea Ecuatorial			Shaya Honarvar, Director, Bioko Marine Turtle Program, University of Hawaii at Manoa for data 2008-2014 (honarvar@hawaii.edu)	research fellow) - bocumademe@gmail.com BMTP: Lisa Sinclair (Program Manager)- esincla2@gmail.com;

T4.3	LO-SCATL	Equatorial Guinea	Central Africa, Bioko Island, Gran Caldera Scientific Reserve (Bioko Sur)	Golfina - Bioko Island	Population Status; PIT tags; Nesting turtles; Conservation; Bioko Island; Eastern Atlantic Ocean	2000	ongoing	Bioko Biodiversity Protection Program	Private	Drexel University, National University of Equatorial Guinea, Instituto Nacional de Desarrollo Forestal y Gestión del Sistema de Áreas Protegidas, Tortugas Marin	REF #1/www.bioko.org	US Fish and Wildlife Service and others	Dr. Mary Katherine Gonder, BBPP Director & Drexel Associate Professor, for original data 2000-2017 (mkg62@drexel.edu) and Dr. Shaya Honarvar, Director, Bioko Marine Turtle Program, University of Hawaii at Manoa for data 2008-2014 (honarvar@hawaii.edu)	BBPP: Dana Venditti (Ph.D. Student) - dmv52@drexel.edu & Dr. Demetrio Bocuma Mene (BBPP Post-doctoral research fellow) - bocumademe@gmail.com BMTP: Lisa Sinclair (Program Manager)- esincla2@gmail.com;

										as de Guinea Ecuatorial				
T4.4	EI-SCATL	Equatorial Guinea	Central Africa, Bioko Island, Gran Caldera Scientific Reserve (Bioko Sur)	Carey - Bioko Island	Population Status; PIT tags; Nesting turtles; Conservation; Bioko Island; East	2000	ongoing	Bioko Biodiversity Protection Program	Private	Drexel University, National University of Equatorial Guinea, Instituto Nacional de Desarrollo Forest	REF #1/www.bioko.org	US Fish and Wildlife Service and others	Dr. Mary Katherine Gonder, BBPP Director & Drexel Associate Professor, for original data 2000-2017 (mkg62@drexel.edu) and Dr. Shaya Honarvar, Director, Bioko Marine Turtle	BBPP: Dana Venditti (Ph.D. Student) - dmv52@drexel.edu & Dr. Demetrio Bocuma Mene (BBPP Post-doctoral research fellow) - bocumademe@gmail.com BMTP:

					ern Atlantic Ocean					al y Gestión del Sistema de Áreas Protegidas, Tortugas Marinas de Guinea Ecuatorial			Program, University of Hawaii at Manoa for data 2008-2014 (honarvar@hawaii.edu)	Lisa Sinclair (Program Manager)-esincla2@gmail.com;

Table 5. Raw data

All Bioko (Gran Caldera Scientific Reserve) Nesting Beaches								
Leatherbacks		Greens		Olive Ridleys		Hawksbills		
Year	Encounters	Year	Encounters	Year	Encounters	Year	Encounters	
1996 - 1997	1109	1996 - 1997	3422	1996 - 1997	83	1996 - 1997	41	Tomas et al. 1999
1997 - 1998	1447	1997 - 1998	2613	1997 - 1998	108	1997 - 1998	4	
2000 - 2001	5283	2000 - 2001	1692	2000 - 2001	71	2000 - 2001	4	Honarvar et al. 2016 published data
2001 - 2002	6353	2001 - 2002	2406	2001 - 2002	66	2001 - 2002	5	
2002 - 2003	5909	2002 - 2003	1493	2002 - 2003	99	2002 - 2003	3	
2003 - 2004	3192	2003 - 2004	1541	2003 - 2004	119	2003 - 2004	15	
2004 - 2005	2400	2004 - 2005	954	2004 - 2005	128	2004 - 2005	6	
2005 - 2006	3917	2005 - 2006	1243	2005 - 2006	173	2005 - 2006	2	
2006 - 2007	5383	2006 - 2007	968	2006 - 2007	191	2006 - 2007	5	
2007 - 2008	1792	2007 - 2008	1237	2007 - 2008	121	2007 - 2008	17	
2008 - 2009	350	2008 - 2009	248	2008 - 2009	84	2008 - 2009	4	
2009 - 2010	1095	2009 - 2010	677	2009 - 2010	77	2009 - 2010	4	

2010 - 2011	942	2010 - 2011	299	2010 - 2011	134	2010 - 2011	5	
2011 - 2012	1693	2011 - 2012	735	2011 - 2012	110	2011 - 2012	6	
2012 - 2013	2541	2012 - 2013	714	2012 - 2013	182	2012 - 2013	4	
2013 - 2014	3010	2013 - 2014	2571	2013 - 2014	176	2013 - 2014	5	
2014 - 2015	1020	2014 - 2015	1117	2014 - 2015	175	2014 - 2015	7	Unpublished data; Same methodology as previous years
2015 - 2016	581	2015 - 2016	2511	2015 - 2016	190	2015 - 2016	0	
2016 - 2017	470	2016 - 2017	1571	2016 - 2017	138	2016 - 2017	5	

		Encounters		Encounters		Encounters		Encounters		
Year	Beach	D. coriacea		C. mydas		L. olivacea		E. imbricata		Effort
2000	A	277	2.02189781	684	4.99270073	9	0.06569343	3	0.02189781	137
2001	A	566	3.09289618	924	5.04918033	26	0.1420765	1	0.00546448	183
2002	A	459	2.66860465	598	3.47674419	21	0.12209302	1	0.00581395	172
2003	A	166	0.86010363	500	2.59067358	14	0.07253886	1	0.00518135	193
2004	A	153	0.86931818	256	1.45454546	6	0.03409091	1	0.00568182	176
2005	A	423	2.10447761	467	2.32338309	16	0.07960199	0	0	201
2006	A	312	1.47169811	295	1.39150943	11	0.05188679	1	0.00471698	212

2007	A	136	0.81437126	349	2.08982036	9	0.05389222	0	0	167
2008	A	5	0.08333333	82	1.36666667	20	0.33333333	4	0.06666667	60
2009	A	44	0.49438202	87	0.97752809	13	0.14606742	4	0.04494382	89
2010	A	n/a		n/a		n/a		n/a		n/a
2011	A	n/a		n/a		n/a		n/a		n/a
2012	A	205	1.73728814	319	2.70338983	52	0.44067797	0	0	118
2013	A	96	0.82758621	1258	10.8448276	20	0.17241379	0	0	116
2000-2001	B	172	1.17808219	645	4.41780822	17	0.11643836	1	0.00684932	146
2001-2002	B	477	2.63535912	925	5.11049724	15	0.08287293	0	0	181
2002-2003	B	346	2.0969697	533	3.23030303	20	0.12121212	0	0	165
2003-2004	B	208	1.07772021	474	2.45595855	9	0.04663212	3	0.01554404	193
2004-2005	B	173	0.99425287	312	1.79310345	28	0.16091954	1	0.00574713	174
2005-2006	B	265	1.31840796	365	1.8159204	26	0.12935323	0	0	201
2006-2007	B	221	1.0625	300	1.44230769	35	0.16826923	0	0	208
2007-2008	B	76	0.47204969	393	2.44099379	39	0.24223603	1	0.00621118	161
2008-2009	B	12	0.19354839	68	1.09677419	6	0.09677419	0	0	62
2009-2010	B	34	0.38636364	134	1.52272727	22	0.25	0	0	88
2010-2011	B	30	0.2970297	81	0.8019802	39	0.38613861	4	0.03960396	101
2011-2012	B	25	0.25773196	136	1.40206186	23	0.2371134	0	0	97
2012-2013	B	115	1.0952381	155	1.47619048	32	0.30476191	0	0	105
2013-2014	B	87	0.73109244	708	5.94957983	19	0.15966387	0	0	119
2000-2001	C	796	6.21875	244	1.90625	12	0.09375	0	0	128
2001-2002	C	1497	8.75438597	459	2.68421053	18	0.10526316	4	0.02339181	171
2002-2003	C	1652	8.17821782	237	1.17326733	32	0.15841584	2	0.00990099	202
2003-2004	C	845	3.80630631	491	2.21171171	68	0.30630631	8	0.03603604	222
2004-2005	C	598	3.39772727	335	1.90340909	64	0.36363636	4	0.02272727	176
2005-2006	C	870	4.32835821	361	1.7960199	95	0.47263682	2	0.00995025	201
2006-2007	C	1432	6.85167464	306	1.46411483	81	0.38755981	4	0.01913876	209
2007-2008	C	452	2.77300614	394	2.41717791	55	0.33742331	16	0.09815951	163
2008-2009	C	26	0.325	81	1.0125	9	0.1125	0	0	80

2009-2010	C	158	1.7173913	231	2.51086957	7	0.07608696	0	0	92
2010-2011	C	117	1.21875	110	1.14583333	11	0.11458333	1	0.01041667	96
2011-2012	C	192	1.95918367	319	3.25510204	30	0.30612245	6	0.06122449	98
2012-2013	C	383	3.86868687	145	1.46464647	23	0.23232323	1	0.01010101	99
2013-2014	C	720	6.15384615	319	2.72649573	70	0.5982906	5	0.04273504	117
2000-2001	D	2290	14.8701299	6	0.03896104	8	0.05194805	0	0	154
2001-2002	D	1494	8.16393443	13	0.07103825	3	0.01639344	0	0	183
2002-2003	D	1247	6.5631579	8	0.04210526	8	0.04210526	0	0	190
2003-2004	D	691	4.21341463	16	0.09756098	17	0.10365854	3	0.01829268	164
2004-2005	D	641	3.68390805	10	0.05747126	14	0.08045977	0	0	174
2005-2006	D	1095	5.475	2	0.01	9	0.045	0	0	200
2006-2007	D	1626	7.74285714	22	0.10476191	33	0.15714286	0	0	210
2007-2008	D	346	2.17610063	16	0.10062893	13	0.08176101	0	0	159
2008-2009	D	74	0.74	4	0.04	16	0.16	0	0	100
2009-2010	D	312	2.94339623	15	0.14150943	12	0.11320755	0	0	106
2010-2011	D	228	2.01769912	10	0.08849558	17	0.15044248	0	0	113
2011-2012	D	314	2.88073395	6	0.05504587	14	0.12844037	0	0	109
2012-2013	D	642	5.30578512	13	0.10743802	24	0.19834711	3	0.02479339	121
2013-2014	D	863	6.84920635	91	0.72222222	41	0.32539683	0	0	126
2000-2001	E	1748	14.8135593	113	0.95762712	25	0.21186441	0	0	118
2001-2002	E	2319	12.6721312	85	0.46448087	4	0.02185792	0	0	183
2002-2003	E	2205	11.9836957	117	0.63586957	18	0.09782609	0	0	184
2003-2004	E	1282	6.60824742	60	0.30927835	11	0.05670103	0	0	194
2004-2005	E	835	4.77142857	41	0.23428571	16	0.09142857	0	0	175
2005-2006	E	1264	6.32	48	0.24	27	0.135	0	0	200
2006-2007	E	1792	8.492891	45	0.21327014	31	0.14691943	0	0	211
2007-2008	E	782	4.8875	85	0.53125	5	0.03125	0	0	160
2008-2009	E	233	1.72592593	13	0.0962963	33	0.24444444	0	0	135
2009-2010	E	547	4.97272727	210	1.90909091	23	0.20909091	0	0	110
2010-2011	E	567	4.93043478	98	0.85217391	67	0.5826087	0	0	115

2011-2012	E	1162	10.2831858	274	2.42477876	43	0.38053097	0	0	113
2012-2013	E	1196	10.3103448	82	0.70689655	51	0.43965517	0	0	116
2013-2014	E	1244	10.2809917	195	1.61157025	26	0.21487603	0	0	121

GABON

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1. RMU: Southeast Atlantic Leatherbacks

1.1. Distribution, abundance, trends

1.1.1. Nesting sites

Most of the 594 km of the coastline can be considered leatherback nesting sites (with >20 nests/yr AND >10 nests/km yr) (Fig. 1), with Gabon having been described as the largest leatherback nesting population in the world (Ref. 1).

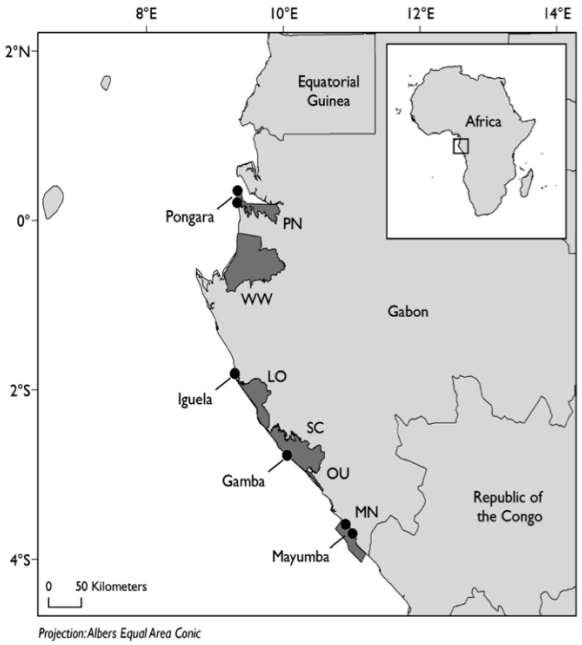

Figure 1. Map of Gabon coastline and major nesting beaches.

Data for index nesting beaches was not available at the time of reporting. Data mentioned below pertains to national-scale analysis (Table 1) but long-term trend analyses are not currently available, though in preparation. Long-term research and monitoring projects have been ongoing since 1998 to the present, 5 major sites are targeted and data analysis is underway.

1.1.2. Marine areas

Extensive satellite tracking, mark-recapture and modelling analyses have allowed the mapping of marine areas utilised by this population, both within territorial waters during inter-nesting periods and across migratory routes toward foraging grounds (Ref. 2, 5, 7, 8, 13, 20, 29).

1.2. Threats

Despite extensive conservation initiatives, Gabon's turtles are still subject to a variety of threats (Table 1).

1.3. Conservation

All sea turtle species are integrally protected by Gabon's national legislation and approximately 79% of nesting occurs within national parks and protected areas (Table 1).

1.4. Research

More than 29 scientific studies have been carried out and published (or in review) on leatherbacks, olive ridleys and green turtles in Gabon (see Ref list below).

2. RMU: East Atlantic Olive Ridley

2.1 Distribution, abundance, trends

2.1.1 Nesting sites

585 km of Gabon's coastline can be considered Olive Ridley nesting habitat, although 4 sites are considered major sites (with >20 nests/yr AND >10 nests/km yr) (Fig. 2). The olive ridley nesting population of Gabon has been described as the largest in the Atlantic Ocean (Ref. 6).

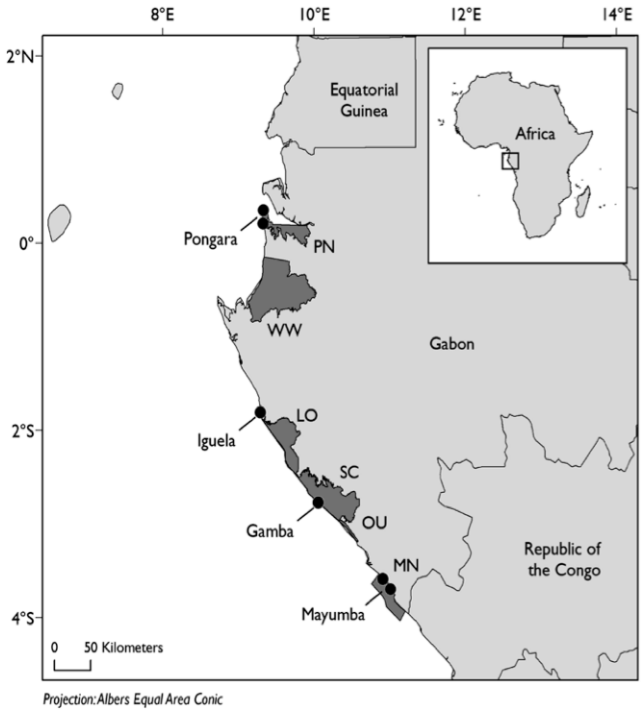

Figure 2. Map of Gabon coastline and major nesting beaches.

Data presented in Table 1 pertain to a national-scale analysis published in 2015 (Ref. 6), although research and monitoring projects ongoing since 1998 to the present at 5 different index sites. The overall trend for the population was calculated using the most reliable data between 2006 and 2013, and shows a 13.3% increase (Ref. 6).

2.1.2. Marine areas

Extensive satellite tracking, mark-recapture and modelling analyses have allowed the mapping of marine areas utilised by this population, both within territorial waters during inter-nesting periods and across migratory routes toward foraging grounds (Ref. 4, 6, 15, 18).

