

**SEA TURTLES IN THE WEST AFRICA AND EAST  
ATLANTIC REGION  
MTSG ANNUAL REPORT 2018**



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## REGIONAL OVERVIEW

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### CONTRIBUTING COUNTRIES

For this report, data was synthesized from five out of the 25 countries that are present in the region. The countries whose data were used for this report are Equatorial Guinea, Gabon, Gambia, Ghana and Republic of Congo. This report, though gives a picture of the situation with sea turtles in the area, may not be an entire reflection of the species, population and distribution of turtles in the Region.

Table 1 show the list of countries in the region. Countries with asterisk indicate those countries involved in the report.

**Table 1.** List of countries in the Region. Asterisks indicate countries that are included in this report.

No.	Country	13	Guinea-Bissau
1	Angola	14	Liberia
2	Ascension Island	15	Mauritania
3	Benin	16	Morocco
4	Cabo Verde	17	Namibia
5	Cameroon	18	Nigeria
6	Cote d'Ivoire	19	Portugal-Azores & Madeira
7	DRC	20	Republic of Congo*
8	Equatorial Guinea*	21	Sao Tome & Principe
9	Gabon*	22	Senegal
10	Gambia*	23	Sierra Leone
11	Ghana*	24	Spain (Canaries)
12	Guinea	25	Togo

## 1. Regional Summary

### 1.1 Distribution, abundance, trends

The distribution abundance and trends presented in this section are those of five countries (See Table 1).

### **1.1.1 Nesting sites**

There are a total of 42 nesting sites (Table 2) for the West Africa and East Atlantic sub-population. Of these, 26 are classified as *õmajorõ* nesting sites while 16 are as classified as *õminorõ* nesting sites (see Table 2). There are up to 19 index nesting sites in the 5 countries of the Region. For abundance indexes (e.g. nests, females) please see Table 2.

### **1.1.2 Marine areas**

Pelagic foraging ground have been identified for juvenile green turtle in Congo but not the other countries. Congo, Gabon and Gambia also have benthic foraging grounds for adult green turtles (Figure 2) while benthic foraging grounds for adult hawksbill exist in only Congo.

## **1.2 Other biological data**

Please see Table 2.

## **1.3 Threats**

### **1.3.1 Nesting sites**

Several threats exist on the nesting beaches for the region but boat strikes were absent in all the countries except one (Table 1).

Please see Table 2.

### **1.3.2 Marine areas**

Please see Table 2.

## **1.4 Conservation**

National laws exist in all countries to conserve sea turtles and in some countries like Ghana, their habitats as well (Table 2).

Please see Table 2

## **2 RMU: *Dermochelys coriacea* - Southeast Atlantic**

### **2.1 Distribution, abundance, trends**

#### **2.1.1 Nesting sites**

Nesting sites occur in all 5 countries but there are no pelagic and benthic foraging grounds in any of the countries (Table 2). There are 23 nesting sites all of which are classified as *õmajorõ* nesting sites stretching 820.4 km and receives about 21, 564 nesting females depositing 80,220 nests per annum. There was a general decrease in the number of nests between 2000 and 2014 (Table 2).

### **2.1.2 Marine areas**

There is 1 marine area in Congo. Please see Table 2.

### **2.2 Other biological data**

Please see Table 2.

### **2.3 Threats**

Please see Table 2.

### **2.4 Conservation**

National laws for leatherback protection is present in all the countries. Please see Table 2.

## **3 RMU: *Chelonia mydas* ó East Atlantic**

### **3.1 Distribution, abundance, trends**

#### **3.1.1 Nesting sites**

There are 25 nesting sites, 12 of which are classified as õmajorsö nesting sites and 13 as õminorö nesting sites (Table 2). Nesting by green occurs along a 166.4 km beaches in the 5 countries with an annual nesting intensity not properly documented. Nesting activities is reported to be stable between 2000 and 2014 in Equatorial Guinea (Table 2).

#### **3.1.2 Marine areas**

Thera are 2 marine areas in Ghana. Please see Table 2.

### **3.2 Other biological data**

Please see Table 2.

### **3.3 Threats**

Please see Table 2.

### **3.4 Conservation**

National laws for green turtle protection are available in Congo, Equatorial Guinea, Gambia and Ghana. Please see Table 2.

## **4 RMU: *Lepidochelys olivacea* - East Atlantic**

### **4.1 Distribution, abundance, trends**

#### **4.1.1 Nesting sites**

There are 33 nesting sites, 17 of which are classified as õmajorö nesting sites and 16 as õminorö nesting sites (Table 2). Nesting by olive ridleys in the 5 countries occur along a 788.4 km beach.

An annual nesting intensity of 3,132 nest per year at major and minor nesting sites combined deposited by 5,614 females (Table 2).

#### **4.1.2 Marine areas**

One marine area exists in Congo. Please see Table 2.

#### **4.2 Other biological data**

Please see Table 2.

#### **4.3 Threats**

Please see Table 2.

#### **4.4 Conservation**

National laws for olive ridley protection are available in Congo, Equatorial Guinea, Gambia and Ghana. Please see Table 2.

### **5 RMU: *Eretmochelys imbricata* ó East Atlantic**

#### **5.1 Distribution, abundance, trends**

##### **5.1.1 Nesting sites**

There are 12 nesting sites all of which are classified as õminorõ nesting sites (Table 2). Nesting by hawksbill occur in Equatorial Guinea and Congo along a 99 km beach.

##### **5.1.2 Marine areas**

Please see Table 2.

#### **5.2 Other biological data**

Please see Table 2.

#### **5.3 Threats**

Please see Table 2.

#### **5.4 Conservation**

National laws for hawksbill protection are available in Congo, Equatorial Guinea, Gambia and Ghana. Please see Table 2.

### **6 RMU: *Caretta caretta* ó Atlantic Northeast**

#### **6.1 Distribution, abundance, trends**

##### **6.1.1 Nesting sites**



Foraging activity by hawksbill is reported in Ghana. There are nine confirmed nesting sites for this species along Ghana's coastline, but nesting abundance data are only available for four. Please see Table 2.

#### **6.1.2 Marine areas**

Fishermen along the entire coastline quickly identify this species and indicate routinely encountering them while fishing.

#### **6.2 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.

#### **6.3 Threats**

Please see Table 2.

#### **6.4 Conservation**

National laws for hawksbill protection are available in Congo, Equatorial Guinea, Gambia and Ghana. Please see Table 2.

