

# **North Atlantic & Wider Caribbean MTSG Regional Report**

Michel Nalovic

Eduardo Cuevas

Matthew Godfrey

## Summary :

Countries included in this report are Colombia, Cuba, France Atlantic, French Guiana, Guadeloupe, Martinique, Mexico, St. Bartholome, St. Eustach, St. Martin, St. Pierre et Miquelon, Venezuela. It is our hope that more countries will be interested in participating in this initiative.

## Content

<b>Chapter 1. North Atlantic &amp; Wider Caribbean Regional Overview ..</b>	<b>3</b>
<b>Chapter 2: Colombia.....</b>	<b>29</b>
<b>Chapter 3: Cuba .....</b>	<b>48</b>
<b>Chapter 4: French Guiana.....</b>	<b>68</b>
<b>Chapter 5: Guadeloup .....</b>	<b>79</b>
<b>Chapter 6: Martinique.....</b>	<b>89</b>
<b>Chapter 7: Mexico.....</b>	<b>101</b>
<b>Chapter 8: Saint Eustach .....</b>	<b>122</b>
<b>Chapter 9: Saint Pierre et Miquelon .....</b>	<b>128</b>
<b>Chapter 10. St Barthelemy FWI .....</b>	<b>135</b>
<b>Chapter 11. St Martin FWI .....</b>	<b>163</b>
<b>Chapter 12: French Atlantic and Channel coasts.....</b>	<b>196</b>
<b>Chapter 13: Venezuela .....</b>	<b>206</b>

# Chapter 1. North Atlantic & Wider Caribbean Regional Overview

Michel Nalovic<sup>1</sup>, Eduardo Cuevas<sup>2</sup>, Matthew Godfrey<sup>3</sup>

1. Comite Regional des Peches Maritimes et Elevages Marins de Guyane
2. CONACYT – Universidad Autónoma del Carmen / Mexico.
3. Duke University / U. S. A.

This Region comprise 48 parties, amongst countries and territories (Anguilla, Antigua & Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Bonaire, British Virgin Islands, Canada, Cape Verde, Cayman Islands, Colombia, Costa Rica, Cuba, Curacao, Dominica, Dominican Republic, French Atlantic & Channel coasts, French Guiana, Grenada, Guadeloupe, Guatemala, Guyana, Haiti, Honduras, Jamaica, Martinique, Mexico, Monserrat, Nicaragua, Panama, Portugal, Puerto Rico, Saba (Dutch West Indies), Saint Barthélemy, Saint Vincent & The Grenadines, Saint Eustach, Saint Maarten, Saint Kitts & Nevis, Saint Lucia, Saint Pierre & Miquelon, Suriname, Trinidad & Tobago, United Kingdom, United States of America, US Virgin Islands, Venezuela). In the present report it is included a total of 12 parties (23%, Colombia, Cuba, French Atlantic & Channel coasts, French Guiana, Guadeloupe, Martinique, Mexico, Saint Eustach, Saint Pierre & Miquelon, Saint Barthélemy, Saint Maarten, Venezuela).

It demands a big effort to bring together the detailed information from all the parties, and although there are still several parties to include, this document presents information that give a regional panorama of complete information regarding reproductive ecology and status for populations in the Atlantic.

## 1. RMU: *Caretta caretta* – Northwest Atlantic

### 1.1. Distribution, abundance, trends

#### 1.1.1. Nesting sites

The rookeries reported for this compilation are located in Colombia, Cuba, Mexico and Venezuela (Table 1). Only Mexico and Cuba together host a total of 65 nesting beaches for this species (Figure 1). These countries report nesting beaches with more than 1,000 nests per year for the period 2000 – 2016, with a total of 15 major sites and 18 nesting sites considered minor (<20 nests/yr). The total estimated length of the nesting beaches in these countries is 266 km, where even more than 150 nesting females per year may be recorded (Cuba).

The recent trends (last 20 years) at major nesting sites (Mexico and Cuba) is going up (approximately 6%/year, 2000-2016), with the oldest documented abundance of nests/year of 8 and 58 in 1983 and 1998, respectively, in Cuba.