2.2. Threats

Despite extensive conservation initiatives, Gabon's turtles are still subject to a variety of threats (Table 1).

2.3. Conservation

All sea turtle species are integrally protected by Gabon's national legislation and approximately 81% of nesting occurs within national parks and protected areas (Table 1).

2.4. Research

More than 29 scientific studies have been carried out and published (or in review) on leatherbacks, olive ridleys and green turtles in Gabon (see Ref list below).

3. RMU: Atlantic Green Turtles

While green turtle nesting in Gabon is scarce, the region hosts one of the most important green turtle foraging grounds in Central Africa (21, 22, 23, 24, 25, 26, 27). Unfortunately, additional studies on this foraging population, while ongoing since 1998, are still in prep. Data is not currently available, other than general information on threats and conservation initiatives described in Table 1.

Table 1. Biological and conservation information about sea turtle Regional Management Units in Gabon. DN (drift net), SN (set net), ST (shrimp trawls), MT (multi-specific bottom trawls), (PT (pelagic trawls).

RMU	DC- SE Atlantic	Ref #	LO- East Atlantic	Ref #	CM-Atlantic	Ref #
Occurrence						
Nesting sites	Y	1,11,12	Y	6	N	
Pelagic foraging grounds	N	2,5,7,8,13	Y	4	N	
Benthic foraging grounds	N	2,5,7,8,13	n/a		Y	21, 22, 23, 24, 25, 26, 27
Key biological data						
Nests/yr: recent average (range of years)	78510 (2002-2007)	1	2370-9814 (2006-2013)	6	n/a	
Nests/yr: recent order of magnitude	36185-126480	1	1887-14033	6		
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	most of the coastline	1	4	6	n/a	
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	n/a		n/a			
Nests/yr at "major" sites: recent average (range of years)	n/a		510 (2006-2013)	6	n/a	
Nests/yr at "minor" sites: recent average (range of years)	n/a		n/a		n/a	
Total length of nesting sites (km)	594	1	585	6	n/a	
Nesting females / yr	5865-20499	1	948-5452	6	n/a	
Nests / female season (N)	n/a		n/a		n/a	
Female remigration interval (yrs) (N)	n/a		n/a		n/a	
Sex ratio: Hatchlings (F / Tot) (N)	n/a		n/a		n/a	

Sex ratio: Immatures (F / Tot) (N)	n/a		n/a		n/a	
Sex ratio: Adults (F / Tot) (N)	n/a		n/a		n/a	
Min adult size, CCL or SCL (cm)	n/a		n/a		n/a	
Age at maturity (yrs)	n/a		n/a		n/a	
Clutch size (n eggs) (N)	n/a		n/a		n/a	
Emergence success (hatchlings/egg) (N)	n/a		n/a		n/a	
Nesting success (Nests/ Tot emergence tracks) (N)	n/a		n/a		n/a	
Trends						
Recent trends (last 20 yrs) at nesting sites (range of years)	n/a		Up 13.3% (2006-2013)	6	n/a	
Recent trends (last 20 yrs) at foraging grounds (range of years)	n/a		n/a		n/a	
Oldest documented abundance: nests/yr (range of years)	n/a		n/a		n/a	
Published studies						
Growth rates	N		N		N	
Genetics	Y	19	N		N	
Stocks defined by genetic markers	N		N		N	
Remote tracking (satellite or other)	Y	2,5,7,20,29	Y	4,15,18	N	
Survival rates	N		N		N	
Population dynamics	N		N		N	
Foraging ecology (diet or isotopes)	N		N		N	
Capture-Mark-Recapture	Y	8,13	N		N	

Threats						
Bycatch: presence of small scale / artisanal fisheries?	Y (DN, SN)	16	Y (DN, SN)	16	Y (DN,SN)	21, 22, 23, 24, 25, 26 ,27
Bycatch: presence of industrial fisheries?	Y (ST, MT, PT)	3,31	Y (ST, MT, PT)	3	N	
Bycatch: quantified?	Y	3	Y	3	N	
Take. Intentional killing or exploitation of turtles	n/a		N		Y	21, 22, 23, 24, 25, 26, 27
Take. Egg poaching	Y	28	Y	6		
Coastal Development. Nesting habitat degradation	Y	17	Y	6		
Coastal Development. Photopollution	Y	9,10	Y	9,10		
Coastal Development. Boat strikes	n/a		Y	6	Y	PS
Egg predation	Y	28	Y	6		
Pollution (debris, chemical)	Y	17	Y	6	Y	21, 22, 23, 24, 25, 26, 27
Pathogens	n/a		n/a		Y	21, 22, 23, 24, 25, 26, 27
Climate change	Y	17	Y	6	Y	21, 22, 23, 24, 25, 26, 27
Foraging habitat degradation	n/a		Y	4	Y	21, 22, 23, 24, 25, 26, 27
Other	Y (stranded logs)	14,17	Y (stranded logs)	14,17		
Long-term projects (>5yrs)						
Monitoring at nesting sites (period: range of years)	Y (1998-ongoing)	1	Y (1998-ongoing)	6		

Number of index nesting sites	5	1	5	6		
Monitoring at foraging sites (period: range of years)	N		n/a		Y (1998-ongoing)	21, 22, 23, 24, 25, 26, 27
Conservation						
Protection under national law	Y	3	Y	6	Y	21, 22, 23, 24, 25, 26, 27
Number of protected nesting sites (habitat preservation) (% nests)	79% +/- 6% nests in protected areas	1	81% +/- 3.5% nests in protected areas	6	n/a	
Number of Marine Areas with mitigation of threats	20 marine protected areas (9 parks, 11 reserves covering 26% of EEZ)	4	20 marine protected areas (9 parks, 11 reserves covering 26% of EEZ)	4	20 marine protected areas (9 parks, 11 reserves covering 26% of EEZ)	4
N of long-term conservation projects (period: range of years)	>6 (1996-ongoing)	1	>6 (1996-ongoing)	6	>6 (1998-ongoing)	21, 22, 23, 24, 25, 26, 27
In-situ nest protection (eg cages)	N		N		n/a	
Hatcheries	Y	28	Y	28	n/a	
Head-starting	N		N		n/a	
By-catch: fishing gear modifications (eg, TED, circle hooks)	Y	3	Y	3	n/a	
By-catch: onboard best practices	Y	3	Y	3,30	n/a	
By-catch: spatio-temporal closures/reduction	Y	3	Y	3	Y	3
Other	log removal	17	n/a		n/a	

Table 3. International conventions protecting sea turtles and signed by Gabon.

International Conventions	Signed	Binding	Compliance measured and reported	Species	Conservation actions	Relevance to sea turtles
CITES	Y	Y	N	ALL		
CMS	Y	Y	N	ALL		
CBD	Y	Y	N	ALL		
Algiers Convention	Y	Y	N	ALL		
Abidjan Memorandum on Sea Turtle Conservation	Y	N	N	ALL		

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GAMBIA

[last update: 2018]

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1 RMU: West Africa / East Atlantic Region

1.1 Distribution, abundance, trends

1.1.1 Nesting Sites

Gambia has about 80 km of coastline (Barnett et al., 2004). About 71.7 km of Gambia's coastline support nesting by sea turtles (Figure 1). Table 5 below indicates the length of the beaches surveys in the various regions along the 71.7 km beach. The 71.7 km stretch of sandy beach is utilized by four species of sea turtle namely the leatherback (Dermochelys coriacea), green turtle (*Chelonia mydas*), olive ridley (*Lepidochelys olivacea*) and Hawksbill (*Erethmochelys imbricate*) (Ref #1: Hawkes et al., 2006).

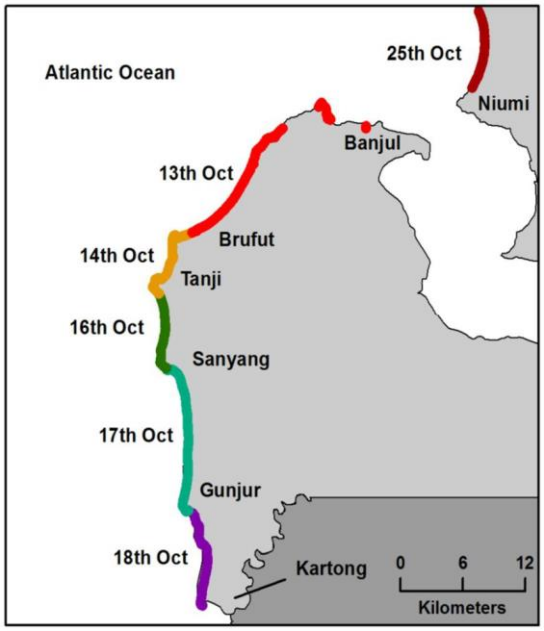

Figure 1. Sea turtle nesting beaches in Gambia

The data used for the report was collected through interviews with fishermen (Barnett et al., 2004) and field surveys (Barnett et al., 2004; Hawkes et al., 2006).

Table 5. Distance of the sections surveyed (Source: Hawkes et al., 2006)

Date	Region	Beach length (km)
13-Oct-06	Denton Bridge, Hotel Fajara to Bijoli Forest Park	8.6
13-Oct-06	Bijoli Forest Park to Brufut Fishing Village	9.7
14-Oct-06	Brufut Fishing Village to Batokunku	10.1
15-Oct-06	Bijol Islands (excludes transit to island)	2.5
16-Oct-06	Batokunku to Sanyang Point	8.3
17-Oct-06	Sanyang to Gunjur	14.7
18-Oct-06	Gunjur to Kartong	9.9
25-Oct-06	Niumi National Park	7.9
Total length of beach (km)		71.7

There are a total of 7 major nesting beaches (Figure 1) were surveyed during the 1999- 2000 nesting season (interviews and beach patrols) and also in 2006 (beach patrols). Green turtles were the dominant species recorded in the surveys while the other three species were lowly represented. The surveys recorded 2 leatherbacks, 59 green turtles, 1 olive ridley and 1 hawksbill per year (Barnett et al., 2004; Hawkes et al., 2006).

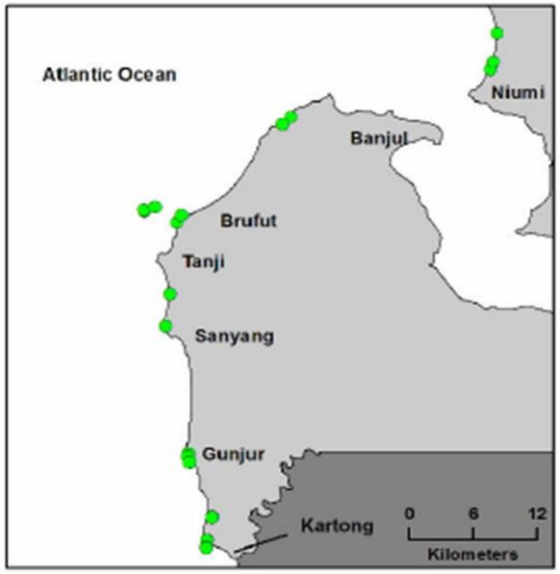

Figure 2: Map showing the locations of nesting activities along the coast of Gambia (Source: Hawkes et al., 2006).

1.1.2 Marine areas

There are no reports of marine protected areas. An in-water survey conducted to determine the existing habitats occupied by marine turtles in the Gambian waters encountered an individual live sea turtle (unidentified species) at about 5 m depth contour (Figure 3). In-water surveys and reports from interviews with fishermen show that the waters of Gambia may provide suitable habitats for both juvenile and adult marine turtles (Hawkes et al., 2006). It is however not documented whether marine turtle occupy Gambian waters year round.

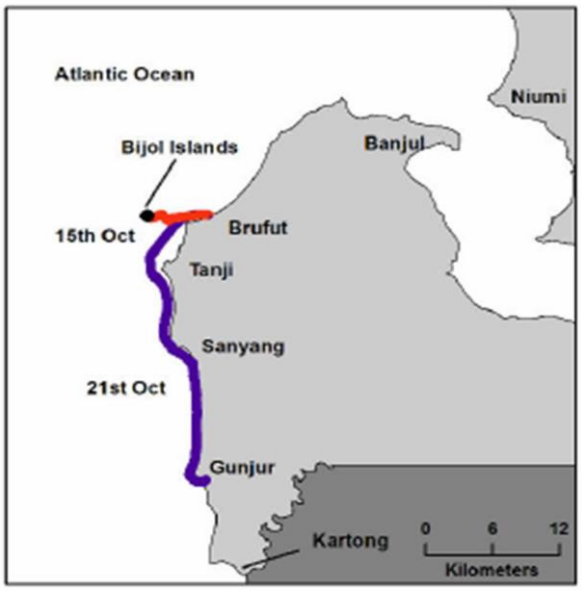

Figure 3. Map of coastal areas of Gambia showing route of in-water survey

1.1 Threats

1.1.1 Nesting sites

Threats to sea turtles on the nesting beach include direct take of turtles, egg poaching, egg predation, and habitat degradation. The consumptive use of turtle is facilitated by the belief among local communities that turtle meat when consumed give the consumer strength, virility, and good health. Turtle meat is believed to be good for men and pregnant women.

1.1.2 Marine areas

Fishery by-catch in both industrial and artisanal fishery is the main threat existing in offshore areas of Gambian waters.

1.2 Conservation

The government of Gambia has issued a law which offer protection for turtles by regulating their killing. There has also been marine turtle conservation programs in the past which conducted conservation education and training along nesting beaches.

1.5 Research

Key knowledge gaps

- Long term beach surveys to establish species composition and population status
- The seasonality in marine turtle nesting along Gambia's coast
- In-water survey to assess marine turtle habitats
    - Species and abundance of sea turtles that utilize the waters of Gambia
    - The life stage of turtles utilizing the coastal waters of Gambia
- Any hotspot for marine turtle on the beach and offshore

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Table 1. Biological and conservation information about sea turtle Regional Management Units in Gambia.

RMU	***D. coriacea* Atlantic Southeast**	**Ref #**	**C. Mydas Atlantic East**	**Ref #**	**L. olivacea Atlantic East**	**Ref #**	**E. imbricate Atlantic East**	**Ref #**
Occurrence								
Nesting sites	Y	1, 2	Y	1	n/a		Y	
Pelagic foraging grounds	n/a		n/a		n/a		n/a	
Benthic foraging grounds	n/a		Y	2	n/a		n/a	
Key biological data								
Nests/yr: recent average (range of years)	2 (1998-1999)	2	59 (1998-2006)	1, 2	1 (1998-1999)	2	1 (1998-1999)	2
Nests/yr: recent order of magnitude							n/a	
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	n/a	1	7	1	n/a	1	n/a	1
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	7	1	n/a	1	7	1	7	1
Nests/yr at "major" sites: recent average (range of years)	1 (1998-1999)	2	7.4 (1998-2006)	1	0.5 (1998-1999)	2	0.5 (1998-1999)	
Nests/yr at "minor" sites: recent average (range of years)	n/a		n/a		n/a		n/a	
Total length of nesting sites (km)	80	2	80	2	80	2	80	2
Nesting females / yr	n/a		n/a		n/a		n/a	
Nests / female season (N)	n/a		n/a		n/a		n/a	
Female remigration interval (yrs) (N)	n/a		n/a		n/a		n/a	
Sex ratio: Hatchlings (F / Tot) (N)	n/a		n/a		n/a		n/a	

Sex ratio: Immatures (F / Tot) (N)	n/a		n/a		n/a		n/a	
Sex ratio: Adults (F / Tot) (N)	n/a		n/a		n/a		n/a	
Min adult size, CCL or SCL (cm)	152 (CCL)	2	n/a	2	n/a		28.7 (SCL); 31 (CCL)	2
Age at maturity (yrs)	n/a		n/a		n/a		n/a	
Clutch size (n eggs)	n/a		n/a		n/a		n/a	
Emergence success (hatchlings/egg)	n/a		n/a		n/a		n/a	
Nesting success (Nests/ Tot emergence tracks)	n/a		n/a		n/a		n/a	
Trends								
Recent trends (last 20 yrs) at nesting sites (range of years)	n/a		n/a		n/a		Down -30% (1999-2012)	
Recent trends (last 20 yrs) at foraging grounds (range of years)	n/a		n/a				n/a	
Oldest documented abundance: nests/yr (range of years)	2 (1998-1999)	2	50 (1998-1999)	1, 2	1 (1998-1999)	2	1 (1998-1999)	2
Published studies								
Growth rates	N		N		N		N	
Genetics	N		N		N		N	
Stocks defined by genetic markers	N		N		N		N	
Remote tracking (satellite or other)	N		N		N		N	
Survival rates	N		N		N		N	
Population dynamics	N		N		N		N	
Foraging ecology (diet or isotopes)	N		N		N		N	
Capture-Mark-Recapture	N		N		N		N	
Threats								
Bycatch: small scale / artisanal	Y		Y		Y		Y	

Bycatch: industrial	Y		Y		Y		Y	
Bycatch: quantified?	N		N		N		N	
Intentional killing or exploitation of turtles	Y		Y		Y		Y	
Egg poaching	Y	2	Y		Y		Y	
Egg predation	Y	2	Y		Y		Y	
Photopollution	Y		Y		Y		Y	
Boat strikes	n/a		n/a		n/a		n/a	
Nesting habitat degradation	Y		Y		Y		Y	
Foraging habitat degradation	n/a		n/a		n/a		n/a	
Other	n/a		n/a		n/a		n/a	
Long-term projects								
Monitoring at nesting sites	n/a		n/a		n/a		n/a	
Number of index nesting sites	n/a		n/a		n/a		n/a	
Monitoring at foraging sites	n/a		n/a		n/a		n/a	
Conservation								
Protection under national law	Y		Y		Y		Y	
Number of protected nesting sites (habitat preservation)	n/a		n/a		n/a		n/a	
Number of Marine Areas with mitigation of threats	n/a		n/a		n/a		n/a	
Long-term conservation projects (number)	n/a		n/a		n/a		n/a	
In-situ nest protection (eg cages)	n/a		n/a		n/a		n/a	
Hatcheries	n/a		n/a		n/a		n/a	
Head-starting	n/a		n/a		n/a		n/a	
By-catch: fishing gear modifications (eg, TED, circle hooks)	n/a		n/a		n/a		n/a	
By-catch: onboard best practices	n/a		n/a		n/a		n/a	

By-catch: spatio-temporal closures/reduction	n/a		n/a		n/a		n/a	
Other	n/a		n/a		n/a		n/a	

Table 3. International conventions protecting sea turtles and signed by Gambia.