**Table 2.** Summary of country data

<b>RMU (all RMUs of all species occurring in a Country or Region)</b>	<b>DC- ATL SE</b>	<b>Country Chapters from which the info is taken</b>	<b>CM- ATL E</b>	<b>Country Chapters from which the info is taken</b>	<b>LO- ATL E</b>	<b>Country Chapters from which the info is taken</b>	<b>EI - ATL E</b>	<b>Country Chapters from which the info is taken</b>	<b>CC- ATL NE</b>	<b>Country Chapters from which the info is taken</b>
<b>Occurrence</b>										
Nesting sites	Y	Equatorial Guinea, Congo, Gabon, Gambia, Ghana	Y	Congo, Gabon, Gambia, Ghana	Y	Equatorial Guinea, Congo, Gabon, Ghana	Y	Equatorial Guinea, Gambia	Y	Ghana
Pelagic foraging grounds	N	n/a	J	Congo	Y	Gabon	N		n/a	
Benthic foraging grounds	N	n/a	Y	Congo, Gambia, Gabon	Y	Congo	Y	Congo	n/a	
<b>Key biological data</b>										
Nests/yr: recent average (range of years)	80,220 (1998- 2016)	Equatorial Guinea, Gambia, Ghana, Gabon	884 (1998- 2016)	Equatorial Guinea, Gambia, Ghana	12,939 (1998- 2016)	Equatorial Guinea, Gabon, Gambia, Ghana	86 (1998 - 2014)	Equatorial Guinea, Congo	1 (2015)	Ghana
Nests/yr: recent order of magnitude	36185- 126480	Gabon	n/a		466- 14,033	Congo, Gabon	n/a		n/a	
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	23	Equatorial Guinea, Gambia, Ghana, Gabon	12	Equatorial Guinea, Gambia	17	Congo, Ghana, Gabon	n/a		n/a	

Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	n/a		13	Congo, Ghana	16	Equatorial Guinea, Gambia,	12	Equatorial Guinea, Gambia	n/a	
Nests/yr at "major" sites: recent average (range of years)	1573 (1998-2016)	Equatorial Guinea, Gambia, Ghana	629 (1998-2014)	Equatorial Guinea, Gambia	3,029 (1998-2016)	Ghana, Gabon	0.5 (1998-1999)	Gambia	n/a	
Nests/yr at "minor" sites: recent average (range of years)	23 (2008-2016)	Ghana	38 (1998-2016)	Ghana	103 (2008 - 2014)	Equatorial Guinea			n/a	
Total length of nesting sites (km)	820.4	Equatorial Guinea, Congo, Gabon, Gambia, Ghana	166.4	Equatorial Guinea, Congo, Gambia, Ghana	788.4	Congo, Equatorial Guinea, Gambia, Ghana, Gabon	99	Equatorial Guinea, Gambia	9	Ghana
Nesting females / yr	21,564	Equatorial Guinea, Congo, Gabon	n/a		5614 (2014-2016)	Congo, Gabon	n/a		1 (2015)	Ghana
Nests / female season (N)	83.1 (194)		3.63 (72)	Congo	2.29 (291)	Congo	n/a		1	Ghana
Female remigration interval (yrs) (N)	3.3 (48)		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)	142 CCL	Ghana	109 SCL (2017)	Equatorial Guinea	40.5 CCL	Ghana	28.7 (SCL); 31 (CCL)	Gambia	n/a	
Age at maturity (yrs)	n/a		n/a		n/a	n/a	n/a		n/a	
Clutch size (n eggs) (N)	103 (37)	Equatorial Guinea, Ghana	n/a		122 (34)	Ghana, Congo	n/a		n/a	
Emergence success (hatchlings/egg) (N)	76.9% (16)	Ghana, Congo	n/a		84 (22)	Ghana, Congo	n/a		n/a	
Nesting success (Nests/Tot emergence tracks) (N)	0.95 (409)	Ghana, Congo	n/a		1.8 (450)	Ghana, Congo	n/a		n/a	
<b>Trends</b>										
Recent trends (last 20 yrs) at nesting sites (range of years)	Down (2000-2014)	Equatorial Guinea	Stable (2000-2014)	Equatorial Guinea	Up (2007-2014)	Equatorial Guinea, Gabon	n/a		n/a	
Recent trends (last 20 yrs) at foraging grounds (range of years)	n/a		n/a		Up (2007-2014)	Equatorial Guinea	n/a		n/a	
Oldest documented abundance: nests/yr (range of years)	76(1998-2008)	Ghana, Gambia	n/a		103 (2007-2008), 1 (1998-1999)	Ghana (103), Gambia (1)	n/a		n/a	
<b>Published studies</b>										
Growth rates	N		N		N		N		N	
Genetics	Y	Gabon, Ghana	N		N		N		N	

Stocks defined by genetic markers	N		N		N		N		N	
Remote tracking (satellite or other)	Y	Gabon	N		Y	Gabon	N		N	
Survival rates	N		Y	Equatorial Guinea	N		N		N	
Population dynamics	N		Y	Equatorial Guinea	N		N		N	
Foraging ecology (diet or isotopes)	N		N		N		N		N	
Capture-Mark-Recapture	Y	Gabon, Ghana	Y	Equatorial Guinea	N		N		N	
<b>Threats</b>										
Bycatch: presence of small scale / artisanal fisheries?	Y	Equatorial Guinea, Gabon, Gambia, Congo, Ghana	Y	Equatorial Guinea, Congo, Gambia, Ghana, Gabon	Y	Equatorial Guinea, Congo, Gambia, Ghana, Gabon	Y	Equatorial Guinea, Congo, Gambia, Ghana	Y	Ghana
Bycatch: presence of industrial fisheries?	Y	Equatorial Guinea, Gambia, Congo, Ghana	Y	Equatorial Guinea, Congo, Gambia, Ghana	Y	Equatorial Guinea, Congo, Gambia, Ghana, Gabon	Y	Equatorial Guinea, Congo, Gambia	Y	Ghana
Bycatch: quantified?	Y	Equatorial Guinea,	Y	Equatorial Guinea, Congo, Ghana	Y	Equatorial Guinea, Congo, Ghana, Gabon	Y	Equatorial Guinea, Congo, Ghana	Y	Ghana

Take: Intentional killing or exploitation of turtles	Y	Congo, Equatorial Guinea, Gambia, Ghana	Y	Equatorial Guinea, Congo, Ghana, Gabon	Y	Equatorial Guinea, Congo, Gambia, Ghana	Y	Equatorial Guinea, Ghana, Congo, Gambia	Y	Ghana
Take: Egg poaching	Y	Equatorial Guinea, Gambia, Congo, Ghana	Y	Equatorial Guinea, Congo, Gambia, Ghana	Y	Equatorial Guinea, Congo, Gambia, Ghana, Gabon	Y	Equatorial Guinea, Ghana, Gambia	Y	Ghana
Coastal Development. Nesting habitat degradation	Y	Equatorial Guinea, Gambia, Congo, Ghana	Y	Equatorial Guinea, Congo, Gambia, Ghana	Y	Equatorial Guinea, Congo, Gambia, Ghana,	Y	Equatorial Guinea, Ghana, Gambia	Y	Ghana
Coastal Development. Photopollution	Y	Equatorial Guinea, Gambia, Congo, Ghana	Y	Equatorial Guinea, Congo, Gambia, Ghana	Y	Congo, Gambia, Ghana, Gabon	Y	Equatorial Guinea, Ghana, Congo, Gambia	Y	Ghana
Coastal Development. Boat strikes	Y	Congo	Y	Equatorial Guinea, Congo, Gambia, Ghana	Y	Congo, Gabon	Y	Congo	N	
Egg predation	Y	Congo, Equatorial Guinea, Gambia, Ghana,	Y	Equatorial Guinea, Congo, Gambia, Ghana	Y	Equatorial Guinea, Congo, Gambia, Ghana	Y	Equatorial Guinea, Ghana, Gambia	Y	Ghana