#### 1.1.2. Marine areas

Pelagic foraging grounds for this species are reported in Colombia and Venezuela (Table 1.1), and benthic foraging grounds reported in Colombia, Cuba, Mexico and Venezuela. Telemetry tracking of is reported for individuals from Cuba, Mexico and Venezuela, with also data of mark-recapture projects in these same countries. In Mexico there is long-term monitoring project at foraging sites from 1988 and ongoing.

## **1.2. Other biological data**

Please see Table 1.1 – Main Table.

## **1.3. Threats**

### **1.3.1. Nesting sites**

Please see Table 1.1 – Main Table.

### **1.3.2. Marine areas**

Please see Table 1.1 – Main Table.

## **1.4. Conservation**

This species is protected under national law in all the countries that contributed to this chapter of the Regional Report (Colombia, Cuba, Mexico and Venezuela), and there are more than 15 long-term conservation projects particularly in Cuba, Mexico and Venezuela. See Table 1.3 in the country chapters for individual conventions and laws applied to sea turtles in each country.

## **2. RMU: *Dermochelys coriacea* – Northwest Atlantic**

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

#### **2.1.1. Nesting sites**

Ten countries in this region report nesting activity of *D. coriacea* in some of their beaches (Colombia, Cuba, French Guiana, Guadeloupe, Martinique, Mexico, St. Bartholome, St. Eustatius, St. Martin and Venezuela), with more than 15 nesting beaches, of which 2 are considered major sites (Colombia and French Guiana) with more than 800 nests/year (2013 – 2017), and more than 30 minor sites (Colombia, Cuba, French Guiana, Mexico, St. Bartholome, St. Eustatius, St. Martin and Venezuela) with less than 25 nests/year (Figure 2).

The estimated total length of nesting beach for this species was reported as little more than 60 km, hosting between 100 and 250 nesting females per year, particularly in French Guiana, St. Bartholome, St. Eustatius and St. Martin. The recent trend for these rookeries is positive and considering the oldest documented abundance of 10 nests in 2002 in St. Eustatius and French Guiana.

### **2.1.2. Marine areas**

Pelagic foraging grounds for this species are reported in Cuba, France Atlantic, French Guiana, Mexico and Venezuela; and benthic foraging grounds only in French Guiana and Venezuela. There are big information gaps regarding the usage of marine areas this species does in this region, reporting no published information on growth rates, remote tracking, foraging ecology and mark-recapture studies.

In Venezuela there is a long-term monitoring project at foraging grounds that started in 2000 and it is still operating.

### **2.2. Other biological data.**

Please see Table 1.1 – Main Table.

### **2.3. Threats**

#### **2.3.1. Nesting sites**

Please see Table 1.1 – Main Table.

#### **2.3.2. Marine areas**

Please see Table 1.1 – Main Table.

### **2.4. Conservation.**

Please see Table 1 for national laws and Table 3 in the country chapters for international conventions. The 67% of the countries included in this Report protect *D. coriacea* under national law (6/9).

Together France Atlantic, St. Bartholome, St. Martin, St. Eustatius and Venezuela report >6 long-term conservation projects that started in 2002 and are still ongoing.

## **3. RMU: *Chelonia mydas* – Northwest Atlantic.**

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

#### **3.1.1. Nesting sites.**

*Chelonia mydas* is also a widely distributed species in this RMU, it was reported by 9 different countries (Colombia, Cuba, French Guiana, Martinique, Mexico, St. Bartholome, St. Eustatius, St. Martin and Venezuela), and it is certainly the species with the highest nesting abundance in the region with an average of more 5,000 nests/year (2000-2016) in tens of nesting beaches (Table 1). For this RMU there are reported 25 major nesting sites and at least 42 minor sites (<50 nests/yr) (Figure 3).

The total length of the nesting beaches is >400 km in only 7 of the countries, and these littorals receive between 175 and 4,200 nesting females per year. The recent trends for Mexico, Cuba and Venezuela is positive, with increases of more than 15% per year (2000-2016), and the oldest documented abundance of 20 nests/yr in Cuba and 200 in Venezuela.