International Conventions	**Signed**	**Binding**	**Compliance measured and reported**	**Species**	**Conservation actions**	**Relevance to sea turtles**
Bonn Convention on Migratory Species	Y	Y	Y	ALL	Species and habitat	Y
Abidjan Memorandum of Understanding	Y	Y	Y	ALL	Species and habitat	Y

GHANA

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1 RMU: Loggerhead turtle (*Caretta caretta*) Atlantic Northeast

1.1. Distribution, abundance, trends

1.1.1 Nesting Sites

There is only one nesting beach where nesting has been documented for this species over the past 30 years. Two loggerhead nests were documented in December 1998; and a single loggerhead was observed nesting in January 2013 in PramPram Ghana (seen in Fig 1 as small star; Ref #4). It should be noted that consistent nesting surveys have only been conducted on this beach from August 1998 to April 2000. See Table 1 and 2.

1.1.2 Marine Areas

Ghana's coastal zone includes sandy bottom, hard bottom, coral reef, and sea grass bed habitats. Fishermen indicate observing loggerheads at sea and there are a few photographs of loggerhead landings which confirm this report by fishermen. Also in 2019, there was an unsuccessful nesting attempt by a loggerhead turtle in the in the Greater Accra Region, making it a total of three documented events by loggerheads in the past three decades. Surveys and research have not been done on foraging grounds or migration paths.

1.2 Other Biological Data

Historical accounts of sea turtles in the region indicate the presence of loggerheads in lower frequencies than olive ridley, leatherback, and green sea turtles.

1.3 Threats

1.3.1 Nesting Sites

The primary threats on the nesting beach are direct harvesting of nesting females, egg poaching, predation by dogs and pigs, sand removal for concrete production, and sea level rise that has rapidly increased erosion and eliminated nesting habitats. See Table 1.

1.3.2 Marine Areas

The primary in-water threats are incidental capture by fishing nets of artisanal and commercial fisheries, and direct harvest.

1.4 Conservation

The Wildlife Conservation Regulations Bill of 1971 (I.1 685) prohibits the capture or slaughter of all sea turtles in the water or on the nesting beach. This regulation is rarely enforced beyond coastal communities that contain a Wildlife Division field office. Some communities recognize a cultural taboo against

harming sea turtles. The community chief and elders enforce this traditional protection that appears to be a stronger deterrent than the federal law.

1.5 Research

Ghana continues to suffer from the lack of consistent sea turtle nesting data from most of the 550 km coastline. Multiple NGOs have attempted to establish a monitoring program but rarely completes a single year of monitoring before exhausting financial resources. The Ghana Turtle Conservation Project is the only source of consistent nesting information, but their effort is limited to only 10 km of coastline. Three Wildlife Division field offices provide quarterly and annual internal reports that include limited sea turtle data but these reports are not easily accessible to the public, since the information within have not been consolidated. Ghana needs to establish a national database network to improve the accessibility of these data.

2 RMU: Leatherback turtle (*Dermochelys coriacea*) Atlantic Southeast

2.1. Distribution, abundance, trends

2.1.1 Nesting Sites

There are nine confirmed nesting sites for this species along Ghana's coastline, but nesting abundance data are only available for about three. Some nesting sites would be considered 'major' (example – Ada and Keta) and some would be considered 'minor'. Unconfirmed reports indicate the possibility of additional 'major' nesting sites. It is almost certain leatherbacks are nesting along the entire coastline, but surveys have not been conducted along most of Ghana's coast. See Tables 1 and 2.

2.1.2 Marine Areas

Fishermen along the entire coastline quickly identify this species and indicate routinely encountering them while fishing. Unpublished satellite telemetry data indicate females swim directly south to leave the coastal zone at the end of the nesting season. Surveys and research have not been done on foraging grounds or migration paths.

2.2 Other Biological Data

Much of Ghana's 550 km coastline is composed of sandy beach habitat suitable for nesting sea turtles, but less than 10% of the coastline has been surveyed for nesting activity.

2.3 Threats

2.3.1 Nesting Sites

The primary threats on the nesting beach are direct harvesting of nesting females, egg poaching, predation by dogs and pigs, sand removal for concrete production, and sea level rise that has rapidly increased erosion and eliminated nesting habitats. See Table 1.

2.3.2 Marine Areas

The primary in-water threats are incidental capture by fishing nets of artisanal (ref # 9) and commercial fisheries, and direct harvest. Plastic pollution could also be a challenge in offshore areas (ref # 2).

2.4 Conservation

The Wildlife Conservation Regulations Bill of 1971 (I.1 685) prohibits the capture or slaughter of all sea turtles in the water or on the nesting beach. This regulation is rarely enforced beyond coastal communities

that contain a Wildlife Division field office. Some communities recognize a cultural taboo against harming sea turtles. The community chief and elders enforce this traditional protection that appears to be a stronger deterrent than the federal law.

2.5 Research

Ghana's nesting leatherback turtles share genetic haplotypes with individuals from the Atlantic Southeast and Indian Southwest RMUs, but also contain unique haplotypes currently only known for the West Africa region. This indicates the nesting populations in Ghana are important for the genetic diversity of the species (Ref # 7). Satellite telemetry data suggest nesting females immediately leave the coastal zone at the end of the nesting season and enter more pelagic habitats beyond the Gulf of Guinea. Fishery bycatch data and a possible prevention method for sea turtle bycatch has been recorded and we are working to publish the findings.

3 RMU: Green turtle (*Chelonia mydas*) Atlantic East

3.1. Distribution, abundance, trends

3.1.1 Nesting Sites

There are nine confirmed nesting sites for this species along Ghana's coastline, but nesting abundance data are only available for a few. Although nesting is consistent at these a few locations, they would be considered 'minor' due to the low overall density across the beach. There may be a 'major' nesting beach in the Western Region of Ghana but formal survey data are missing for that potentially important nesting beach. It is almost certain green turtles are nesting along the entire coastline, but surveys have not been conducted along most of Ghana's coast. See Tables 1 and 2.

3.1.2 Marine Areas

Fishermen along the entire coastline quickly identify this species and indicate routinely encountering them while fishing. Surveys and research have not been done on foraging grounds or migration paths.

3.2 Other Biological Data

Much of Ghana's 550 km coastline is composed of sandy beach habitat suitable for nesting sea turtles, but less than 10% of the coastline has been surveyed for nesting activity.

3.3 Threats

3.3.1 Nesting Sites

The primary threats on the nesting beach are direct harvesting of nesting females, egg poaching, predation by dogs and pigs, sand removal for concrete production, and sea level rise that has rapidly increased erosion and eliminated nesting habitats. See Table 1.

3.3.2 Marine Areas

The primary in-water threats are incidental capture by fishing nets of artisanal (ref # 9) and commercial fisheries, and direct harvest.

3.4 Conservation

The Wildlife Conservation Regulations Bill of 1971 (I.1 685) prohibits the capture or slaughter of all sea turtles in the water or on the nesting beach. This regulation is rarely enforced beyond coastal communities

that contain a Wildlife Division field office. Some communities recognize a cultural taboo against harming sea turtles. The community chief and elders enforce this traditional protection that appears to be a stronger deterrent than the federal law.

3.5 Research

Unpublished research from the University of Ghana (ref # 1) and Ghana Wildlife Society suggest green turtle nesting activity is highest in the western region and gradually declines to absent in the eastern region. This has not been confirmed by research. We currently know very little about the nesting activity, patterns, and trends for this species in Ghana.

4 RMU: Hawksbill turtle (*Eretmochelys imbricate*) Atlantic East

4.1. Distribution, abundance, trends

4.1.1 Nesting Sites

Historical reports indicate this species nested in Ghana at one time, but there have been zero confirmed reports of this species nesting in the last 30 years. Wildlife Division officers occasionally report a hawksbill nest Ghana's western region, but these have never been validated.

4.1.12 Marine Areas

Ghana's coastal zone includes rocky hard bottoms and coral reefs, especially in the western region. Fishermen often recognize this species from photos and remark about the shell pattern and sharp head. But a specimen has not been confirmed in Ghana's waters in the last 30 years by scientific or photo evidence. Surveys and research have not been done to locate foraging grounds or migration paths.

4.2 Other Biological Data

Fishermen clearly know this species, but it is difficult to know if they see the turtle in Ghana since many fishermen will operate throughout the Gulf of Guinea beyond Ghana's waters.

4.3 Threats

4.3.1 Nesting Sites

The primary threats on the nesting beach are direct harvesting of nesting females, egg poaching, predation by dogs and pigs, sand removal for concrete production, and sea level rise that has rapidly increased erosion and eliminated nesting habitats. See Table 1.

4.3.2 Marine Areas

The primary in-water threats are incidental capture by fishing nets of artisanal and commercial fisheries, and direct harvest.

4.4 Conservation

The Wildlife Conservation Regulations Bill of 1971 (I.1 685) prohibits the capture or slaughter of all sea turtles in the water or on the nesting beach. This regulation is rarely enforced beyond coastal communities that contain a Wildlife Division field office. Some communities recognize a cultural taboo against harming sea turtles. The community chief and elders enforce this traditional protection that appears to be a stronger deterrent than the federal law.

4.5 Research

Routine night-time nesting surveys are needed in Ghana's Western Region to determine if this species is still nesting in the country. In-water surveys on the rocky and coral reef habitats in the region need to be conducted to determine if the species is foraging within the area.

5 RMU: Olive Ridley turtle (*Lepidochelys olivacea*) Atlantic East

5.1. Distribution, abundance, trends

5.1.1 Nesting Sites

There are nine confirmed nesting sites for this species along Ghana's coastline, but nesting abundance data are only available for a few. Most nesting sites for this species would be considered 'major' (Ada, Prampram, Ningo, Mankodze, and Tema) due to the high nesting density. Unconfirmed reports indicate the possibility of additional 'major' nesting sites. It is almost certain olive ridleys are nesting along the entire coastline, but surveys have not been conducted along most of Ghana's coast. More 'major' nesting beaches will likely be found when additional areas are surveyed. See Tables 1 and 2.

5.1.2 Marine Areas

Fishermen along the entire coastline quickly identify this species and indicate routinely encountering them while fishing. Some fishermen report congregations of this species farther offshore but such sightings have not been confirmed. Surveys and research have not been done to locate foraging grounds or migration paths.

5.2 Other Biological Data

Much of Ghana's 550 km coastline is composed of sandy beach habitat suitable for nesting sea turtles, but less than 10% of the coastline has been surveyed for nesting activity.

5.3 Threats

5.3.1 Nesting Sites

The primary threats on the nesting beach are direct harvesting of nesting females, egg poaching, predation by dogs and pigs, sand removal for concrete production, and sea level rise that has rapidly increased erosion and eliminated nesting habitats. Major marine debris and debris on the beach may inhibit nesting. See Table 1.

5.3.2 Marine Areas

The primary in-water threats are incidental capture by fishing nets of artisanal and commercial fisheries, and direct harvest. Industrial bycatch is included because commercial fisheries operating in Ghanaian waters likely capture turtles unintentionally, but this has not been quantified. See Table 1.

5.4 Conservation

The Wildlife Conservation Regulations Bill of 1971 (I.1 685) prohibits the capture or slaughter of all sea turtles in the water or on the nesting beach. This regulation is rarely enforced beyond coastal communities that contain a Wildlife Division field office. Some communities recognize a cultural taboo against harming sea turtles. The community chief and elders enforce this traditional protection that appears to be a stronger deterrent than the federal law.

5.5 Research

Ghana's nesting olive ridley turtles share haplotypes with those found in India, Australia, and French Guiana (South America) but also contains haplotypes found throughout West Africa, and at least one unique haplotype only found in Ghana. Satellite telemetry data indicates these animals move around the Gulf of Guinea during and after the nesting season by staying in very shallow coastal waters just off shore from the beach zone. Poor tag return suggests low philopatry or suffers from high mortality across the region. Fishery bycatch data and a possible prevention method for sea turtle bycatch has been recorded and we are working to publish the findings. As long-term nesting data has been gathered at a "major" nesting beach, we are working to publish the preliminary results soon.

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Table 1. Main Table. Biological data for five RMUs historically reported from Ghana. The hawksbill turtle is included due to historical records, recent unconfirmed nesting reports, and recognition by fishermen.

RMU	D. coriacea	Ref #	C. mydas	Ref #	L. olivacea	Ref #	C. caretta	Ref #	E. imbricata	Ref #
Occurrence										
Nesting sites	Y	1,2,3,4,5	Y	1,5,6	Y	1,2,3,5	Y	1,2,3,5	n/a	
Pelagic foraging grounds	n/a		Y	8	n/a		n/a		n/a	
Benthic foraging grounds	n/a		n/a		n/a		n/a		n/a	
Key biological data										
Nests/yr: recent average (range of years)	188 (1998-2019)		47 (1998-2019)		881 (1998-2019)		1 (2015)	4	n/a	
Nests/yr: recent order of magnitude	n/a		n/a		n/a		n/a		n/a	
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	4	2,3,4,5,6	2		4		0		n/a	
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	0		4		0		0		n/a	
Nests/yr at "major" sites: recent average (range of years)	188 (1998-2019)		47 (1998-2019)		881 (1998-2019)		n/a		n/a	
Nests/yr at "minor" sites: recent average (range of years)	n/a		38 (1998-2016)		n/a		n/a		n/a	
Total length of nesting sites (km)	30.1	2	30.1	2	30.1		9		n/a	
Nesting females / yr	n/a		n/a		n/a	2	1		n/a	
Nests / female season (N)	n/a		n/a		n/a	2	1		n/a	
Female remigration interval (yrs) (N)	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	
Sex ratio: Immatures (F / Tot) (N)	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	
Min adult size, CCL or SCL (cm)	114, CCL	2	111, CCL		40.5, CCL	2	n/a		n/a	
Age at maturity (yrs)	n/a		n/a		n/a		n/a		n/a	
Clutch size (n eggs)	85 (12)		137 (3)		103 (29)	2	n/a		n/a	
Emergence success (hatchlings/egg)	74.8% (11)		n/a		77.2% (84)		n/a		n/a	
Nesting success (Nests/ Tot emergence tracks)	0.95 (277)		1 (6)		0.98 (118)		n/a		n/a	
Trends										
Recent trends (last 20 yrs) at nesting sites (range of years)	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	
Oldest documented abundance: nests/yr (range of years)	74 (2007-2008)	2	n/a		103 (2007-2008)	2	n/a		n/a	
Published studies										
Growth rates	n/a		n/a		n/a		n/a		n/a	
Genetics	Y	7	n/a		n/a		n/a		n/a	
Stocks defined by genetic markers	n/a		n/a		n/a		n/a		n/a	
Remote tracking (satellite or other)	Y		n/a		Y		n/a		n/a	

Survival rates	**n/a**		**n/a**		**n/a**		**n/a**		**n/a**	
Population dynamics	n/a		n/a		n/a		n/a		n/a	
Foraging ecology (diet or isotopes)	n/a		n/a		n/a		n/a		n/a	
Capture-Mark-Recapture	n/a		n/a		n/a		n/a		n/a	
Threats										
Bycatch: small scale / artisanal	Y		Y		Y		Y		Y	
Bycatch: industrial	Y		Y		Y		n/a		n/a	
Bycatch: quantified?	Y		Y		Y		Y		Y	
Intentional killing or exploitation of turtles	Y	2	Y		Y		Y		Y	
Egg poaching	Y	2	Y		Y		Y		Y	
Egg predation	Y	2	Y		Y		Y		Y	
Photopollution	Y	2	Y		Y		Y		Y	
Boat strikes	n/a		n/a		n/a		n/a		n/a	
Nesting habitat degradation	Y	2	Y		Y		Y		Y	
Foraging habitat degradation	n/a		n/a		n/a		n/a		n/a	
Other	n/a		n/a		n/a		n/a		n/a	
Long-term projects										
Monitoring at nesting sites	Y		Y		Y		N		N	
Number of index nesting sites	n/a		n/a		n/a		n/a		n/a	
Monitoring at foraging sites	n/a		n/a		n/a		n/a		n/a	
Conservation										
Protection under national law	Y	2, 5	Y	2, 5	Y	2, 5	Y	2, 5	Y	2

Number of protected nesting sites (habitat preservation)	All of sandy coastline (100%)		All of sandy coastline (100%)		All of sandy coastline (100%)		All of sandy coastline (100%)		All of sandy coastline (100%)	
Number of Marine Areas with mitigation of threats	0		0		0		0		0	
Long-term conservation projects (number)	Y (4)		Y (4)		Y (4)		N		N	
In-situ nest protection (eg cages)	N		N		N		N		N	
Hatcheries	N		N		N		N		N	
Head-starting	N		N		N		N		N	
By-catch: fishing gear modifications (eg, TED, circle hooks)	Y		Y		Y		Y		Y	
By-catch: onboard best practices	Y		Y		Y		Y		Y	
By-catch: spatio-temporal closures/reduction	N		N		N		N		N	
Other	n/a		n/a		n/a		n/a		n/a	

Table 2. Nesting Beaches.