Pollution (debris, chemical)	Y	Equatorial Guinea, Congo, Gambia, Ghana,	Y	Equatorial Guinea, Congo, Gambia, Ghana, Gabon	Y	Equatorial Guinea, Congo, Gambia, Ghana, Gabon	Y	Equatorial Guinea, Congo, Ghana, Gambia	Y	Ghana
Pathogens	Y	Congo, Equatorial Guinea	Y	Equatorial Guinea, Gabon	Y	Congo	Y	Congo	N	
Climate change	Y	Congo, Equatorial Guinea, Ghana	Y	Equatorial Guinea, Ghana, Gabon	Y	Congo, Equatorial Guinea, Ghana, Gabon	Y	Equatorial Guinea, Congo, Ghana	Y	Ghana
Nesting habitat degradation	Y	Gambia, Ghana	n/a		Y	Equatorial Guinea, Gambia, Ghana, Gabon	Y	Equatorial Guinea, Congo, Ghana	Y	Ghana
Foraging habitat degradation	n/a		n/a		Y	Congo, Gabon	Y	Congo	n/a	
Other	n/a		n/a		n/a		n/a		n/a	
<b>Long-term projects (&gt;5yrs)</b>										
Monitoring at nesting sites (period: range of years)	Y	Congo (2003-2017), Equatorial Guinea (2000-ongoing) Ghana	Y	Congo (2003-2017), Equatorial Guinea (2000-ongoing) Ghana	Y	Congo (2003-2017), Equatorial Guinea (2000-ongoing), Ghana(2006-ongoing),	Y	Congo (2003-2017), Equatorial Guinea (2000-ongoing) Ghana	N	

		(2006-ongoing),		(2006-ongoing),		Gabon (1998-ongoing)		(2006-ongoing),		
Number of index nesting sites	2		19	Equatorial Guinea, Congo, Gabon	19	Equatorial Guinea, Congo, Gabon	14	Equatorial Guinea, Congo	n/a	
Monitoring at foraging sites (period: range of years)	N		Y (2005-2017)	Congo	Y (2005-2017)	Congo	Y (2005-2017)	Congo	N	
<b>Conservation</b>										
Protection under national law	Y	Gambia, Congo, Gabon, Ghana, Equatorial Guinea	Y	Gambia, Congo, Ghana, Equatorial Guinea, Gabon	Y	Gambia, Congo, Ghana, Equatorial Guinea	Y	Gambia, Congo, Ghana, Equatorial Guinea	Y	Ghana
Number of protected nesting sites (habitat preservation) (% nests)	Y	Ghana (100%), Congo (80%); Gabon (79%)	80%-100% of sandy beach	Ghana (100%), Congo (80%)	80%-100% of sandy beach	Ghana (100%), Congo (80%)	80%-100% of sandy beach	Ghana (100%), Congo (80%)	All of sandy coastline (100%)	
Number of Marine Areas with mitigation of threats	21	Congo (1), Gabon (20)	22	Ghana (2), Gabon (20)	1	Congo	1	Congo	0	



N of long-term conservation projects (period: range of years)	>6 (1996-present)	Congo, Equatorial Guinea, Ghana, Gabon	>6 (1996-present)	Congo, Equatorial Guinea, Ghana, Gabon	>1 (1996-present)	Congo, Equatorial Guinea, Ghana	>1 (1996-present)	Congo, Equatorial Guinea, Ghana	N	
In-situ nest protection (eg cages)	Y	Equatorial Guinea	Y	Equatorial Guinea	Y	Equatorial Guinea, Congo,	Y	Equatorial Guinea, Congo	N	
Hatcheries	Y	Gabon	n/a		Y	Gabon	N		N	
Head-starting	N		n/a		N	n/a	N		N	
By-catch: fishing gear modifications (eg, TED, circle hooks)	Y	Ghana, Gabon	Y	Ghana	Y	Ghana, Gabon	Y	Ghana	Y	Ghana
By-catch: onboard best practices	Y	Ghana, Gabon	Y	Ghana	Y	Ghana, Gabon	Y	Ghana	Y	Ghana
By-catch: spatio-temporal closures/reduction	Y	Gabon	Y	Gabon	Y	Gabon, Gabon	N		N	
Other	N		N		N	n/a	N		n/a	

## REPUBLIC OF CONGO

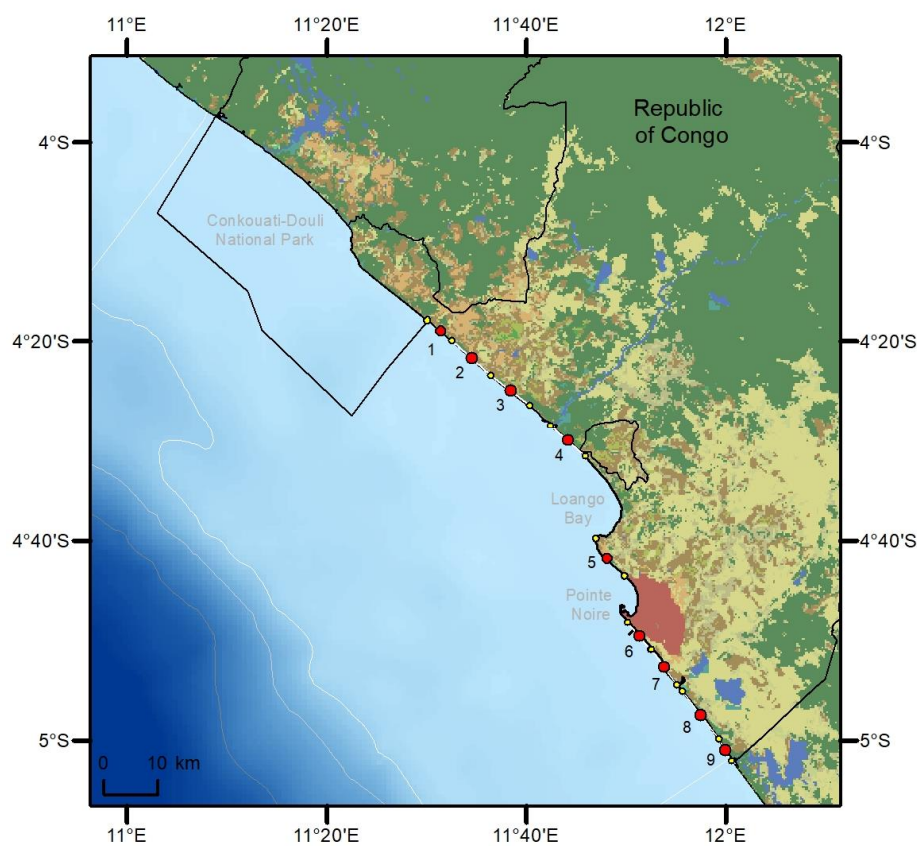
<sup>1</sup>Bréheret Nathalie & <sup>1</sup>Mavoungou, J.óG.