### **3.1.2. Marine areas.**

Colombia, French Guiana, St. Bartholome, St. Martin and Venezuela reported pelagic foraging grounds for this species, and eight countries more reported to host benthic foraging grounds for adults and juveniles (Table 1.1). It is reported the availability of studies on several aspects of this species in marine areas, including stocks defined by genetic markers, remote tracking, foraging ecology and mark-recapture.

In at least four countries (Colombia, Cuba, Mexico, St. Eustatius) exist long-term monitoring projects at foraging sites, all of them started in 2001 and still ongoing.

### **3.2. Other biological data.**

Please see Table 1.1 – Main Table.

### **3.3. Threats.**

#### **3.3.1. Nesting sites**

Please see Table 1.1 – Main Table.

#### **3.3.2. Marine areas**

Please see Table 1.1 – Main Table.

### **3.4. Conservation.**

In this RMU six countries reported to have protection under national law for this species (Table 1), with at least 7 long-term conservation projects that operate since 1990 and still ongoing (Cuba, Mexico, St. Bartholome, St. Eustatius, St. Martin and Venezuela).

See Table R in the country chapters for individual conventions and laws applied to sea turtles in each country.

## **4. RMU: *Eretmochelys imbricata* – Northwest Atlantic**

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

#### **4.1.1. Nesting sites**

This species was reported by eight countries in the region (Colombia, Cuba, Martinique, Mexico, St. Bartholome, St. Eustatius, St. Martin and Venezuela). Reproductive values are reported by these countries having close to 1,000 nests/year (1995 – 2016) with >15 important major nesting sites (Colombia, Cuba, Mexico, St. Bartholome, St. Eustatius and St. Martin) and at more than 60 minor sites (Figure 1.4).

The total length of the nesting beaches in the countries that reported the presence of this species is more than 400 km, receiving between 90 and even more than 1000 nesting females per year. The recent trend for this species in Cuba is up (1998 – 2016), and for Mexico is slightly going down (1995 – 2010), with the oldest documented abundance between 10 and 300 nests/year in 1983 (Cuba, Mexico, St. Eustatius and Venezuela).

#### **4.1.2. Marine areas**

Colombia, Mexico, St. Bartholome, St. Martin and Venezuela reported pelagic foraging grounds, and these same countries plus Cuba and St. Eustatius also reported benthic foraging grounds). There are several studies for this species in marine areas, including mark-recapture, foraging ecology and remote tracking. In all these countries there are long-term monitoring projects at foraging sites (1992 – ongoing).

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

Please see Table 1 – Main Table.

### **4.3. Threats**

#### **4.3.1. Nesting sites**

Please see Table 1.1 – Main Table.

#### **4.3.2. Marine areas**

Please see Table 1.1 – Main Table.

### **4.4. Conservation.**

All the above-mentioned countries reported to have national law to protect *E. imbricata*. There are more than nine long-term conservation projects that have been operating since 1990 and are still ongoing in Cuba, Mexico, St. Eustatius and Venezuela.

See Table R in the country chapters for individual conventions and laws applied to sea turtles in each country.

## **5. RMU: *Lepidochelys kempii* – Northwest Atlantic**

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

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

This species is the most restricted one, it is circumscribed to the Gulf of Mexico. For this report, Mexican littoral in the Gulf of Mexico is recognized to host several nesting sites, with its main beach at Rancho Nuevo, northwest Gulf of Mexico. In recent years the average of nests per year is around 12,000 (2009 – 2015), with three major nesting sites and seven minor ones.

The total length of the nesting beach is 212 km in Mexico, hosting more than 5,000 nesting females per year. The trend is clearly positive (1995 – 2015).

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

The Gulf of Mexico's waters host important pelagic and benthic foraging areas for this species. It is one of the most studied species in this RMU, existing a huge variety of in-water studies and long-term projects occurring in this area.

The recovery of its populations is one an example of successful multinational collaboration and the capacity of recovery by these species.

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

Please see Table 1.1 – Main Table.

### **5.3. Threats**

#### **5.3.1. Nesting sites**

Please see Table 1.1 – Main Table.

#### **5.3.2. Marine areas**

Please see Table 1.1 – Main Table.

### **5.4. Conservation**

Mexico and U. S. have national law that protect this species all over its distribution range in the RMU. The bi-national conservation project for this species started in 1975 and it is still ongoing.