Nesting site	**Index site**	**Nests/yr: recent average (range of years)**	**Crawls/yr: recent average (range of years)**	**Western limit**		**Eastern limit**		**Central point**		**Length (km)**	**% Monitored**	**Reference #**
D. coriacea				**Long**	**Lat**	**Long**	**Lat**	**Long**	**Lat**			

Ada-Foah	Y	74 (2007-2008)	77 (2007-2008)	05°46' 37.4"	000°36' 36.4"	05°46' 06.1"	000°41' 04.2"	05°46' 26.3"	000°38' 52.2"	7	100	2
Mankodze	Y	22.7 (2012-2015)	13.2 (2012-2015)	05°41.613'	000°18.749'	05°19.425'	000°39.540'	05°19.210'	000°40.312'	3.4	100	
Prampram		125 (1998-2000)	140 (1998-2000)							9	100	
Old Ningo		140 (1998-2000)	158 (1998-2000)							6	100	
Mankodze	Y	17.3 (2016-2019)	17.3 (2016-2019)	05°41.613'	000°18.749'	05°19.425'	000°39.540'	05°19.210'	000°40.312'	3.4	100	
Anloga-Volta	Y	49 (2018-2019)	59 (2018-2019)	05°46.860'	000°52.966'	05°47.222'	000°55.474'	05°47.025'	000°54.335'	4.7	100	
C. Mydas												
Ada-Foah		0	0	05°46' 37.4"	000°36' 36.4"	05°46' 06.1"	000°41' 04.2"	05°46' 26.3"	000°38' 52.2"	7	100	
Mankodze	Y	1 (2012-2015)	0.7 (2012-2015)	05°41.613	000°18.749	05°19.425	000°39.540	05°19.210	000°40.312	3.4	100	
Prampram		15 (1998-2000)	19 (1998-2000)							9	100	
Old Ningo		22 (1998-2000)	25 (1998-2000)							6	100	
Mankodze	Y	4.3 (2016-2019)	8 (2016-2019)	05°41.613'	000°18.749'	05°19.425'	000°39.540'	05°19.210'	000°40.312'	3.4	100	
Anloga-Volta		1.5 (2018-2019)	3 (2018-2019)	05°46.860'	000°52.966'	05°47.222'	000°55.474'	05°47.025'	000°54.335'	4.7	100	
L. olivacea												
Ada-Foah	Y	103 (2007-2008)	118 (2007-2008)	05°46' 37.4"	000°36' 36.4"	05°46' 06.1"	000°41' 04.2"	05°46' 26.3"	000°38' 52.2"	7	100	2

Mankodze	Y	83.3 (2012-2015)	44.7 (2012-2015)	05°41.613	000°18.749	05°19.425	000°39.540	05°19.210	000°40.312	3.4	100	
Prampram		958 (1998-2000)	1,094 (1998-2000)							9	100	
Old Ningo		1,375 (1998-2000)	1,504 (1998-2000)							6	100	
Mankodze	Y	91.3 (2016-2019)	105.5 (2016-2019)	05°41.613'	000°18.749'	05°19.425'	000°39.540'	05°19.210'	000°40.312'	3.4	100	
Anloga-Volta	Y	30.5 (2018-2019)	40.5 (2018-2019)	05°46.860'	000°52.966'	05°47.222'	000°55.474'	05°47.025'	000°54.335'	4.7	100	

Table 3. Conventions relevant to sea turtle RMUs in Ghana.

International Conventions	**Signed**	**Binding**	**Compliance measured and reported**	**Species**	**Conservation actions**	**Relevance to sea turtles**
Convention on Biological Diversity (CBD)	Y	Y	Y	ALL	Conservation of species and nestings beaches	Y
Convention on International Trade in Endangered Species of Wild Fauna and Flora	Y	Y	Y	ALL	Conservation of species and nestings beaches	Y
The Convention on the Conservation of Migratory Species	Y	Y	Y	ALL	Conservation of species and nestings beaches	Y
RAMSAR Convention	Y	Y	Y	ALL	Conservation of nestings beaches	Y

Table 4. Projects and databases on sea turtles in Ghana.

#	RMU	Country	Region / Location	Project Name or descriptive title	Key words	Start date	End date	Leading organisation	Public/Private
T4.1		Ghana	West Africa	Hlami Association fo Turtle Conservation and Hope (HATCH)	Nest counts; Flipper tag; turtles protection; Conservation; Ada Foah ; Ghana	2006	2010	University of Ghana / Florida Gulf Coast University	Public
T4.2		Ghana	West Africa	Ghana Turtle Conservation Project	Nest counts; PIT tagging; Flipper tag; turtles protection; Conservation; Mankoadze; Fishery interraction; by-catch; Ghana	2010	Ongoing	Ghana Wildlife Division (GWD)/ Florida Gulf Coast University (FGCU)	Public
T4.3		Ghana	West Africa	Ghana Turtle Conservation Project		2018	Ongoing	Ghana Wildlife Division (GWD)/ Florida Gulf Coast University (FGCU)	Public

Table 4. (cont.)

#	Collaboration	Reports / Information material	Current Sponsors	Primary Contact (name and Email)	Database available	Name of Database	Names of sites included (matching Table B, if appropriate)	Beginning of the time series	End of the time series	Track information	Nest information	Flipper tagging	Tags in STTI-ACCSTR?	PIT tagging	Remote tracking	Ref #
T4.1	Ghana Wildlife Division		Phil Allman	Phil Allman (pallman@fgcu.edu);	Y		Ada Foah	2008	2010	Y	Y	Y	N	N	N	
T4.2	Local Communities		MTCF-USFWS	Phil Allman (pallman@fgcu.edu); Andrews Agyekumhene (andyaohene@yahoo.com)	Y		Mankoadze	2012	2019	Y	Y	Y	N	Y	N	
T4.3	Local Communities		MTCF-USFWS	Phil Allman (pallman@fgcu.edu); Andrews Agyekumhene (andyaohene@yahoo.com)	Y		Anloga	2018	2019	Y	Y	Y	N	Y	N	

Figure 1. Map of the coastal regions of Ghana showing location of nesting sites where data was recorded. Black stars indicate monitoring location

GUINEA BISSAU

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General remarks

Guinea Bissau is of global importance for the conservation of sea turtles; five of the seven extant species can be seen in the country: the green turtle, the hawksbill, the olive ridley, the leatherback and the loggerhead. Except for the loggerhead turtle, all other species nest in Guinea Bissau, being the green turtle the most abundant by far. Green and hawksbill turtles also use the country's neritic habitats for foraging, both during their juvenile and their adult stages. Most nesting in Guinea-Bissau occurs at the archipelago of the Bijagós, a group of 88 islands and islets, most of them uninhabited. Some significant nesting and foraging also occurs in the mainland, particularly in the northern region of Varela, which borders Senegal.

The Bijagós Archipelago is a designated UNESCO Biosphere Reserve, since 1996, and has three Marine Protected Areas (MPAs): the Orango National Park, the Marine National Park of João Vieira - Poilão, and the Urok Islands Community Protected Marine Area. Within the archipelago, most breeding sites occur inside the MPAs, particularly within the Orango National Park (ONP) and the Marine National Park of João Vieira - Poilão (MNPJVP). The ONP was created in December 2000 and is the largest protected area of the Bijagós Archipelago, with a total area of 158,235 ha. It is located in the southern part of the archipelago (N11˚00′ to 11˚20′ and W15.87' to 16˚25′) and encompasses the islands of Orango Grande, Orangozinho, Canogo, Meneque and Imbone, and several islets. At the ONP, there are several nesting beaches for green turtles, olive ridley and leatherback turtles (6). The MNPJVP was created in August 2000, it sets in the southeast region of the Bijagós Archipelago (N10°77' to 11°07', W15°56' to 15°77') and covers an area of 49,500 ha, comprising four main islands; João Vieira, Cavalos, Meio and Poilão, and three islets; Cabras, Baixo das Gaivotas and Ilhéu do Meio. This park hosts one of the largest populations of green turtles globally (2, 13), with most of the population nesting at the small island of Poilão. Here, nesting by hawksbills also occurs, albeit at a much smaller scale, with ≤ 10 nests per year (1). In the other islands of the MNPJVP, namely, João Vieira, Meio, Cavalos and Cabras, there is also nesting of green turtles, but in considerably lower proportions (6, 7, 15, 1).

The illegal harvesting of turtles and their eggs, bycatch by industrial and artisanal fishing vessels, and the decline in surface and quality of nesting habitat due to coastal erosion, flooding, and egg predation by native species are the main threats that sea turtles face in Guinea Bissau (6, 1).

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Table 1. Biological and conservation information about sea turtle Regional Management Units in Guinea Bissau.

RMU	**CM-E ATL**	**Ref #**	**EI-E ATL**	**Ref #**	**LO-E ATL**	**Ref #**	**DC-E ATL**	**Ref #**
Occurrence								
Nesting sites	Y	1,2,6	Y	1,2,6	Y		Y	
Pelagic foraging grounds	n/a		n/a		n/a		n/a	
Benthic foraging grounds	J, A	PS	J, A	PS	n/a		n/a	
Key biological data								
Nests/yr: recent average (range of years)	n/a		n/a		32 (2012 - 2016)	PS	n/a	
Nests/yr: recent order of magnitude	15689 - 38242	PS	n/a		5-56	PS	n/a	
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	6	1, PS	0	1	1	PS	0	PS
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	n/a		1	1	0	PS	1	PS
Nests/yr at "major" sites: recent average (range of years)	27251 (2013 - 2017)	10	n/a		n/a		n/a	
Nests/yr at "minor" sites: recent average (range of years)			n/a		n/a		n/a	
Total length of nesting sites (km)	~80km	2,6,PS	n/a		n/a		n/a	
Nesting females / yr	29016	11	n/a		n/a		n/a	
Nests / female season (N)	3,0 (232)	1	n/a		n/a		n/a	
Female remigration interval (yrs) (N)	n/a		n/a		n/a		n/a	
Sex ratio: Hatchlings (F / Tot) (N)	1,2:1 (F:M)	1,8,9	n/a		n/a		n/a	
Sex ratio: Immatures (F / Tot) (N)	n/a		n/a		n/a		n/a	
Sex ratio: Adults (F / Tot) (N)	n/a		n/a		n/a		n/a	
Min adult size, CCL or SCL (cm)	85 CCL	6.12	81 CCL	6	51 CCL	6	n/a	
Age at maturity (yrs)	n/a		n/a		n/a		n/a	

Clutch size (n eggs) (N)	120,3 (232)	1	163,8 (5)	2	130 (7)	6	n/a	
Emergence success (hatchlings/egg) (N)	59.7 % (98)	9	n/a		n/a		n/a	
Nesting success (Nests/ Tot emergence tracks) (N)	81.30 %	2	n/a		n/a		n/a	
Trends								
Recent trends (last 20 yrs) at nesting sites (range of years)	Up (2007 - 2016)	1	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	
Oldest documented abundance: nests/yr (range of years)	7400 (2000)	5	n/a		n/a		n/a	
Published studies								
Growth rates	N		N		N		N	
Genetics	Y	4	N		N		N	
Stocks defined by genetic markers	Y	4	N		N		N	
Remote tracking (satellite or other)	Y	3	N		N		N	
Survival rates	N		N		N		N	
Population dynamics	Y	1,2,8, 14	N		N		N	
Foraging ecology (diet or isotopes)	N		N		N		N	
Capture-Mark-Recapture	N		N		N		N	
Threats								
Bycatch: presence of small scale / artisanal fisheries?	Y	1.6	Y	6	Y	6	Y	6
Bycatch: presence of industrial fisheries?	Y	6	Y	6	Y	6	Y	6
Bycatch: quantified?	N		N		N		N	
Take. Intentional killing or exploitation of turtles	Y	1.6	Y	6	Y	6	Y	6
Take. Egg poaching	Y	2	N		Y	6	Y	6
Coastal Development. Nesting habitat degradation	N	1.6	N		N		N	
Coastal Development. Photopollution	n/a		N		N		N	
Coastal Development. Boat strikes	n/a		n/a		n/a		n/a	
Egg predation	Y	1,5,6, 7	Y	5.6	Y	5. 6	Y	5. 6
Pollution (debris, chemical)	N		n/a		n/a		n/a	

Pathogens	n/a		n/a		n/a		n/a	
Climate change	Y	9,12, 13	n/a		n/a		n/a	
Foraging habitat degradation	n/a		n/a		n/a		n/a	
Other	N							
Long-term projects (>5yrs)								
Monitoring at nesting sites (period: range of years)	Y (2007 - ongoing)	1	Y (2007 - ongoing)	1	Y (2012 - ongoing)	PS	Y (2012 - ongoing)	PS
Number of index nesting sites	1	1	n/a		n/a		n/a	
Monitoring at foraging sites (period: range of years)	N		N		N		N	
Conservation								
Protection under national law	Y	1	Y	1	Y	1	Y	1
Number of protected nesting sites (habitat preservation) (% nests)	2	1,2,6	2	1.6	1	1.6	2	1.6
Number of Marine Areas with mitigation of threats	0		0		0		0	
N of long-term conservation projects (period: range of years)	>1 (2007 - ongoing)	1	>1 (2007 - ongoing)	1	>1 (2012 - ongoing)	1	>1 (2012 - ongoing)	1
In-situ nest protection (eg cages)	N		N		N		N	
Hatcheries	N		N		N		N	
Head-starting	N		N		N		N	
By-catch: fishing gear modifications (eg, TED, circle hooks)	N		N		N		N	
By-catch: onboard best practices	N		N		N		N	
By-catch: spatio-temporal closures/reduction	N		N		N		N	
Other								

Table 2. Sea turtle nesting beaches in Guinea Bissau.

RMU / Nesting beach name	Index site	Nests/ yr: recent average (range of years)	Crawls/yr: recent average (range of years)	Western limit		Eastern limit		Central point		Length (km)	% Monitored	Reference #	Monitoring Level (1-2)	Monitoring Protocol (A-F)
CM-E ATL				**Long**	**Lat**	**Long**	**Lat**	**Long**	**Lat**					
Poilão (JVPMNP)	Y (Poilão index site for all beaches of JVPMNP)	27251 (2013-2017)						-15.7238	10.8724	2.3	100	1	1	E
João Vieira (JVPMNP)	N	173 (2016)						-15.635	11.033	11	one-off survey	7	2	D
Cavalos (JVPMNP)	N	2507 (2016)						-15.705	11.009	6	one-off survey	PS	2	D
Meio (JVPMNP)	N	2063 (2016)	n/a					-15.668	10.978	10	basic survey	1	2	D
Ilhéu das Cabras (JVPMNP)	N							-15.682853	10.966470	0.5				
Orango National Park (ONP)	Y (Ancopado beach)		>500 (2012-2016)					-16.0698	11.0322	52	100	PS	1	B
EI-E ATL														
Poilão (JVPMNP)			~1-10 (2007-2016)					-15.7238	10.8724	2.3	100	1	1	E
LO-E ATL														

Orango National Park (ONP)		>30 (2012-2016)					-16.0698	11.0322	52	100	PS	1	B
DC-E ATL													
Orango National Park (ONP)		>5 (2012-2016)					-16.0698	11.0322	52	100	PS	1	B

Table 3. International conventions protecting sea turtles and signed by Guinea Bissau.