<sup>1</sup>Renatura Congo, BP 414 - Pointe-Noire, République du Congo

1. RMU: Atlantic East: *L. olivacea*, *C. mydas*, *E. imbricata* / Atlantic South East: *D. coriacea*

### 1.1 Distribution, abundance, trends

#### 1.1.1 Nesting Sites



**Figure 1:** Location of the nesting beaches monitored by Renatura during the 2016 ó 2017 nesting season. Labels: (1) Longo-Bondi; (2) Bellelo; (3) Bas-Kouilou Nord; (4) Bas-Kouilou Sud; (5) Nkounda ; (6) Pointe-Noire; (7) Mvassa; (8) Djeno; and (9) Cabinda. Yellow dots indicate start and end points of monitored beach, and red dots the midpoint. To highlight relative distribution of monitored nesting beaches along the coast habitat data from Global Land Cover (2009) dataset is included. Black lines indicate boundaries of protected areas.

#### Fully monitored sites

Three beaches are the subject of day- and night-time monitoring efforts: Bellelo, Mvassa and Djeno (**Figure 1**). Bellelo is located between the border of Conkouati-Douli National Park and Bas-Kouilou River and has been monitored since 2003. Mvassa is located at the southern end of Pointe Noire and has been the focus of monitoring efforts since 2005 and daily monitoring efforts since the 2012-2013 nesting season. Djeno is located approximately 20 km south of Pointe Noire, has been subject to monitoring efforts for 11 years and has served as a reference for statistical modelling of nesting activities along the Republic of Congo's national coast (see Godgenger et al., 2009; Girard & Breheret, 2013).

### **Survey beaches**

Six beaches are the subject of periodic day-time surveys: Longo-Bondi, Bas-Kouilou Nord, Bas-Kouilou Sud, Nkounda, Pointe Noire and Cabinda (**Figure 1**). Longo-Bondi is a 5 km beach located between the border of Conkouati-Douli National Park and Bellelo nesting beach. Bas-Kouilou Nord is a 13 km beach that stretches from Bellelo to the northern bank of the Kouilou river. Bas-Kouilou Sud is a 10 km that extends from the southern bank of the Kouilou river to the village of Holl Moni. Nkounda is a 10 km beach that is located between Pointe Indienne and Pointe Noire. Pointe Noire is a 7 km beach that stretches from the southern limit of Pointe Noire harbour to Mvassa nesting beach. Cabinda is a 4 km beach that extends from the southern limit of the Djeno nesting beach to the border with Cabinda.

### **1.1.2 Marine areas**

The Republic of Congo is a globally important region for sea turtles in the eastern Atlantic hosting important nesting beaches for olive ridley (*Lepidochelys olivacea*) and leatherback (*Dermochelys coriacea*) sea turtles (see figure 1), as well as important foraging grounds for juvenile green (*Chelonia mydas*) and hawksbill (*Eretmochelys imbricata*) sea turtles.

Analyses of seasonal nesting effort during the 2015-2016 and 2016-2017 nesting seasons indicate that the Republic of Congo hosts the second largest rookery for olive ridley and leatherback sea turtles in Central Africa based on current data availability (**Table 1**). This is likely to reflect the fact that the Republic of Congo is an extension of nesting populations in neighbouring Gabon, with some individual sea turtles likely nesting at beaches in both countries during the season.

**Table 1.** Maximum number of olive ridley and leatherback sea turtle nests estimated to be laid annually at nesting beaches along the Atlantic coast of Central Africa.

Country	Olive ridley nests	Leatherback nests
Cameroon	51 ó 143 <sup>1</sup>	n/a
Equatorial Guinea*	19 ó 29 <sup>2</sup>	123 ó 293 <sup>2</sup>
Gabon	2,370 ó 9,814 <sup>3</sup>	36,185 ó 126,480 <sup>4</sup>
Republic of Congo	439 <sup>5</sup> ó 709 <sup>6</sup>	191 <sup>6</sup> ó 497 <sup>5</sup>
Cabinda	n/a	n/a
Democratic Republic of Congo	n/a	n/a
Angola	123 <sup>7</sup>	14 <sup>7</sup>

**Table 1 notes:** Data sources: <sup>1</sup> Angoni et al. (2010) based on nesting data from 1998/1999, 2000/2001 and 2004/2005; <sup>2</sup> Tomás et al. (2010); <sup>3</sup> Metcalfe et al. (2015); <sup>4</sup> Witt et al. (2009); <sup>5</sup> Godgenger et al. (2009); <sup>6</sup> estimates derived using data presented in this report. Please also note estimates for Republic of Congo do not account for nesting effort within Conkouati-Douli National Park; and <sup>7</sup>, data limited to only a few monitored sites. \* Data only for Bioko.

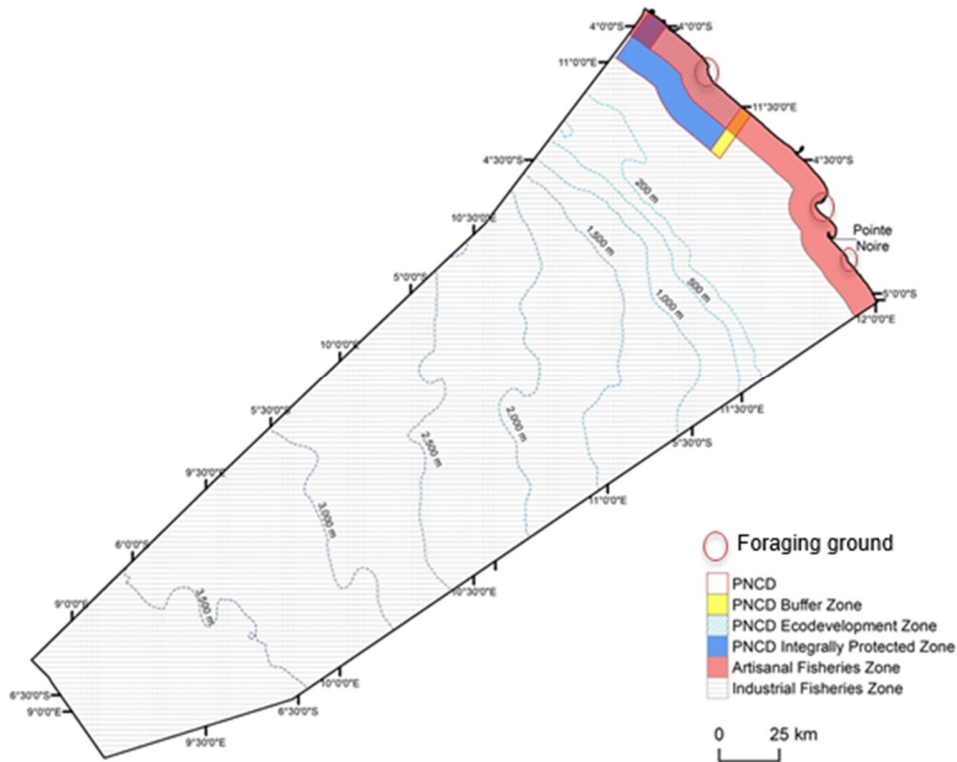


Figure 2 Location of the principal sea turtles foraging grounds and other zones

## 1.2 Other biological data

Les captures-recaptures montrent des liens pour les tortues luth et olivates avec la RDC et l'Angola, pour les tortues vertes avec le Gabon et la Guinée Equatoriale.

## 1.3 Threats

### 1.3.1 Nesting sites

Nest and female poaching  
 Beach destruction  
 Coastal development  
 Photo pollution

### 1.3.2 Marine areas

Foraging habitat degradation  
 Lack of marine protected area development  
 Industrial fisheries and UNN  
 Artisanal fisheries  
 Coastal development

## **1.4 Conservation**

National laws for the conservation of sea turtles.

## **1.5 Research**

### Key knowledge gaps

Genetic

Foraging habitat

Fisheries impact

### Existing but unpublished data that should be urgently published

Population trend

**Table 2.**

<b>RMU (all RMUs of all species occurring in a Country or Region)</b>	<i>L. olivacea</i> <b>Atlantic East</b>	Ref #	<i>D. coriacea</i> <b>Atlantic South East</b>	Ref #	<i>C. mydas</i> <b>Atlantic East</b>	Ref #	<i>E. imbricata</i> <b>Atlantic East</b>	Ref #
<b>Occurrence</b>								
Nesting sites	Y		Y		Y		N	
Pelagic foraging grounds								
Benthic foraging grounds	Y		Y		Y		Y	
<b>Key biological data</b>								
Nests/yr: recent average (range of years)	502 (2014-2016)		113 (2014-2016)		6 (2014-2016)		na	
Nests/yr: recent order of magnitude	466-530		60-149		08-05-17		na	
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	7		2		0		na	
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	2		7		9		na	
Nests/yr at "major" sites: recent average (range of years)	n/a							
Nests/yr at "minor" sites: recent average (range of years)	n/a							
Total length of nesting sites (km)	79		79		42		n/a	
Nesting females / yr	127 (2014-2016)		24 (2014-2016)		n/a		n/a	
Nests / female season (N)	2.29 (291)		3.63 (72)		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		127 CCL		n/a		n/a	
Age at maturity (yrs)	n/a		n/a		n/a		n/a	
Clutch size (n eggs) (N)	126 (19)		151 (5)		n/a		n/a	
Emergence success (hatchlings/egg) (N)	68% (19)		54% (5)		n/a		n/a	
Nesting success (Nests/ Tot emergence tracks) (N)	93.86% (332)		77.38% (72)		n/a		n/a	
<b>Trends</b>								
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	
<b>Published studies</b>								
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		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	
<b>Threats</b>								
Bycatch: presence of small scale / artisanal fisheries?	Y		Y		Y		Y	
Bycatch: presence of industrial fisheries?	Y		Y		Y		Y	
Bycatch: quantified?	Y		Y		Y		Y	
Take. Intentional killing or exploitation of turtles	Y		Y		Y		Y	
Take. Egg poaching	Y		Y		Y		N	
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		Y		Y		N	
Pollution (debris, chemical)	Y		Y		Y		Y	
Pathogens	Y		Y		Y		Y	
Climate change	Y		Y		Y		Y	
Foraging habitat degradation	Y		Y		Y		Y	
Other								
<b>Long-term projects (&gt;5yrs)</b>								
Monitoring at nesting sites (period: range of years)	2003-2017		2003-2017		2003-17		na	
Number of index nesting sites	9		9		9			

Monitoring at foraging sites (period: range of years)	2005-2017				2005-2017		2005-2017	
<b>Conservation</b>								
Protection under national law	Y		Y		Y		Y	
Number of protected nesting sites (habitat preservation) (% nests)	80%		80%		80%		na	
Number of Marine Areas with mitigation of threats	1		1		1		1	
N of long-term conservation projects (period: range of years)	2 (2003-17)		2 (2003-17)		2 (2003-17)		2 (2003-17)	
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	By-catch release program		By-catch release program		By-catch release program		By-catch release program	

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1	Honarvar, S., D. B. Fitzgerald, C. L. Weitzman, E. M. Sinclair, J. M. Esara Echube, M. P. O'Connor, G. W. Hearn. (2016) Assessment of Important Marine Turtle Nesting Populations on the Southern Coast of Bioko Island, Equatorial Guinea. <i>Chelonian Conservation and Biology</i> 15(1):79-89.
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5	Thesis: Callie Veelenturf, Department of Biology, Indiana University -Purdue University Fort Wayne. The effects of sea level rise and nest location on reproductive success in leatherback and green sea turtles on Bioko Island, Equatorial Guinea. M.Sc. degree awarded August 2017.
6	Jesús Tomás, Brendan J. Godley, Javier Castroviejo, Juan A. Raga. 2010. Bioko: critically important nesting habitat for sea turtles of West Africa
7	Godgenger, M.C., N. Bréheret, G. Bal, K. N'Damité, A. Girard and M. Girondot. 2009. Nesting estimation and analysis of threats for Critically Endangered leatherback <i>Dermochelys coriacea</i> and Endangered olive ridley <i>Lepidochelys olivacea</i> marine turtles nesting in Congo. <i>Oryx</i> 43(4): 556ó563

## EQUATORIAL GUINEA

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### 1. RMU: South-Central Atlantic

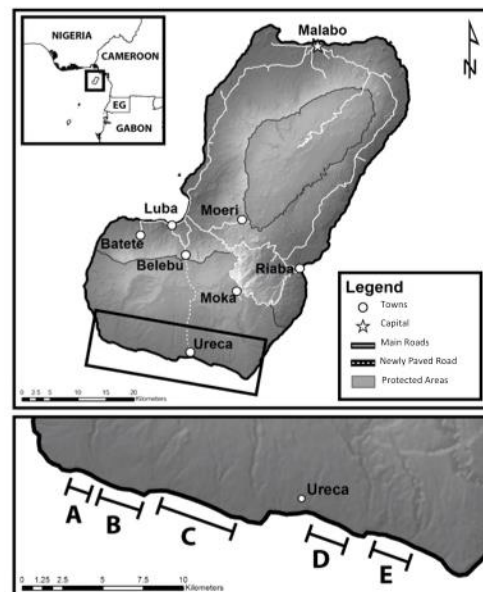
Bioko Island: *D. coriacea*, *C. mydas*, *E. imbricata*, *L. olivacea*

#### 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 ó 2014 and have been published (see provided reference list). Data from the subsequent three years (2014 ó 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 ó 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 successfully increased the number of eco-guards from zero to 4 in the past two years. The BBPP's highly successful education and outreach program teaches 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 ó 2014 remains to be published.