International Conventions	**Signed**	**Binding**	**Compliance measured and reported**	**Species**	**Conservation actions**	**Relevance to sea turtles**
CITES - Convention on International Trade in Endangered Species of Wild Fauna and Flora	Y					
CMS - Convention on the Conservation of Migratory Species of Wild Animals	Y					

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Table 1. Biological and conservation information about sea turtle Regional Management Units in Ivory Coast. PS: present study.

RMU	DC-SE atlantic	Ref #	Olive Ridley East atlantic	Ref #	CM East atlantc	Ref #
Occurrence						
Nesting sites	Y	PS	Y	PS	Y	PS
Pelagic foraging grounds	N	PS	N	PS	J	PS
Benthic foraging grounds	N	PS	N	PS	J	PS
Key biological data						
Nests/yr: recent average (range of years)	88 (2010-2019)	PS	376 (2010-2019)	PS	33 (2010-2019)	PS
Nests/yr: recent order of magnitude	n/a		n/a		n/a	
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	1	PS	1	PS	0	PS
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	0	PS	0	PS	1	PS
Nests/yr at "major" sites: recent average (range of years)	88 (2010-2019)	PS	376 (2010-2019)	PS	0	PS
Nests/yr at "minor" sites: recent average (range of years)		PS		PS	33 (2010-2015)	PS
Total length of nesting sites (km)	30	PS	30	PS	30	PS
Nesting females / yr	n/a		n/a		n/a	

Nests / female season (N)	n/a		n/a		n/a	
Female remigration interval (yrs) (N)	n/a		n/a		n/a	
Sex ratio: Hatchlings (F / Tot) (N)	n/a		n/a		n/a	
Sex ratio: Immatures (F / Tot) (N)	n/a		n/a		n/a	
Sex ratio: Adults (F / Tot) (N)	n/a		n/a		n/a	
Min adult size, CCL or SCL (cm)	CCL 144		CCL 65		CCL 87	
Age at maturity (yrs)	n/a		n/a		n/a	
Clutch size (n eggs) (N)	n/a		n/a		n/a	
Emergence success (hatchlings/egg) (N)	n/a		n/a		n/a	
Nesting success (Nests/ Tot emergence tracks) (N)	n/a		n/a		n/a	
Trends						
Recent trends (last 20 yrs) at nesting sites (range of years)	Up (2010-2014)/Down (2014-2017)/Up (2018-2019)	PS	Up (2010-2019)	PS	Up (2010-2019)	PS
Recent trends (last 20 yrs) at foraging grounds (range of years)	n/a		n/a		n/a	
Oldest documented abundance: nests/yr (range of years)	n/a		n/a		n/a	
Published studies						
Growth rates	n/a		n/a		n/a	
Genetics	n/a		n/a		n/a	
Stocks defined by genetic markers	n/a		n/a		n/a	
Remote tracking (satellite or other)	n/a		n/a		n/a	
Survival rates	n/a		n/a		n/a	
Population dynamics	n/a		n/a		n/a	
Foraging ecology (diet or isotopes)	n/a		n/a		n/a	
Capture-Mark-Recapture	n/a		n/a		n/a	
Threats						
Bycatch: presence of small scale / artisanal fisheries?	MT	PS	MT	PS	MT	PS
Bycatch: presence of industrial fisheries?	SN, DN, FP	PS	SN, DN, FP	PS	SN, DN, FP	PS
Bycatch: quantified?	N	PS	N	PS	N	PS
Take. Intentional killing or exploitation of turtles	Y	PS	Y	PS	Y	PS
Take. Egg poaching	Y	PS	Y	PS	Y	PS

Coastal Development. Nesting habitat degradation	Y	PS	Y	PS	Y	PS
Coastal Development. Photopollution	Y	PS	Y	PS	Y	PS
Coastal Development. Boat strikes	N	PS	N	PS	N	PS
Egg predation	Y	PS	Y	PS	Y	PS
Pollution (debris, chemical)	N	PS	N	PS	N	PS
Pathogens	N	PS	N	PS	N	PS
Climate change	Y	PS	Y	PS	Y	PS
Foraging habitat degradation	Y	PS	Y	PS	Y	PS
Other						
Long-term projects (>5yrs)						
Monitoring at nesting sites (period: range of years)	Y (2010-ongoing)	PS	Y (2010-ongoing)	PS	Y (2010-ongoing)	PS
Number of index nesting sites	n/a		n/a		n/a	
Monitoring at foraging sites (period: range of years)	N	PS	N	PS	N	PS
Conservation						
Protection under national law	Y	PS	Y	PS	Y	PS
Number of protected nesting sites (habitat preservation) (% nests)	1 (20%)	PS	1 (20%)	PS	1 (20%)	PS
Number of Marine Areas with mitigation of threats	0	PS	0	PS	0	PS
N of long-term conservation projects (period: range of years)	1 (2010-ongoing)	PS	1 (2010-ongoing)	PS	1 (2010-ongoing)	PS
In-situ nest protection (eg cages)	Y	PS	Y	PS	Y	PS
Hatcheries	Y	PS	Y	PS	Y	PS
Head-starting	N	PS	N	PS	N	PS
By-catch: fishing gear modifications (eg, TED, circle hooks)	N	PS	N	PS	N	PS

By-catch: onboard best practices	N	PS	N	PS	N	PS
By-catch: spatio-temporal closures/reduction	N	PS	N	PS	N	PS

Table 2. Sea turtle nesting beaches in Ivory Coast.

RMU / Nesting beach name	**Index site**	**Nests/ yr: recent average (range of years)**	**Crawls/ yr: recent average (range of years)**	**Western limit**		**Eastern limit**		**Central point**		**Length (km)**	**% Monitored**	**Reference #**	**Monitoring Level (1-2)**	**Monitoring Protocol (A-F)**
DC-SE Atlantic				Long	Lat	Long	Lat	Long	Lat					
Beach A		88 (2010-2019)		N 04.62990	W 006.94089	N 04.51361	W 007.19556							
LO East Atlantic														
Beach A		376 (2010-2019)		N 04.62990	W 006.94089	N 04.51361	W 007.19556							
CM East Atlantc														
Beach A		33 (2010-2019)		N 04.62990	W 006.94089	N 04.51361	W 007.19556							

Table 3. International conventions protecting sea turtles and signed by Ivory Coast.

International Conventions	**Signed**	**Binding**	**Compliance measured and reported**	**Species**	**Conservation actions**	**Relevance to sea turtles**
Convention relative à la coopération en matière de protection et de mise en valeur du milieu marin et des zones côtières de la région de l'Afrique de l'Ouest et du Centre (convention d'abidjan)	Y			ALL		
Convention relative à la conservation de la faune et de la flore LE 31 mai 1938	Y			ALL		
Convention Africaine sur la Conservation de la nature et des ressources naturelles; le 15 Juin 1969	Y			ALL		
Convention de Ramsar; Adhésion Février 1993	Y			ALL		
Convention sur le Commerce International des Espèces de Faune et de Flore sauvages menacées d'extinction;Adhésion novembre 1994	Y			ALL		
. Convention sur la Diversité Biologique Adhésion le 14 Novembre 1994	y			ALL		
Convention de Bonn sur la Conservation des Espèces migratrices appartenant à la Faune sauvage;ratifiée le 17 Août 2000	y			ALL		
Convention de Ramsar. Adhésion Février 1993	y			ALL		

LIBERIA

[last update:2019]

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1. RMU: Olive Ridley (*Lepidochelys olivacea*) North West Atlantic

1.1. Distribution, abundance, trends

1.1.1. Nesting sites

Nesting sites include Borgor Point (Beach A) and Little Bassa (Beach B).

1.1.2. Marine areas

There are no current abundance indexes for the Marine Protected Area.

1.2. Other biological data

There is a long-term project that has been monitoring the two nesting sites since 2005. However, the biological data has not been published for this site (See Table 1; Table 2).
Project and data base are referenced in Table 4.

1.3. Threats

1.3.1. Nesting sites

Threats at the nesting site include Intentional killing or exploitation of turtles, take/ egg poaching, egg predation and pollution (debris, chemical) (See Table 1).

1.3.2. Marine areas

Threats in Marine areas are unknown (See Table 1).

1.4. Conservation

There is a long-term project that has been monitoring the two nesting sites since 2005.

Olive ridley turtles are protected under international (Table 3) and national laws. There is protection provided for the two nesting sites and there is in-situ nest protection (see Table 1).

1.5. Research

Research in all fields is needed.

2. RMU: Green turtle (*Chelonia mydas*) North West Atlantic

2.1. Distribution, abundance, trends

2.1.1. Nesting sites

Nesting sites include Borgor Point (Beach A) and Little Bassa (Beach B).

2.1.2. Marine areas
There are no current abundance indexes for the Marine Protected Area.

2.2. Other biological data
There is a long-term project that has been monitoring the two nesting sites since 2005. However, the biological data has not been published for this site (See Table 1; Table 2).

Project and data base are referenced in Table 4.

2.3. Threats
2.3.1. Nesting sites
Threats at the nesting site include Intentional killing or exploitation of turtles, take/ egg poaching, egg predation and pollution (debris, chemical) (See Table 1).

2.3.2. Marine areas
Threats in Marine areas are unknown (See Table 1).

2.4. Conservation
There is a long-term project that has been monitoring the two nesting sites since 2005.

Green turtles are protected under international (Table 3) and national laws. There is protection provided for the two nesting sites and there is in-situ nest protection (see Table 1).

2.5. Research
Research in all fields is needed.

3. RMU: Leatherback (*Dermochelys coricea*) North West Atlantic
3.1. Distribution, abundance, trends
3.1.1. Nesting sites
Nesting sites include Borgor Point (Beach A) and Little Bassa (Beach B).

3.1.2. Marine areas
There are no current abundance indexes for the Marine Protected Area.

3.2. Other biological data
There is a long-term project that has been monitoring the two nesting sites since 2005. However, the biological data has not been published for this site (See Table 1; Table 2).
Project and data base are referenced in Table 4.

3.3. Threats
3.3.1. Nesting sites
Threats at the nesting site include Intentional killing or exploitation of turtles, take/ egg poaching, egg predation and pollution (debris, chemical) (See Table 1).

3.3.2. Marine areas
Threats in Marine areas are unknown (See Table 1).

3.4. Conservation
There is a long-term project that has been monitoring the two nesting sites since 2005.
Leatherback turtles are protected under international (Table 3) and national laws. There is protection provided for the two nesting sites and there is in-situ nest protection (see Table 1).

3.5. Research
Research in all fields is needed.

4. RMU: Hawksbill turtle (*Eretmochelys imbricata*) North West Atlantic
4.1. Distribution, abundance, trends
4.1.1. Nesting sites
Nesting sites include Borgor Point (Beach A) and Little Bassa (Beach B).

4.1.2. Marine areas
There are no current abundance indexes for the Marine Protected Area.

4.2. Other biological data
There is a long-term project that has been monitoring the two nesting sites since 2005. However, the biological data has not been published for this site (See Table 1; Table 2).
Project and data base are referenced in Table 4.

4.3. Threats
4.3.1. Nesting sites
Threats at the nesting site include Intentional killing or exploitation of turtles, take/ egg poaching, egg predation and pollution (debris, chemical) (See Table 1).

4.3.2. Marine areas
Threats in Marine areas are unknown (See Table 1).

4.4. Conservation
There is a long-term project that has been monitoring the two nesting sites since 2005.
Hawksbill turtles are protected under international (Table 3) and national laws. There is protection provided for the two nesting sites and there is in-situ nest protection (see Table 1).

4.5. Research
Research in all fields is needed.

Table 1. Biological and conservation information about sea turtle Regional Management Units in Country.

RMU (all RMUs of all species occurring in a Country or Region)	**DC-NW ATL**	**Ref #**	**CM-NW ATL**	**Ref #**	**EI-NW ATL**		**LO-NW ATL**	**Ref #**
Occurrence								
Nesting sites	Y		Y		Y		Y	
Pelagic foraging grounds	n/a		n/a		n/a		n/a	
Benthic foraging grounds	n/a		n/a		n/a		n/a	
Key biological data								
Nests/yr: recent average (range of years)	published data n/a	published data n/a	published data n/a	published data n/a	published data n/a	published data n/a	published data n/a	
Nests/yr: recent order of magnitude	published data n/a	published data n/a	published data n/a	published data n/a	published data n/a	published data n/a	published data n/a	
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	published data n/a	published data n/a	published data n/a	published data n/a	published data n/a	published data n/a	published data n/a	
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	published data n/a	published data n/a	published data n/a	published data n/a	published data n/a	published data n/a	published data n/a	
Nests/yr at "major" sites: recent average (range of years)	n/a		n/a		n/a		n/a	
Nests/yr at "minor" sites: recent average (range of years)	n/a		n/a		n/a		n/a	
Total length of nesting sites (km)	n/a		n/a		n/a		n/a	
Nesting females / yr	n/a		n/a		n/a		n/a	
Nests / female season (N)	n/a		n/a		n/a		n/a	
Female remigration interval (yrs) (N)	n/a		n/a		n/a		n/a	
Sex ratio: Hatchlings (F / Tot) (N)	n/a		n/a		n/a		n/a	
Sex ratio: Immatures (F / Tot) (N)	n/a		n/a		n/a		n/a	
Sex ratio: Adults (F / Tot) (N)	n/a		n/a		n/a		n/a	
Min adult size, CCL or SCL (cm)	n/a		n/a		n/a		n/a	

Age at maturity (yrs)	n/a		n/a		n/a		n/a	
Clutch size (n eggs) (N)	n/a		n/a		n/a		n/a	
Emergence success (hatchlings/egg) (N)	n/a		n/a		n/a		n/a	
Nesting success (Nests/ Tot emergence tracks) (N)	n/a		n/a		n/a		n/a	
Trends								
Recent trends (last 20 yrs) at nesting sites (range of years)	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	
Oldest documented abundance: nests/yr (range of years)	n/a		n/a		n/a		n/a	
Published studies								
Growth rates	N		N		N		N	
Genetics	N		N		N		N	
Stocks defined by genetic markers	N		N		N		N	
Remote tracking (satellite or other)	N		N		N		N	
Survival rates	N		N		N		N	
Population dynamics	N		N		N		N	
Foraging ecology (diet or isotopes)	N		N		N		N	
Capture-Mark-Recapture	N		N		N		N	
Threats								
Bycatch: presence of small scale / artisanal fisheries?	n/a		n/a		n/a		n/a	
Bycatch: presence of industrial fisheries?	n/a		n/a		n/a		n/a	
Bycatch: quantified?	n/a		n/a		n/a		n/a	

Take. Intentional killing or exploitation of turtles	Y		Y		Y		Y	
Take. Egg poaching	Y		Y		Y		Y	
Coastal Development. Nesting habitat degradation	N		N		N		N	
Coastal Development. Photopollution	N		N		N		N	
Coastal Development. Boat strikes	N		N		N		N	
Egg predation	Y		Y		Y		Y	
Pollution (debris, chemical)	Y		Y		Y		Y	
Pathogens	n/a		n/a		n/a		n/a	
Climate change	n/a		n/a		n/a		n/a	
Foraging habitat degradation	n/a		n/a		n/a		n/a	
Other	n/a		n/a		n/a		n/a	
Long-term projects (>5yrs)								
Monitoring at nesting sites (period: range of years)	Y (2005-ongoing)		Y (2005-ongoing)		Y (2005-ongoing)		Y (2005-ongoing)	
Number of index nesting sites	2		2		2		2	
Monitoring at foraging sites (period: range of years)	N		N		N		N	
Conservation								
Protection under national law	Y		Y		Y		Y	
Number of protected nesting sites (habitat preservation) (% nests)	2 (90%)		2 (90%)		2 (90%)		2 (90%)	
Number of Marine Areas with mitigation of threats	0		0		0		0	
N of long-term conservation projects (period: range of years)	>1 (2005-ongoing)		>1 (2005-ongoing)		>1 (2005-ongoing)		>1 (2005-ongoing)	
In-situ nest protection (eg cages)	Y		Y		Y		Y	
Hatcheries	N		N		N		N	

Head-starting	N		N		N		N		
By-catch: fishing gear modifications (eg, TED, circle hooks)	N		N		N		N		
By-catch: onboard best practices	N		N		N		N		
By-catch: spatio-temporal closures/reduction	N		N		N		N		
Other	Y (see text)		Y (see text)		Y (see text)		Y (see text)		

Table 2. Sea turtle nesting beaches in Liberia.