**Table 2.**

<b>RMU (all RMUs of all species occurring in a Country or Region)</b>	<b><i>D. coriacea</i> Bioko Island</b>	Ref #	<b><i>C. mydas</i> Bioko Island</b>	Ref #	<b><i>E. imbricata</i> Bioko Island</b>	Ref #	<b><i>L. olivacea</i> Bioko Island</b>	Ref #
<b>Occurrence</b>								
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	
<b>Key biological data</b>								
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			n/a					
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	5	n/a	5	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	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	1
Nests/yr at "minor" sites: recent average (range of years)	n/a	n/a	n/a	n/a	85 encounters (2000 - 2014)		103 (2008 - 2014)	n/a
Total length of nesting sites (km)	19	1,6	19	1,6	19	1,6	19	1,6
Nesting females / yr	967	1	237	1	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	
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	
<b>Trends</b>								
Recent trends (last 20 yrs) at nesting sites (range of years)	Down (2000-2014)	1	Stable (2000-2014)	1	Low encounter numbers	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							
<b>Published studies</b>								
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	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	
<b>Threats</b>								

Bycatch: presence of small scale / artisanal fisheries?	Y	Unpub lished data	Y	Unpub lished data	Y	Unpubli shed data	Y	Unpubl ished data
Bycatch: presence of industrial fisheries?	Y		Y		Y		Y	
Bycatch: quantified?	Y	Unpub lished data	Y	Unpub lished data	Y	Unpubli shed data	Y	Unpubl ished 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		N		N		N	
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)	Unpub lished data	Y (plastics)	Unpub lished data	Y (plastics)	Unpubli shed data	Y (plastics)	Unpubl ished data
Pathogens	y	5	y	5	n/a		n/a	
Climate change	Y	5	Y	5	Y	5	Y	5
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
<b>Long-term projects (&gt;5yrs)</b>								

Monitoring at nesting sites (period: range of years)	Y (2000-ongoing)	1	Y (2000-ongoing)	1	Y (2000-ongoing)		Y (2000-ongoing)	1
Number of index nesting sites	5		5		5		5	
Monitoring at foraging sites (period: range of years)	N		N		N		N	
<b>Conservation</b>								
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	0		0		0		0	
N of long-term conservation projects (period: range of years)	2 (1996-1998)(1999-present)	6,1	2 (1996-1998)(1999-present)	6,1	2 (1996-1998)(1999-present)	6,1	2 (1996-1998)(1999-present)	6,1
In-situ nest protection (eg cages)	Y		Y		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)	

## Reference

1	Honarvar, S., D. B. Fitzgerald, C. L. Weitzman, E. M. Sinclair, J. M. Esara Echube, M. P. O'Connor, G. W. Hearn. (2016) Assessment of Important Marine Turtle Nesting Populations on the Southern Coast of Bioko Island, Equatorial Guinea. <i>Chelonian Conservation and Biology</i> 15(1):79-89.
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5	Thesis: Callie Veelenturf, Department of Biology, Indiana University -Purdue University Fort Wayne. The effects of sea level rise and nest location on reproductive success in leatherback and green sea turtles on Bioko Island, Equatorial Guinea. M.Sc. degree awarded August 2017.
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## GABON

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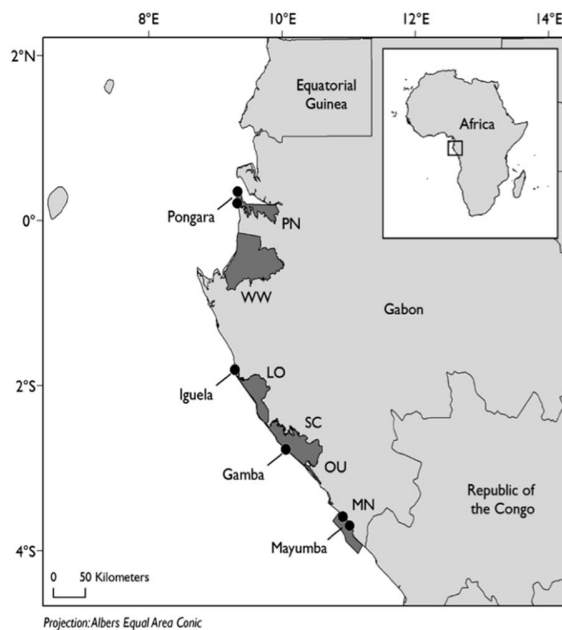
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### 1. RMU: Southeast Atlantic Leatherbacks

#### 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 1a) 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.

**Table 1a. Key biological data for the Gabon leatherback nesting population (Ref. 1)**

<b>Known Biological Data</b>	
Nests/yr: recent average (range of years)	78510 (2002-2007)
Nests/yr: recent order of magnitude	36185-126480
Total length of nesting sites (km)	594
Nesting females / yr	5865-20499

### **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 1b).

**Table 1b. Main threats affecting nesting and marine habitat for Gabon leatherbacks.**

<b>Main threat</b>	<b>Presence (Y/N)</b>	<b>Ref.</b>
Bycatch: presence of small scale / artisanal fisheries?	Y (DN, SN)*	16
Bycatch: presence of industrial fisheries?	Y (ST, MT, PT)*	3
Bycatch: quantified?	Y	3
Take. Intentional killing or exploitation of turtles	n/a	
Take. Egg poaching	Y	28
Coastal Development. Nesting habitat degradation	Y	17
Coastal Development. Photopollution	Y	9,10
Coastal Development. Boat strikes	n/a	
Egg predation	Y	28
Pollution (debris, chemical)	Y	17
Pathogens	n/a	



Climate change	Y	17
Foraging habitat degradation	n/a	
Other	Y (stranded logs)	14,17

\* *DN* (drift net), *SN* (set net), *ST* (shrimp trawls), *MT* (multi-specific bottom trawls), *PT* (pelagic trawls).