RMU / Nesting beach name	**Index site**	**Nests/yr: recent average (range of years)**		**Crawls/yr: recent average (range of years)**	**Western limit**		**Eastern limit**		**Central point**		**Length (km)**	**% Monitored**	**Reference #**	**Monitoring Level (1-2)**	**Monitoring Protocol (A-F)**
DC-NW ALT					Long	Lat	Long	Lat	Long	Lat					
Borgor Point (Beach A)	N	published data n/a		published data n/a							16				
Little Bassa (Beach B)	N	published data n/a		published data n/a							22	100%			
		published data n/a		published data n/a											
CM-NW ALT		published data n/a		published data n/a											
Borgor Point (Beach A)	N	published data n/a		published data n/a							16				
Little Bassa (Beach B)	N	published data n/a		published data n/a							22	100%			

		published data n/a		published data n/a										
EI-NW ALT		published data n/a		published data n/a										
Borgor Point (Beach A)	N	published data n/a		published data n/a						16				
Little Bassa (Beach B)	N	published data n/a		published data n/a						22	100%			
		published data n/a		published data n/a										
LO-NW ALT		published data n/a		published data n/a										
Borgor Point (Beach A)	N	published data n/a		published data n/a						16				
Little Bassa (Beach B)	N	published data n/a		published data n/a						22	100%			

Table 3. International conventions protecting sea turtles and signed by Liberia.

International Conventions	**Signed**	**Binding**	**Compliance measured and reported**	**Species**	**Conservation actions**	**Relevance to sea turtles**
Memorandum of Understanding concerning Conservation Measures for Marine Turtles of the Atlantic Coast of Africa	Y	Y	n/a	DC, EI, LO, CM, CC	Marine turtle monitoring program	Y
Convention on Biological Diversity	Y	Y	n/a	ALL	Marine turtle monitoring program	Y

Convention on Migratory Species (CMS)	Y	Y	n/a	ALL	Marine turtle monitoring program	Y
CITES	Y	Y	n/a	ALL	Marine turtle monitoring program	Y
Ramsar Convention on Wetlands	Y	Y	n/a			N
UN Framework Convention on Climate Change (UNFCCC)	Y	Y	n/a			N
African Convention on the Conservation of Nature and Natural Resources	Y	Y	n/a			N
Cartagena Protocol on Biosafety to the CBD	Y	Y	n/a			N
Montreal Protocol on substances that Deplete the Ozone Layer	Y	Y	n/a			N
Stockholm Convention on Persistent Organic Pollutants	Y	Y	n/a			N
Convention Concerning the Protection of World Cultural and Natural Heritage	Y	Y	n/a			N
United Nation Convention to Combat Desertification (UNCCD)	Y	Y	n/a			N

Table 4. Projects and databases on sea turtles in Liberia.

#	RMU	Country	Region / Location	Project Name or descriptive title	Key words	Start date	End date	Leading organization	Public/Private	Collaboration with	Reports / Information material
T4.1	NW-ATL	Liberia	Borgor Point, Little Bassa	Liberia Sea Turtle Project: Community -Based Marine Turtle Conservation Program	Marine Turtles, Nesting, Bycatch, Beach monitoring, Tagging	2005	On-going	Sea Turtle Watch	Private	Save My Future Foundation	

Current Sponsors	Primary Contact (name and Email)	Other Contacts (name and Email)	Database available	Name of Database
US Fish and Wildlife Service, Rufford Small Grant Foundation	Trokon Saykpa / trokonsaykpa@seaturtlewatchlr.org	Andrew Tokpa / andrewtokpa@samfufoundation.org	N	n/a

MOROCCO

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Figure 1. Map of Morocco coastline .

1. RMU: *Caretta Caretta* North-East Atlantic

1.1. Distribution, abundance, trends

1.1.1. Nesting sites

There are no nesting sites on the Moroccan coastline

1.1.2. Marine areas

There is currently no abundance index for the Marine Protected Area.

1.2. Other biological data

See Table1.

1.3. Threats

1.3.1. Nesting sites

See Table1.

There are no nesting sites, so no specific threats.

1.3.2. Marine areas

See Table1.

1.4. Conservation

See Table1.

1.5. Research

Research in all fields is needed.

2. RMU: *Chelonia mydas* - North East Atlantic

2.1. Distribution, abundance, trends

2.1.1. Nesting sites

There are no nesting sites on the Moroccan coastline

2.1.2. Marine areas

See Table1.

There is currently no abundance index for the Marine Protected Area.

2.2. Other biological data

See Table1.

2.3. Threats

2.3.1. Nesting sites

There are no nesting sites, so no specific threats.

2.3.2. Marine areas

See Table1.

2.4. Conservation

See Table1.

2.5. Research
Research in all fields is needed.

3. RMU: *Dermochelys coriacea*- North East Atlantic
3.1. Distribution, abundance, trends
3.1.1. Nesting sites
There are no nesting sites on the Moroccan coastline

3.1.2. Marine areas
See Table1.
There is currently no abundance index for the Marine Protected Area.

3.2. Other biological data
See Table1.

3.3. Threats
3.3.1. Nesting sites
There are no nesting sites, so no specific threats.

3.3.2. Marine areas
See Table1.

3.4. Conservation
See Table1.

3.5. Research
Research in all fields is needed.

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Table 1. Biological and conservation information about sea turtle Regional Management Units in Morocco.

RMU	CC-NW IND	Ref #	CM-NW IND	Ref #	DC-SW IND
Occurrence					
Nesting sites	N	6	N		N
Pelagic foraging grounds	n/a		n/a		n/a
Benthic foraging grounds	Y	1 to 5	n/a		n/a
Key biological data					
Nests/yr: recent average (range of years)	N		N		N
Nests/yr: recent order of magnitude	N		N		N
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	N		N		N
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	N		N		N
Nests/yr at "major" sites: recent average (range of years)	N		N		N
Nests/yr at "minor" sites: recent average (range of years)	N		N		N
Total length of nesting sites (km)	N		N		N
Nesting females / yr	N		N		N
Nests / female season (N)	N		N		N
Female remigration interval (yrs) (N)	N		N		N
Sex ratio: Hatchlings (F / Tot) (N)	N		N		N
Sex ratio: Immatures (F / Tot) (N)	N		N		N
Sex ratio: Adults (F / Tot) (N)	N		N		N
Min adult size, CCL or SCL (cm)	N		N		N
Age at maturity (yrs)	N		N		N

Clutch size (n eggs) (N)	N		N		N
Emergence success (hatchlings/egg) (N)	N		N		N
Nesting success (Nests/ Tot emergence tracks) (N)	N		N		N
Trends					
Recent trends (last 20 yrs) at nesting sites (range of years)	N		N		N
Recent trends (last 20 yrs) at foraging grounds (range of years)	N		N		N
Oldest documented abundance: nests/yr (range of years)	N		N		N
Published studies					
Growth rates	N		N		N
Genetics	N		N		N
Stocks defined by genetic markers	N		N		N
Remote tracking (satellite or other)	N		N		N
Survival rates	N		N		N
Population dynamics	N		N		N
Foraging ecology (diet or isotopes)	N		N		N
Capture-Mark-Recapture	N		N		N
Threats					
Bycatch: presence of small scale / artisanal fisheries?	Y	1 to 7	Y		Y
Bycatch: presence of industrial fisheries?	Y		Y		Y
Bycatch: quantified?	Y	3 and 9	Y		Y
Take. Intentional killing or exploitation of turtles	some	9 and 10			
Take. Egg poaching	N				
Coastal Development. Nesting habitat degradation	N				
Coastal Development. Photopollution	N				

Coastal Development. Boat strikes	N				
Egg predation	N				
Pollution (debris, chemical)	Y				
Pathogens	N				
Climate change	N		N		N
Foraging habitat degradation	N		N		N
Other					
Long-term projects (>5yrs)					
Monitoring at nesting sites (period: range of years)	N		N		N
Number of index nesting sites	N		N		N
Monitoring at foraging sites (period: range of years)	N		N		N
Conservation					
Protection under national law	Y	10	Y		Y
Number of protected nesting sites (habitat preservation) (% nests)	N		N		N
Number of Marine Areas with mitigation of threats	N		N		N
N of long-term conservation projects (period: range of years)	N		N		N
In-situ nest protection (eg cages)	N		N		N
Hatcheries	N		N		N
Head-starting	N		N		N
By-catch: fishing gear modifications (eg, TED, circle hooks)	N		N		N
By-catch: onboard best practices	N		N		N
By-catch: spatio-temporal closures/reduction	N		N		N
Other	N		N		N

Table 3. International conventions protecting sea turtles and signed by Morocco.

International Conventions	Signed	Binding	Compliance measured and reported	Species	Conservation actions	Relevance to sea turtles
Memorandum of Understanding concerning Conservation Measures for Marine Turtles of the Atlantic Coast of Africa	Y	Y	n/a	DC, EI, LO, CM, CC	Marine turtle monitoring program	Y
Convention on Biological Diversity	Y	Y	n/a	ALL	Marine turtle monitoring program	Y
Convention on Migratory Species (CMS)	Y	Y	n/a	ALL	Marine turtle monitoring program	Y
CITES	Y	Y	n/a	ALL	Marine turtle monitoring program	Y

NAMIBIA

[last update : 2018]

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1. RMU: *Caretta caretta* Southeast Atlantic
1.1. Distribution, abundance, trends
1.1.1. Nesting sites
See Table 1.

1.1.2. Marine areas
See Table 1.
There is currently no abundance index for the Marine Protected Area

1.2. Other biological data
See Table 1.

1.3. Threats
1.3.1. Nesting sites
There are no nesting sites, so no specific threats.

1.3.2. Marine areas
See Table 1.

1.4. Conservation
See Table 1.

1.5. Research
See Table 1.
Research in all fields is needed.

2. RMU: *Chelonia mydas* Southeast Atlantic
2.1. Distribution, abundance, trends
2.1.1. Nesting sites
See Table 1.

2.1.2. Marine areas
See Table 1.
There is currently no abundance index for the Marine Protected Area

2.2. Other biological data
See Table 1.

2.3. Threats
2.3.1. Nesting sites
See Table 1.
There are no nesting sites, so no specific threats.

2.3.2. Marine areas
See Table 1.

2.4. Conservation
See Table 1.

2.5. Research
See Table 1.
Research in all fields is needed.

3. RMU: *Dermochelys coriacea* Southeast Atlantic
3.1. Distribution, abundance, trends
3.1.1. Nesting sites
See Table 1.

3.1.2. Marine areas
See Table 1.
There is currently no abundance index for the Marine Protected Area

3.2. Other biological data
See Table 1.

3.3. Threats
3.3.1. Nesting sites
See Table 1.
There are no nesting sites, so no specific threats.

3.3.2. Marine areas
See Table 1.

3.4. Conservation
See Table 1.

31.5. Research
See Table 1.
Research in all fields is needed.

4. RMU: Lepidochelys olivacea Southeast Atlantic
4.1. Distribution, abundance, trends
4.1.1. Nesting sites
See Table 1.

4.1.2. Marine areas
See Table 1.
There is currently no abundance index for the Marine Protected Area

4.2. Other biological data
See Table 1.

4.3. Threats
4.3.1. Nesting sites
See Table 1.
There are no nesting sites, so no specific threats.

4.3.2. Marine areas
See Table 1.

4.4. Conservation
See Table 1.

4.5. Research
See Table 1.
Research in all fields is needed.

5. RMU: *Eretmochelys imbricata* Southeast Atlantic
5.1. Distribution, abundance, trends
5.1.1. Nesting sites
See Table 1.

5.1.2. Marine areas
See Table 1.
There is currently no abundance index for the Marine Protected Area

5.2. Other biological data
See Table 1.

5.3. Threats
5.3.1. Nesting sites
See Table 1.

There are no nesting sites, so no specific threats.

5.3.2. Marine areas

See Table 1.

5.4. Conservation

See Table 1.

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Table 1. Biological and conservation information about sea turtle Regional Management Units in Namibia.

RMU	**CC-Namibia Coast**	**Ref #**	**CM-Namibia Coast**	**Ref #**	**DC-Namibia Coast**	**Ref #**	**LO-Namibia Coast**	**Ref #**	**EI-Namibia Coast**	**Ref #**
Occurrence										
Nesting sites	N	4	Y	8	N	4	N	4	N	4
Pelagic foraging grounds	n/a		n/a		Y		n/a		n/a	
Benthic foraging grounds	n/a		Y	4, 6,7	n/a		n/a		n/a	
Key biological data										
Nests/yr: recent average (range of years)	n/a		n/a		n/a		n/a		n/a	
Nests/yr: recent order of magnitude	n/a		n/a		n/a		n/a		n/a	
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	n/a		n/a		n/a		n/a		n/a	
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	n/a		n/a		n/a		n/a		n/a	
Nests/yr at "major" sites: recent average (range of years)	n/a		n/a		n/a		n/a		n/a	
Nests/yr at "minor" sites: recent average (range of years)	n/a		n/a		n/a		n/a		n/a	
Total length of nesting sites (km)	n/a		n/a		n/a		n/a		n/a	
Nesting females / yr	n/a		n/a		n/a		n/a		n/a	
Nests / female season (N)	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	
Sex ratio: Hatchlings (F / Tot) (N)	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	

Sex ratio: Adults (F / Tot) (N)	n/a		n/a		n/a		n/a		n/a	
Min adult size, CCL or SCL (cm)	n/a		n/a		n/a		n/a		n/a	
Age at maturity (yrs)	n/a		n/a		n/a		n/a		n/a	
Clutch size (n eggs) (N)	n/a		n/a		n/a		n/a		n/a	
Emergence success (hatchlings/egg) (N)	n/a		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	
Trends										
Recent trends (last 20 yrs) at nesting sites (range of years)	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	
Oldest documented abundance: nests/yr (range of years)	n/a		n/a		n/a		n/a		n/a	
Published studies										
Growth rates	N		N		N		N		N	
Genetics	N		N		N		N		N	
Stocks defined by genetic markers	N		N		N		N		N	
Remote tracking (satellite or other)	N		N		N		N		N	
Survival rates	N		N		N		N		N	
Population dynamics	N		N		N		N		N	
Foraging ecology (diet or isotopes)	N		N		N		N		N	
Capture-Mark-Recapture	N		N		N		N		N	
Threats										
Bycatch: presence of small scale / artisanal fisheries?	n/a		n/a		n/a		n/a		n/a	
Bycatch: presence of industrial fisheries?	n/a		n/a		n/a		n/a		n/a	

Bycatch: quantified?	n/a		n/a		n/a		n/a		n/a	
Take. Intentional killing or exploitation of turtles	n/a		n/a		n/a		n/a		n/a	
Take. Egg poaching	n/a		n/a		n/a		n/a		n/a	
Coastal Development. Nesting habitat degradation	n/a		n/a		n/a		n/a		n/a	
Coastal Development. Photopollution	n/a		n/a		n/a		n/a		n/a	
Coastal Development. Boat strikes	n/a		n/a		n/a		n/a		n/a	
Egg predation	n/a		n/a		n/a		n/a		n/a	
Pollution (debris, chemical)	n/a		n/a		n/a		n/a		n/a	
Pathogens	n/a		n/a		n/a		n/a		n/a	
Climate change	n/a		n/a		n/a		n/a		n/a	
Foraging habitat degradation	n/a		n/a		n/a		n/a		n/a	
Other	n/a		n/a		n/a		n/a		n/a	
Long-term projects (>5yrs)										
Monitoring at nesting sites (period: range of years)	n/a		n/a		n/a		n/a		n/a	
Number of index nesting sites	n/a		n/a		n/a		n/a		n/a	
Monitoring at foraging sites (period: range of years)	n/a		n/a		n/a		n/a		n/a	
Conservation										
Protection under national law	n/a		n/a		n/a		n/a		n/a	
Number of protected nesting sites (habitat preservation) (% nests)	n/a		n/a		n/a		n/a		n/a	
Number of Marine Areas with mitigation of threats	5	4	5	4	5	4	5	4	5	
N of long-term conservation projects (period: range of years)	n/a		n/a		n/a		n/a		n/a	
In-situ nest protection (eg cages)	n/a		n/a		n/a		n/a		n/a	

Hatcheries	n/a		n/a		n/a		n/a		n/a	
Head-starting	n/a		n/a		n/a		n/a		n/a	
By-catch: fishing gear modifications (eg, TED, circle hooks)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
By-catch: onboard best practices	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
By-catch: spatio-temporal closures/reduction	n/a	n/a	n/a	n/a	n/a	n/a	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	

Table 2. Sea turtle nesting beaches in Namibia.

RMU / Nesting beach name	**Index site**	**Nests/yr: recent average (range of years)**	**Crawls/yr: recent average (range of years)**	**Western limit**		**Eastern limit**		**Central point**		**Length (km)**	**% Monitored**	**Reference #**	**Monitoring Level (1-2)**	**Monitoring Protocol (A-F)**
Namibian Coast	N	n/a	n/a									4		

Table 3. International conventions protecting sea turtles and signed by Namibia.