### 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 1c).

**Table 1c. Conservation initiatives undertaken.**

Main Conservation Initiative	Presence (Y/N)	Ref.
Protection under national law	Y	3
Number of protected nesting sites (habitat preservation) (% nests)	79% +/- 6% nests in protected areas	1
Number of Marine Areas with mitigation of threats	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
In-situ nest protection (eg cages)	N	
Hatcheries	Y	28
Head-starting	N	
By-catch: fishing gear modifications (eg, TED, circle hooks)	Y	3
By-catch: onboard best practices	Y	3
By-catch: spatio-temporal closures/reduction	Y	3
Other	Log removal	17

## 1.4. Research

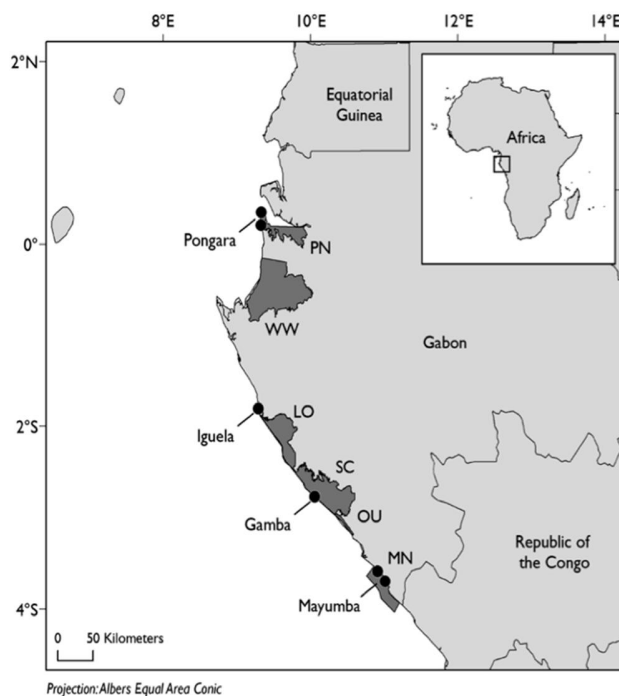
More than 29 scientific studies have been carried out and published (or in review) on leatherbacks, olive ridleys and green turtles in Gabon (see Ref list below).

## 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 2a 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).

**Table 2a. Key biological data for the Gabon olive ridley nesting population (Ref. 6)**

<b>Known Biological Data</b>	
Nests/yr: recent average (range of years)	2370-9814 (2006-2013)
Nests/yr: recent order of magnitude	1887-14033
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	4
Nests/yr at "major" sites: recent average (range of years)	510 (2006-2013)
Total length of nesting sites (km)	585
Nesting females / yr	948-5452

### **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 2b).

**Table 2b. Main threats affecting nesting and marine habitat for Gabon's olive ridley.**

<b>Main threats</b>	<b>Presence (Y/N)</b>	<b>Ref.</b>
Bycatch: presence of small scale / artisanal fisheries?	Y (DN, SN)*	16
Bycatch: presence of industrial fisheries?	Y (ST, MT, PT)*	3
Bycatch: quantified?	Y	3
Take. Intentional killing or exploitation of turtles	N	
Take. Egg poaching	Y	6
Coastal Development. Nesting habitat degradation	Y	6
Coastal Development. Photopollution	Y	9,10
Coastal Development. Boat strikes	Y	6
Egg predation	Y	6
Pollution (debris, chemical)	Y	6
Pathogens	n/a	
Climate change	Y	6
Foraging habitat degradation	Y	4
Other	Y (stranded logs)	14,17

\* *DN* (drift net), *SN* (set net), *ST* (shrimp trawls), *MT* (multi-specific bottom trawls), (*PT* (pelagic trawls).

### 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 2c).

**Table 2c. Conservation initiatives undertaken.**

<b>Conservation</b>	<b>Presence (Y/N)</b>	<b>Ref.</b>
Protection under national law	Y	6
Number of protected nesting sites (habitat preservation) (% nests)	81% +/- 3.5% nests in protected areas	6
Number of Marine Areas with mitigation of threats	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)	6
In-situ nest protection (eg cages)	N	
Hatcheries	Y	28
Head-starting	N	
By-catch: fishing gear modifications (eg, TED, circle hooks)	Y	3
By-catch: onboard best practices	Y	3
By-catch: spatio-temporal closures/reduction	Y	3
Other	n/a	

### 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 3a.

**Table 3a. Threats and conservation initiatives undertaken with respect to foraging green turtles in Gabon (Ref. 21, 22, 23, 24, 25, 26, 27).**

<b>Threats</b>	<b>Presence (Y/N)</b>
Bycatch: presence of small scale / artisanal fisheries?	Y (DN,SN)*
Bycatch: presence of industrial fisheries?	N
Bycatch: quantified?	N
Take. Intentional killing or exploitation of turtles	Y
Pollution (debris, chemical)	Y
Pathogens	Y
Climate change	Y
Foraging habitat degradation	Y
<b>Conservation Initiatives</b>	
Protection under national law	Y
Number of Marine Areas with mitigation of threats	20 marine protected areas (9 parks, 11 reserves covering 26% of EEZ)
N of long-term conservation projects (period: range of years)	>6 (1998-ongoing)
By-catch: fishing gear modifications (eg, TED, circle hooks)	n/a
By-catch: onboard best practices	n/a
By-catch: spatio-temporal closures/reduction	Y

\* *DN (drift net), SN (set net).*

**Table 4.**

<b>RMU (all RMUs of all species occurring in a Country or Region)</b>	<b>DC- SE Atlantic</b>	<b>Ref #</b>	<b>LO- East Atlantic</b>	<b>Ref #</b>	<b>CM- Atlantic</b>	<b>Ref #</b>
<b>Occurrence</b>						
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
<b>Key biological data</b>						
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	
<b>Trends</b>						
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	
<b>Published studies</b>						
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	
<b>Threats</b>						
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	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		
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		
<b>Long-term projects (&gt;5yrs)</b>						
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
<b>Conservation</b>						



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	n/a	
By-catch: spatio-temporal closures/reduction	Y	3	Y	3	Y	3
Other	log removal	17	n/a		n/a	

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## GAMBIA

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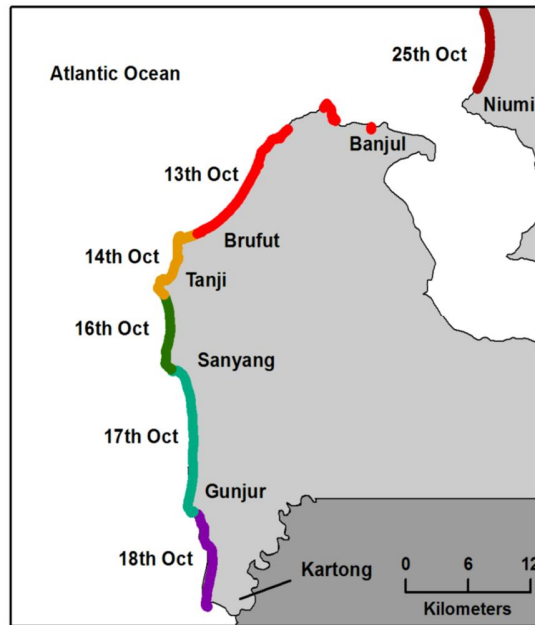
### 1 RMU: West Africa / East Atlantic Region

#### 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 1 below indicates the length of the beaches surveyed 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).



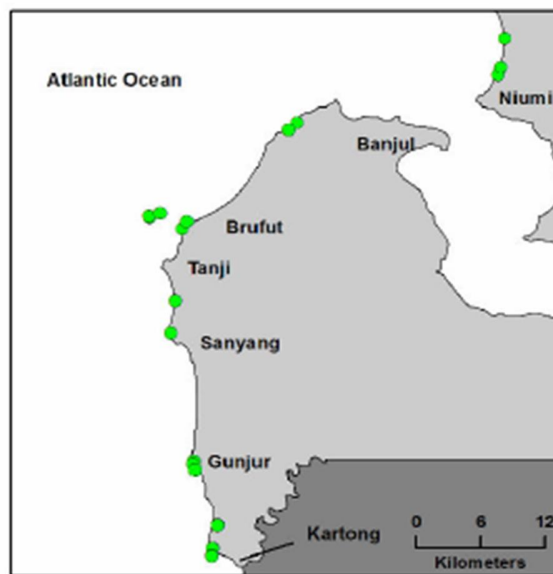
**Figure 1.** Sea turtle nesting beaches in Gambia (Source: Hawkes et al., 2006).

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 1.** 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

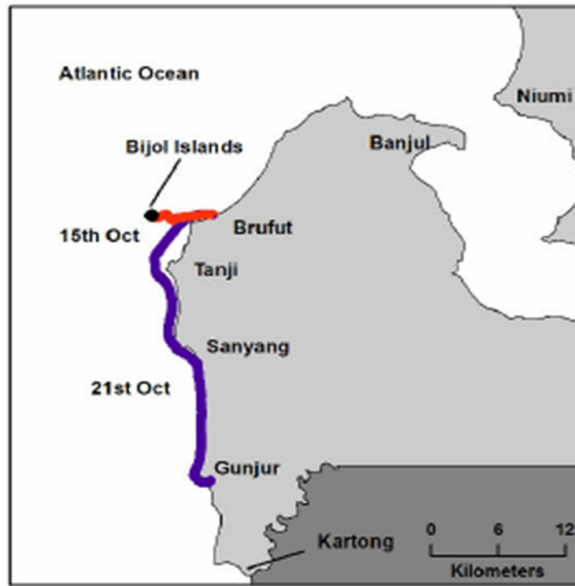
There are a total of 7 major nesting beaches (Figure 1) were surveyed during the 1999-2000 nesting season (interviews and beach patrols) and also in 2006 (beach patrols). Green turtles were the dominant species recorded in the surveys while the other three species were lowly represented. The surveys 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

**Table 2.**

<b>RMU (all RMUs of all species occurring in a Country or Region)</b>	<b><i>D. coriacea</i> Atlantic Southeast</b>	<b>Ref #</b>	<b><i>C. Mydas</i> Atlantic East</b>	<b>Ref #</b>	<b><i>L. olivacea</i> Atlantic East</b>	<b>Ref #</b>	<b><i>E. imbricate</i> Atlantic East</b>	<b>Ref #</b>
<b>Occurrence</b>								
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	
<b>Key biological data</b>								
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	
<b>Trends</b>								
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
<b>Published studies</b>								
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	
<b>Threats</b>								
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	
<b>Long-term projects</b>								
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	
<b>Conservation</b>								
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	

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## GHANA

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### **1 RMU: *Caretta caretta* ó 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. It should be noted that consistent nesting surveys have only been conducted on this beach from August 1998 to April 2000. See Table 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 but this has not been confirmed.

#### **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 with the lack of consistent sea turtle nesting data for 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 5 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, and the information within have not been consolidated. Ghana needs to establish a national database network to improve the accessibility of these data.

## **2 RMU: *Dermochelys coriacea* ó 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 four. Three nesting sites would be considered "major" (Ada, Prampram, Old Ningo) and one would be considered "minor" (Mankodze). Unconfirmed reports indicate the possibility of two additional "major" nesting sites (Keta and Princess Town). It is almost certain leatherbacks are nesting along the entire coastline, but surveys have not been conducted along most of Ghana's coast. See Table 1.

#### **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.

### **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 2.

#### **2.3.2 Marine Areas**

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

## **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. 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.

## **3 RMU: *Chelonia mydas* ó 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 four. Although nesting is consistent at these four 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 (Beyin) 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 Table 1.

#### **3.1.2 Marine Areas**

Fishermen along the entire coastline quickly identify this species and indicate routinely encountering them while fishing.

### **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 2.

#### **3.3.2 Marine Areas**

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

### **3.4 Conservation**

The Wildlife Conservation Regulations Bill of 1971 (L.I. 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 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: *Eretmochelys imbricata* ó 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.



## **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 2.

### **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.

## **5.0 RMU: *Lepidochelys olivacea* 6 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 four. All four nesting sites would be considered "major" (Ada, Prampram, Old Ningo, Mankodze) due to the high nesting density. Unconfirmed reports indicate the possibility of two additional "major" nesting sites (Keta and Princess Town). 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 Table 1.

### **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.

## **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. See Table 2.

### **5.3.2 Marine Areas**

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

## **5.4 Conservation**

The Wildlife Conservation Regulations Bill of 1971 (L.I. 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.

**Table 1.**

<b>RMU (all RMUs of all species occurring in a Country or Region)</b>	<i>D. coriacea</i>	Ref #	<i>C. Mydas</i>	Ref #	<i>L. olivacea</i>	Ref #	<i>C. caretta</i>	Ref #	<i>E. imbricata</i>	Ref #
<b>Occurrence</b>										
Nesting sites	Y	1,2,3,5,4	Y	1,5,6	Y	1,2,3,5	Y	1,2,3,5	n/a	
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	
<b>Key biological data</b>										
Nests/yr: recent average (range of years)	362 (1998-2016)		38 (1998-2008)		2519 (1998-2016)		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)	3	2,3,4,5,6	0		4		0		n/a	
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	1		4		n/a		0		n/a	
Nests/yr at "major" sites: recent average (range of years)	339 (1998-2008)		n/a		2519 (1998-2016)		n/a		n/a	
Nests/yr at "minor" sites: recent average (range of years)	23 (2008-2016)		38 (1998-2016)		n/a		n/a		n/a	
Total length of nesting sites (km)	25.4	2	25.4	2	25.4		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)	142 CCL	2	n/a		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)	81 (7)	2	n/a		119 (15)	2	n/a		n/a
Emergence success (hatchlings/egg)	99.7% (11)	2	n/a		100% (3)	2	n/a		n/a
Nesting success (Nests/ Tot emergence tracks)	0.96 (77)	2	n/a		0.87 (118)	2	n/a		n/a
<b>Trends</b>									
Recent trends (last 20 yrs) at nesting sites (range of years)	n/a		n/a		n/a		n/a		n/a
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
<b>Published studies</b>									
Growth rates	n/a		n/a		n/a		n/a		n/a
Genetics	Y	7	N		N		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

<b>Threats</b>									
Bycatch: small scale / artisanal	Y		Y		Y		Y		Y
Bycatch: industrial	n/a		n/a		n/a		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		Y		n/a
Other	n/a		n/a		n/a		n/a		n/a
<b>Long-term projects</b>									
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
<b>Conservation</b>									
Protection under national law	Y	2	Y		Y		Y		Y
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		2		0		0		0

Long-term conservation projects (number)	Y (3)		Y (3)		Y (3)		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	

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