International Conventions	Signed	Binding	Compliance measured and reported	Species	Conservation actions	Relevance to sea turtles
CDB		16.05.97				
CMS West African MoU for Sea Turtles	Yes	no				
CITES	18.12.90	18.03.91				
RAMSAR		23.12.95				
UNCLOS	18.04.83	06.04.00				

SÃO TOMÉ AND PRÍNCIPE

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General remarks

The Islands of São Tomé and Príncipe are breeding grounds for four of the seven species coming ashore to nest: being the olive ridley and the green sea turtles the most common species in the country, followed by a small but regionally significant hawksbill nesting population and the leatherback turtles. Although loggerhead turtles have been occasionally reported in coastal waters, there are no confirmed nesting occurrences. Green and hawksbill turtles also use the country's neritic habitats for foraging, both during their juvenile and their adult stages.

The illegal harvesting of turtles and their eggs, bycatch by artisanal and industrial fishing vessels, seismic surveys related to oil exploration and the decline in surface and quality of nesting habitat due to illegal sand mining, coastal erosion, flooding, and egg predation by feral animals are the main threats that sea turtles are facing in São Tomé and Príncipe.

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Table 1. Biological and conservation information about sea turtle Regional Management Units in São Tomé and Príncipe.

RMU	EI-SE ATL STP	Ref #	CM-E ATL STP	Ref #	LO-E ATL STP	Ref #	DC-SE ATL STP	Ref #	CC-NE ATL STP	Ref #
Occurrence										
Nesting sites	Y	9, 10, 11	Y	4, 9, 10, 11, 19	Y	7, 9, 10, 11, 19	Y	9, 10, 11	N	PS
Pelagic foraging grounds	n/a		n/a		n/a		J	14	n/a	
Benthic foraging grounds	J, A	1, 3	J, A	8, 16	A	PS	N		A	PS
Key biological data										
Nests/yr: recent average (range of years)	N	PS	N	PS	N	PS	N	PS	n/a	
Nests/yr: recent order of magnitude	N	PS	N	PS	N	PS	N	PS	n/a	
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	1	PS	4	PS	1	PS	0	PS	n/a	
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	8	PS	5	PS	7	PS	9	PS	n/a	
Nests/yr at "major" sites: recent average (range of years)	N	PS	N	PS	N	PS	N	PS	n/a	
Nests/yr at "minor" sites: recent average (range of years)	N	PS	N	PS	N	PS	N	PS	n/a	
Total length of nesting sites (km)	17.2	PS	24.7	PS	13.2	PS	20.7	PS	n/a	
Nesting females / yr	N		N		N		N		N	
Nests / female season (N)	N		N		N		N		N	

Female remigration interval (yrs) (N)	N		N		N		N		N	
Sex ratio: Hatchlings (F / Tot) (N)	N		N		N		N		n/a	
Sex ratio: Immatures (F / Tot) (N)	N		N		N		N		n/a	
Sex ratio: Adults (F / Tot) (N)	N		N		N		N		n/a	
Min adult size, CCL or SCL (cm)	N		N		N		N		n/a	
Age at maturity (yrs)	N		N		N		N		n/a	
Clutch size (n eggs) (N)	N		N		N		N		n/a	
Emergence success (hatchlings/egg) (N)	N		N		N		N		n/a	
Nesting success (Nests/ Tot emergence tracks) (N)	N		N		N		N		n/a	
Trends										
Recent trends (last 20 yrs) at nesting sites (range of years)	N		N		N		N		N	
Recent trends (last 20 yrs) at foraging grounds (range of years)	N		N		N		N		N	
Oldest documented abundance: nests/yr (range of years)	152 (1999-2008)	11	649 (1999-2008)	11	1015 (1999-2008)	11	78 (1999-2008)	11	n/a	
Published studies										
Growth rates	N		N		N		N		N	
Genetics	Y	3	Y	8, 13, 15	N		N		N	
Stocks defined by genetic markers	N		Y	12	N		N		N	
Remote tracking (satellite or other)	N		N		N		N		N	
Survival rates	N		N		N		N		N	
Population dynamics	N		Y	2, 4, 5, 19	Y	19	N		N	
Foraging ecology (diet or isotopes)	Y	1, 17	Y	16	N		N		N	

Capture-Mark-Recapture	N		Y	16	N		N		N	
Threats										
Bycatch: presence of small scale / artisanal fisheries?	Y	PS	Y	PS	Y	PS	Y	PS	Y	PS
Bycatch: presence of industrial fisheries?	Y	PS	Y	PS	Y	PS	Y	PS	Y	PS
Bycatch: quantified?	N		N		N		N		N	
Take. Intentional killing or exploitation of turtles	Y	6	Y	6	Y	6	Y	6	n/a	
Take. Egg poaching	Y	6	Y	6	Y	6	Y	6	n/a	
Coastal Development. Nesting habitat degradation	Y	PS	Y	PS	Y	PS	Y	PS	n/a	
Coastal Development. Photopollution	Y	19	Y	PS	Y	PS	Y	PS	n/a	
Coastal Development. Boat strikes	n/a		n/a		n/a		n/a		n/a	
Egg predation	Y	PS	Y	PS	Y	PS	Y	PS	n/a	
Pollution (debris, chemical)	Y	PS	Y	PS	Y	PS	Y	PS	Y	PS
Pathogens	n/a		Y	PS	Y	PS	n/a		n/a	
Climate change	n/a		n/a		n/a		n/a		n/a	
Foraging habitat degradation	n/a		n/a		n/a		n/a		n/a	
Sand Mining	Y	PS	Y	PS	Y	PS	Y	PS	n/a	
Long-term projects (>5yrs)										
Monitoring at nesting sites (period: range of years)	Y (1999-ongoing)	11	Y (1999-ongoing)	11	Y (2012-ongoing)	PS	Y (1999-ongoing)	PS	Y (2012-ongoing)	PS
Number of index nesting sites	1	PS	2	PS	2	PS	1	PS	n/a	
Monitoring at foraging sites (period: range of years)	Y Príncipe (2013-2015)	PS	Y São Tomé (2016-ongoing)	PS	N	PS	N	PS	n/a	

	São Tomé (2016-ongoing)		Príncipe (2013-2015)							
Conservation										
Protection under national law	Y	6	Y	6	Y	6	Y	6	Y	6
Number of protected nesting sites (habitat preservation) (% nests)	n/a		n/a		n/a		n/a		n/a	
Number of Marine Areas with mitigation of threats	0		0		0		0		0	
N of long-term conservation projects (period: range of years)	1 (1999-ongoing)	11	1 (1999-ongoing)	11	1 (1999-ongoing)	11	1 (1999-ongoing)	11	n/a	
In-situ nest protection (eg cages)	Y	PS	Y	PS	N		N		n/a	
Hatcheries	Y São Tomé	PS	Y São Tomé	PS	Y São Tomé	PS	N		n/a	
Head-starting	N		N		N		N		N	
By-catch: fishing gear modifications (eg, TED, circle hooks)	N		N		N		N		N	
By-catch: onboard best practices	N		N		N		N		N	
By-catch: spatio-temporal closures/reduction	N		N		N		N		N	
Other										

Table 2. International conventions protecting sea turtles and signed by São Tomé and Príncipe.

International Conventions	Signed	Binding	Compliance measured and reported	Species	Conservation actions	Relevance to sea turtles
Convention on Biological Diversity (CBD)	Y					
Convention on International Trade in Endangered Species (CITES)	Y					
Global Goals for Sustainable Development	Y					
Convention on Migratory Species	Y					

Table 3. Projects and databases on sea turtles in São Tomé and Príncipe.

#	RMU	Country	Region / Location	Project Name or descriptive title	Key words	Start date	End date	Leading organisation	Public/Private
T4.1	EI-SE ATL STP	São Tomé and Príncipe	Central Africa, São Tomé and Príncipe	ECOFAC	Nesting; foraging grounds; conservation; eastern Atlantic Ocean	1998	2001	Agriculture and Fisheries Ministry	Public

T4.2	CM-E ATL STP	São Tomé and Príncipe	Central Africa, São Tomé and Príncipe	ECOFAC	Nesting; foraging grounds; conservation; eastern Atlantic Ocean	1998	2001	Agriculture and Fisheries Ministry	Public
T4.3	LO-E ATL STP	São Tomé and Príncipe	Central Africa, São Tomé and Príncipe	ECOFAC	Nesting; foraging grounds; conservation; eastern Atlantic Ocean	1998	2001	Agriculture and Fisheries Ministry	Public
T4.4	DC-SE ATL STP	São Tomé and Príncipe	Central Africa, São Tomé and Príncipe	ECOFAC	Nesting; foraging grounds; conservation; eastern Atlantic Ocean	1998	2001	Agriculture and Fisheries Ministry	Public
T4.5	CC-NE ATL STP	São Tomé and Príncipe	Central Africa, São Tomé and Príncipe	ECOFAC	Nesting; foraging grounds; conservation; eastern Atlantic Ocean	1998	2001	Agriculture and Fisheries Ministry	Public

T4.6	EI-E ATL ST	São Tomé and Príncipe	Central Africa, São Tomé Island	Programa Tatô	Nesting; foraging grounds; conservation; eastern Atlantic Ocean	2003	2018	Marapa	Private
T4.7	CM-E ATL STP	São Tomé and Príncipe	Central Africa, São Tomé Island	Programa Tatô	Nesting; foraging grounds; conservation; eastern Atlantic Ocean	2003	2018	Marapa	Private
T4.8	LO-E ATL STP	São Tomé and Príncipe	Central Africa, São Tomé Island	Programa Tatô	Nesting; foraging grounds; conservation; eastern Atlantic Ocean	2003	2018	Marapa	Private
T4.9	DC-SE ATL STP	São Tomé and Príncipe	Central Africa, São Tomé Island	Programa Tatô	Nesting; foraging grounds; conservation; eastern Atlantic Ocean	2003	2018	Marapa	Private

T4.10	CC-NE ATL STP	São Tomé and Príncipe	Central Africa, São Tomé Island	Programa Tatô	Nesting; foraging grounds; conservation; eastern Atlantic Ocean	2003	2018	Marapa	Private
T4.11	EI-E ATL ST	São Tomé and Príncipe	Central Africa, São Tomé Island	Programa Tatô	Nesting; foraging grounds; conservation; eastern Atlantic Ocean	2018	ongoing	Associação Programa Tatô	Private
T4.12	CM-E ATL STP	São Tomé and Príncipe	Central Africa, São Tomé Island	Programa Tatô	Nesting; foraging grounds; conservation; eastern Atlantic Ocean	2018	ongoing	Associação Programa Tatô	Private
T4.13	LO-E ATL STP	São Tomé and Príncipe	Central Africa, São Tomé Island	Programa Tatô	Nesting; foraging grounds; conservation; eastern Atlantic Ocean	2018	ongoing	Associação Programa Tatô	Private

T4.14	DC-SE ATL STP	São Tomé and Príncipe	Central Africa, São Tomé Island	Programa Tatô	Nesting; foraging grounds; conservation; eastern Atlantic Ocean	2018	ongoing	Associação Programa Tatô	Private
T4.15	CC-NE ATL STP	São Tomé and Príncipe	Central Africa, São Tomé Island	Programa Tatô	Nesting; foraging grounds; conservation; eastern Atlantic Ocean	2018	ongoing	Associação Programa Tatô	Private
T4.16	EI-E ATL STP	São Tomé and Príncipe	Central Africa, Principe Island	Programa Sada	Nesting; foraging grounds; conservation; eastern Atlantic Ocean	2009	2011	University of Algarve	Private
T4.17	CM-SE ALT STP	São Tomé and Príncipe	Central Africa, Principe Island	Sea Turtle Commission (CTM) - Natural Park of Príncipe (PNP)	Nesting; foraging grounds; conservation; eastern Atlantic Ocean	2011	2014	CTM / PNP	Governmental
T4.18	EI-SE ATL STP	São Tomé and	Central Africa, Principe Island	Sea Turtle Commission (CTM) - Natural Park of Príncipe (PNP)	Nesting; foraging grounds;	2010	2014	CTM / PNP	Governmental

		Príncipe			conservation; eastern Atlantic Ocean				
T4.19	EI-SE ATL STP	São Tomé and Príncipe	Central Africa, Principe Island	Sea Turtle Conservation Program From the Island of Príncipe	Nesting; foraging grounds; conservation; eastern Atlantic Ocean	2012	2014	ATM	Private
T4.20	CM-E ATL STP	São Tomé and Príncipe	Central Africa, Principe Island	Sea Turtle Conservation Program From the Island of Príncipe	Nesting; foraging grounds; conservation; eastern Atlantic Ocean	2012	2014	ATM	Private
T4.21	DC-SE ATL STP	São Tomé and Príncipe	Central Africa, Principe Island	Sea Turtle Conservation Program From the Island of Príncipe	Nesting; foraging grounds; conservation; eastern Atlantic Ocean	2012	2014	ATM	Private
T4.22	EI-SE ATL STP	São Tomé and Príncipe	Central Africa, Principe Island	PROTETUGA	Nesting; foraging grounds; conservation; eastern	2014	ongoing	Príncipe Trust	Private

					Atlantic Ocean				
T4.23	CM-E ATL STP	São Tomé and Príncipe	Central Africa, Principe Island	PROTETUGA	Nesting; foraging grounds; conservation; eastern Atlantic Ocean	2014	ongoing	Príncipe Trust	Private
T4.24	DC-SE ATL STP	São Tomé and Príncipe	Central Africa, Principe Island	PROTETUGA	Nesting; foraging grounds; conservation; eastern Atlantic Ocean	2014	ongoing	Príncipe Trust	Private

Table 4. (cont.)

#	Collaboration with	Reports / Information material	Current Sponsors	Primary Contact (name and Email)	Other Contacts (name and Email)
T4.1	NGO MARAPA		EU	Jacques Fretey (jfretey@imatech.fr)	
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T4.3	NGO MARAPA		EU	Jacques Fretey (jfretey@imatech.fr)	
T4.4	NGO MARAPA		EU	Jacques Fretey (jfretey@imatech.fr)	
T4.5	NGO MARAPA		EU	Jacques Fretey (jfretey@imatech.fr)	
T4.6	ATM, Lisbon University, Paris Sud University		USFWS, Rufford Foundation and Private sector	Betania Ferreira Airaud ATM Program Coordinator (ferreirabetania@gmail.com)	Sara Vieira Programa Tatô Technical Coordinator (saralexvieira@gmail.com) Joana Hancock Ph.D. Student (joana.hancock@gmail.com)

T4.7	ATM, Lisbon University, Paris Sud University		USFWS, Rufford Foundation and Private sector	Betania Ferreira Airaud ATM Program Coordinator (ferreirabetania@gmail.com)	Sara Vieira Programa Tatô Coordinator (saralexvieira@gmail.com); Joana Hancock Ph.D. Student (joana.hancock@gmail.com)
T4.8	ATM, Lisbon University, Paris Sud University		USFWS, Rufford Foundation and Private sector	Betania Ferreira Airaud ATM Program Coordinator (ferreirabetania@gmail.com)	Sara Vieira Programa Tatô Coordinator (saralexvieira@gmail.com); Joana Hancock Ph.D. Student (joana.hancock@gmail.com)
T4.9	ATM, Lisbon University, Paris Sud University		USFWS, Rufford Foundation and Private sector	Betania Ferreira Airaud ATM Program Coordinator (ferreirabetania@gmail.com)	Sara Vieira Programa Tatô Coordinator (saralexvieira@gmail.com); Joana Hancock Ph.D. Student (joana.hancock@gmail.com)
T4.10	ATM, Lisbon University, Paris Sud University		USFWS, Rufford Foundation and Private sector	Betania Ferreira Airaud ATM Program Coordinator (ferreirabetania@gmail.com)	Sara Vieira Programa Tatô Coordinator (saralexvieira@gmail.com); Joana Hancock Ph.D. Student (joana.hancock@gmail.com)

T4.11	NGO MARAPA		USFWS, Lisbon Oceanarium, Rufford Foundation and Private sector	Betania Ferreira Airaud Director (ferreirabetania@gmail.com)	Sara Vieira Programa Tatô Technical Coordinator (saralexvieira@gmail.com)
T4.12	NGO MARAPA		USFWS, Lisbon Oceanarium, Rufford Foundation and Private sector	Betania Ferreira Airaud Director (ferreirabetania@gmail.com)	Sara Vieira Programa Tatô Technical Coordinator (saralexvieira@gmail.com)
T4.13	NGO MARAPA		USFWS, Lisbon Oceanarium, Rufford Foundation and Private sector	Betania Ferreira Airaud Director (ferreirabetania@gmail.com)	Sara Vieira Programa Tatô Technical Coordinator (saralexvieira@gmail.com)
T4.14	NGO MARAPA		USFWS, Lisbon Oceanarium, Rufford Foundation and Private sector	Betania Ferreira Airaud Director (ferreirabetania@gmail.com)	Sara Vieira Programa Tatô Technical Coordinator (saralexvieira@gmail.com)
T4.15	NGO MARAPA		USFWS, Lisbon Oceanarium, Rufford Foundation and Private sector	Betania Ferreira Airaud Director (ferreirabetania@gmail.com)	Sara Vieira Programa Tatô Technical Coordinator (saralexvieira@gmail.com)
T4.16	University of Algarve		USFWS, Lisbon Oceanarium and private sector	Nuno Santos Loureiro Project Coordinator (nlourei@ualg.pt)	
T4.17	Centre of Marine Sciences (University of		n/a	Rogério Ferreira Project Coordinator (coriacea@gmail.com)	

	Algarve), Archi Carr Center for Sea Turtle Research (University of Florida)				
T4.18	Centre of Marine Sciences (University of Algarve), Archi Carr Center for Sea Turtle Research (University of Florida)		n/a	Rogério Ferreira Project Coordinator (coriacea@gmail.com)	
T4.19			HBD	Joana Hancock Project Coordinator (joana.hancock@gmail.com)	
T4.20			HBD	Joana Hancock Project Coordinator (joana.hancock@gmail.com)	
T4.21			HBD	Joana Hancock Project Coordinator (joana.hancock@gmail.com)	
T4.22	University of Exeter, ZSL, National Government		Shuttleworth Foundation, private sector, Regional government, Rufford, OAK Foundation	Vanessa Schmitt Project Coordinator (vfranci16@yahoo.com.br)	
T4.23	University of Exeter, ZSL,		Shuttleworth Foundation, private sector, Regional government, Rufford, OAK Foundation	Vanessa Schmitt Project Coordinator (vfranci16@yahoo.com.br)	

	National Government				
T4.24	University of Exeter, ZSL, National Government		Shuttleworth Foundation, private sector, Regional government, Rufford, OAK Foundation	Vanessa Schmitt Project Coordinator (vfranci16@yahoo.com.br)	

Table 4. (cont.)

#	**Database available**	**Name of Database**	**Names of sites included (matching Table B, if appropriate)**	**Beginning of the time series**	**End of the time series**	**Track information**	**Nest information**	**Flipper tagging**	**Tags in STTI-ACCSTR?**	**PIT tagging**	**Remote tracking**	**Ref #**
T4.1	Y	PROTOMAC	All, except Rolas and Infante	1998	2001	Y	Y	Y	N	N	N	12
T4.2	Y	PROTOMAC	All, except Rolas and Infante	1998	2001	Y	Y	Y	N	N	N	12
T4.3	Y	PROTOMAC	All, except Rolas and Infante	1998	2001	Y	Y	Y	N	N	N	12
T4.4	Y	PROTOMAC	All, except Rolas and Infante	1998	2001	Y	Y	Y	N	N	N	12

T4.5	Y	PROTOMAC	All, except Rolas and Infante	1998	2001	Y	Y	Y	N	N	N	12
T4.6	Y	São Tomé Sea Turtle Data Base		2003	2014	Y	Y	Y	Y	N	N	PS
T4.7	Y	São Tomé Sea Turtle Data Base		2003	2014	Y	Y	Y	Y	N	N	PS
T4.8	Y	São Tomé Sea Turtle Data Base		2003	2014	Y	Y	Y	Y	N	N	PS
T4.9	Y	São Tomé Sea Turtle Data Base		2003	2014	Y	Y	Y	Y	N	N	PS
T4.10	Y	São Tomé Sea Turtle Data Base		2003	2014	Y	Y	Y	Y	N	N	PS
T4.11	Y	São Tomé Sea Turtle Data Base		2014	ongoing	Y	Y	Y	Y	N	Y	PS

T4.12	Y	São Tomé Sea Turtle Data Base		2014	ongoing	Y	Y	Y	Y	N	Y	PS
T4.13	Y	São Tomé Sea Turtle Data Base		2014	ongoing	Y	Y	Y	Y	N	Y	PS
T4.14	Y	São Tomé Sea Turtle Data Base		2014	ongoing	Y	Y	Y	Y	N	Y	PS
T4.15	Y	São Tomé Sea Turtle Data Base		2003	2014	Y	Y	Y	Y	N	N	PS
T4.16	N	Programa Sada Data Base		2009	2011	Y	Y	Y	Y	Y	N	PS
T4.17	Y	Príncipe Sea Turtle Survey		2011	2014	N	Y	Y	Y	N	N	PS
T4.18	Y	Príncipe Sea Turtle Survey		2011	2014	N	Y	Y	Y	N	N	PS
T4.19	Y	Príncipe Sea Turtle Survey		2012	2014	Y	Y	Y	Y	N	N	PS
T4.20	Y	Príncipe Sea Turtle Survey		2012	2014	Y	Y	Y	Y	N	N	PS
T4.21	Y	Príncipe Sea Turtle Survey		2012	2014	Y	Y	Y	Y	N	N	PS

T4.22	Y	Príncipe Sea Turtle Survey		2014	ongoing	Y	Y	Y	N	N	Y	PS
T4.23	Y	Príncipe Sea Turtle Survey		2014	ongoing	Y	Y	Y	N	N	Y	PS
T4.24	Y	Príncipe Sea Turtle Survey		2014	ongoing	Y	Y	Y	N	N	Y	PS

SIERRA LEONE

[1]Edward Aruna, [2]Manjula Tiwari

[1]Reptile and Amphibian Program - Sierra Leone, Reptile and Amphibian Program - Sierra Leone, 7 McCauley Street, Murray Town, Sierra Leone - edwardaruna@yahoo.com
[2]NOAA-National marine Fisheries Service 8901 La Jolla Shores Drive, la Jolla, CA 92037, USA - manjula.tiwari@noaa.gov

Table 1. Biological and conservation information about sea turtle Regional Management Units in Sierra Leone. PS: Present Study (personal information by the Authors).

RMU	CC-NE ATL	Ref #	CM-NE ATL	Ref #	DC-NE ATL	Ref #	EI-NE ATL	Ref #	LO-NE ATL	Ref #
Occurrence										
Nesting sites	Y	PS	Y	PS	Y	PS	Y	PS	Y	PS
Pelagic foraging grounds	n/a		n/a		n/a		n/a		n/a	
Benthic foraging grounds	n/a		n/a		n/a		n/a		n/a	
Key biological data										
Nests/yr: recent average (range of years)	n/a		n/a		n/a		n/a		n/a	
Nests/yr: recent order of magnitude	n/a		n/a		n/a		n/a		n/a	
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	n/a		n/a		n/a		n/a		n/a	
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	n/a		n/a		n/a		n/a		n/a	
Nests/yr at "major" sites: recent average (range of years)	n/a		n/a		n/a		n/a		n/a	
Nests/yr at "minor" sites: recent average (range of years)	n/a		n/a		n/a		n/a		n/a	
Total length of nesting sites (km)	n/a		n/a		n/a		n/a		n/a	
Nesting females / yr	n/a		n/a		n/a		n/a		n/a	
Nests / female season (N)	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	

Sex ratio: Hatchlings (F / Tot) (N)	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	
Sex ratio: Adults (F / Tot) (N)	n/a		n/a		n/a		n/a		n/a	
Min adult size, CCL or SCL (cm)	n/a		n/a		n/a		n/a		n/a	
Age at maturity (yrs)	n/a		n/a		n/a		n/a		n/a	
Clutch size (n eggs) (N)	n/a		n/a		n/a		n/a		n/a	
Emergence success (hatchlings/egg) (N)	n/a		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	
Trends										
Recent trends (last 20 yrs) at nesting sites (range of years)	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	
Oldest documented abundance: nests/yr (range of years)	n/a		n/a		n/a		n/a		n/a	
Published studies										
Growth rates	n/a		n/a		n/a		n/a		n/a	
Genetics	n/a		n/a		n/a		n/a		n/a	
Stocks defined by genetic markers	n/a		n/a		n/a		n/a		n/a	
Remote tracking (satellite or other)	n/a		n/a		n/a		n/a		n/a	
Survival rates	n/a		n/a		n/a		n/a		n/a	
Population dynamics	n/a		n/a		n/a		n/a		n/a	
Foraging ecology (diet or isotopes)	n/a		n/a		n/a		n/a		n/a	
Capture-Mark-Recapture	n/a		n/a		n/a		n/a		n/a	
Threats										

Bycatch: presence of small scale / artisanal fisheries?	Y	PS	Y	PS	Y	PS	Y	PS	Y	PS
Bycatch: presence of industrial fisheries?	Y	PS	Y	PS	Y	PS	Y	PS	Y	PS
Bycatch: quantified?	Y	PS	Y	PS	Y	PS	Y	PS	Y	PS
Take. Intentional killing or exploitation of turtles	Y	PS	Y	PS	Y	PS	Y	PS	Y	PS
Take. Egg poaching	N		N		N		N		N	
Coastal Development. Nesting habitat degradation	Y	PS	Y	PS	Y	PS	Y	PS	Y	PS
Coastal Development. Photopollution	n/a		n/a		n/a		n/a		n/a	
Coastal Development. Boat strikes	n/a		n/a		n/a		n/a		n/a	
Egg predation	n/a		n/a		n/a		n/a		n/a	
Pollution (debris, chemical)	Y	PS	Y	PS	Y	PS	Y	PS	Y	PS
Pathogens	Y	PS	Y	PS	N		N		N	
Climate change	Y	PS	Y	PS	Y	PS	Y	PS	Y	PS
Foraging habitat degradation	Y	PS	Y	PS	Y	PS	Y	PS	Y	PS
Other										
Long-term projects (>5yrs)										
Monitoring at nesting sites (period: range of years)	Y (2006-ongoing)	PS	Y (2006-ongoing)	PS	Y (2006-ongoing)	PS	Y (2006-ongoing)	PS	Y (2006-ongoing)	PS
Number of index nesting sites	6	PS	11	PS	5	PS	8	PS	9	PS
Monitoring at foraging sites (period: range of years)	N		N		N		N		N	
Conservation										
Protection under national law	Y	PS	Y	PS	Y	PS	Y	PS	Y	PS

Number of protected nesting sites (habitat preservation) (% nests)	n/a		n/a		n/a		n/a		n/a	
Number of Marine Areas with mitigation of threats	3	PS	3	PS	3	PS	3	PS	3	PS
N of long-term conservation projects (period: range of years)	1 (2006-DATE)	PS	1 (2006-DATE)	PS	1 (2006-DATE)	PS	1 (2006-DATE)	PS	1 (2006-DATE)	PS
In-situ nest protection (eg cages)	Y	PS	Y	PS	Y	PS	Y	PS	Y	PS
Hatcheries	N		N		N		N		N	
Head-starting	N		N		N		N		N	
By-catch: fishing gear modifications (eg, TED, circle hooks)	N		N		N		N		N	
By-catch: onboard best practices	N		N		N		N		N	
By-catch: spatio-temporal closures/reduction	N		N		N		N		N	
Other	N		N		N		N		N	

Table 2. Sea turtle nesting beaches in Sierra Leone.

RMU / Nesting beach name	**Index site**	**Nests/yr: recent average (range of years)**	**Crawls /yr: recent average (range**	**Western limit**	**Eastern limit**	**Central point**	**Length (km)**	**% Monitored**	**Reference #**	**Monitoring Level (1-2)**	**Monitoring Protocol (A-F)**

			of years)										
CC-NE ATL				**Long**	**Lat**	**Long**	**Lat**	**Long**	**Lat**					
Turtle Islands	Y	n/a (2008-2020)								18	66.6	PS		
Sherbro	Y	n/a (2008-2020)								50	28	PS		
Turners Peninsula	Y	n/a (2015-2020)								150	13.3	PS		
CM-NE ATL														
Turtle Islands	Y	n/a (2008-2020)										PS		
Sherbro	Y	n/a (2008-2020)										PS		
Turners Peninsula	Y	n/a (2015-2020)										PS		
John Obey	Y	n/a (2020)								2	0	PS		
Shenge	Y	n/a (2011-2013)								1	100	PS		
DC-NE ATL														
Turtle Islands	Y	n/a (2008-2020)										PS		
Sherbro	Y	n/a (2008-2020)										PS		
Turners Peninsula	Y	n/a (2015-2020)										PS		

EI-NE ATL														
Turtle Islands	Y	n/a (2008-2020)										PS		
Sherbro	Y	n/a (2008-2020)										PS		
Turners Peninsula	Y	n/a (2015-2020)										PS		
Lumley	Y	n/a (2008-2012)								5	100	PS		
Mania	Y	n/a (2008-2017)										PS		
LO-NE ATL														
Turtle Islands	Y	n/a (2008-2020)										PS		
Sherbro	Y	n/a (2008-2020)										PS		
Turners Peninsula	Y	n/a (2015-2020)										PS		
Lumley	Y	n/a (2008-2010)										PS		
Shenge	Y	n/a (2011-2013)										PS		

Table 3. International conventions protecting sea turtles and signed by Sierra Leone.

International Conventions	Signed	Binding	Compliance measured and reported	Species	Conservation actions	Relevance to sea turtles
CBD	Y	Y	Y	ALL	Biodiversity Conservation	Protection and conservation
CMS	Y	N	Y	ALL	Protection	Protection and conservation
Ramsar	Y	N	Y	ALL	Site conservation	Protection and conservation
CITES	Y		Y	ALL	Species protection	
UNCLOS						

Table 4. Projects and databases on sea turtles in Sierra Leone.

#	RMU	Country	Region / Location	Project Name or descriptive title	Key words	Start date	End date	Leading organisation	Public/Private
T4.1	All species	Sierra Leone	West Africa/Freetown	Monitoring nesting beaches and bycatch in the artisana fisheries, and awareness raising	Monitoring; Nesting; bycatch; awareness	2010	2013	RAP-SL	Public

T4.2	All species	Sierra Leone	West Africa/Freetown	Monitoring nesting beaches and bycatch in the artisanal fisheries, planting trees and awareness raising	Monitoring; Nesting; bycatch; awareness	2014	2015	RAP-SL	Public
T4.3	All species	Sierra Leone	West Africa/Freetown	Monitoring nesting beaches and bycatch in the artisanal fisheries, planting trees and awareness raising	Monitoring; Nesting; bycatch; awareness	2015	2016	RAP-SL	Public
T4.4	All species	Sierra Leone	West Africa/Freetown	Monitoring nesting beaches and bycatch in the artisanal fisheries, planting trees and awareness raising	Monitoring; Nesting; bycatch; awareness	2016	2017	RAP-SL	Public
T4.5	All species	Sierra Leone	West Africa/Freetown	Monitoring nesting beaches and bycatch in the artisanal fisheries, planting trees and awareness raising	Monitoring; Nesting; bycatch; awareness	2017	2018	RAP-SL	Public
T4.6	All species	Sierra Leone	West Africa/Freetown	Monitoring nesting beaches and bycatch in the artisanal fisheries, planting trees and awareness raising	Monitoring; Nesting; bycatch; awareness	2018	2019	RAP-SL	Public

T4.7	All species	Sierra Leone	West Africa/Freetown	Monitoring nesting beaches and bycatch in the artisanal fisheries, planting trees and awareness raising	Monitoring; Nesting; bycatch; awareness	2019	2020	RAP-SL	Public

Table 4. (Cont.)

#	**Collaboration with**	**Reports / Information material**	**Current Sponsors**	**Primary Contact (name and Email)**	**Other Contacts (name and Email)**
T4.1	Ministry of Fisheries and Marine Resources, Wildife Conservation Department		USFWS	Edward Aruna, edwardaruna@yahoo.com	Manjula Tiwari
T4.2	Ministry of Fisheries and Marine Resources, Wildife Conservation Department			Edward Aruna, edwardaruna@yahoo.com	Manjula Tiwari

T4.3	Ministry of Fisheries and Marine Resources, Wildife Conservation Department				
T4.4	Ministry of Fisheries and Marine Resources, Wildife Conservation Department				
T4.5	Ministry of Fisheries and Marine Resources, Wildife Conservation Department				
T4.6	Ministry of Fisheries and Marine Resources, Wildife Conservation Department				

T4.7	Ministry of Fisheries and Marine Resources, Wildife Conservation Department				

Table 4. (Cont.)

#	Database available	Name of Database	Names of sites included (matching Table B, if appropriate)	Beginning of the time series	End of the time series	Track information	Nest information	Flipper tagging	Tags in STTI-ACCSTR?	PIT tagging	Remote tracking	Ref #
T4.1	Y	SL-DB-Turtle		2006	2017	N	Y	Y	N	N	N	
T4.2	Y	SL-DB-Turtle		2014	2015	N	Y	Y	N	N	N	