See Table R in the country chapters for individual conventions and laws applied to sea turtles in each country.



## **6. RMU: *Lepidochelys olivacea* – Northwest Atlantic**

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

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

For this species, only French Guiana and Venezuela reported to have nesting sites along their littoral (Table 1.1). The recent trend in French Guiana is of almost 3,000 nests/year (2008 – 2016), with 2 major nesting sites and equal number of minor sites.

The estimated average number of nesting females in this country is 1,700 (2009 – 2016), with 1.3 nests per female per season. The recent trend reported for this species is stable, with the oldest documented abundance of for more than 3,000 nests per year in French Guiana.

#### **6.1.2. Marine areas**

Both French Guiana and Venezuela reported to have benthic foraging grounds for adults, but only the former reported to host pelagic foraging grounds. There is not much published information regarding the ecology and population features of this species in the RMU.

### **6.2. Other biological data**

Please see Table 1.1 – Main Table.

### **6.3. Threats**

#### **6.3.1. Nesting sites**

Please see Table 1.1 – Main Table.

#### **6.3.2. Marine areas**

Please see Table 1.1 – Main Table.

### **6.4. Conservation**

At least Venezuela has protection under national law for this species, and this same country has a long-term conservation project that started in 2009.

See Table R in the country chapters for individual conventions and laws applied to sea turtles in each country.

**Table 1.1. Main biology and conservation aspects of sea Regional Management Units (RMU) occurring in the North Atlantic and Wider Caribbean Region.**

	<i>E. imbricata</i>	Country Chapters	<i>L. kempii</i>	Country Chapters	<i>L. olivacea</i>	Country Chapters	<i>C. mydas</i>	Country Chapters	<i>C. caretta</i>	Country Chapters	<i>D. coriacea</i>	Country Chapters
Nesting sites	Y	Colombia, Cuba, Martinique, Mexico, St. Bartholome, St. Eustatius, St. Martin, Venezuela	Y	Mexico	Y	French Guiana, Venezuela	Y	Colombia, Cuba, French Guiana, Martinique, Mexico, St. Bartholome, St. Eustatius, St. Martin, Venezuela	Y	Colombia, Cuba, Mexico, Venezuela	Y	Colombia, Cuba, Mexico, French Guiana, Guadeloupe, Martinique, Mexico, Bartholome, St. Eustatius, St. Martin, Venezuela
Pelagic foraging grounds	Y	Colombia, Mexico, St. Bartholome, St. Martin, Venezuela	Y	Mexico	Y	French Guiana	Y	Colombia, French Guiana, St. Bartholome, St. Martin, Venezuela	Y	Colombia, Venezuela	Y (both)	Colombia, Cuba, French Guiana, Atlantic, French Guiana, Mexico, Venezuela
Benthic foraging grounds	Y	Colombia (JA), Cuba, Mexico, St. Bartholome, St. Eustatius, St. Martin, Venezuela	Y	Mexico	Y (A)	French Guiana, Venezuela	Y (both)	Colombia, Cuba, French Guiana, Mexico, St. Bartholome, St. Eustatius, St. Martin, Venezuela	Y (both)	Colombia, Cuba, Mexico, Venezuela	Y	Colombia, French Guiana, Venezuela

<b>Key biological data</b>												
Nests/yr: recent average (range of years)	3.1 (Col), 58.4 (1982-2018(St. Barth)); 940.1 (1995-2016(Mex), 2010-2015)	Colombia, Cuba, Guadeloupe, Mexico, St. Bartholome, St. Eustatius, St. Martin, Venezuela	12000 (2009-2015)	Mexico	2997 (2008-2016)	French Guiana	5-150 (1990-2018, Colombia, St. Bartholome, St. Martin); 3000->5000 (2000-2016, Mexico, Cuba, St. Eustatius, Venezuela, FG, Guadeloupe)	Colombia, Cuba, French Guiana, Guadeloupe, Mexico, St. Bartholome, St. Eustatius, St. Martin, Venezuela	<10 (2007-2018, Colombia); 10-300 (2010-2018 Cuba; 2010-2012 Venezuela); >1000 (2000-2016) (Mexico)	Colombia, Cuba, Mexico, Venezuela	1-1500 (Colombia); 1-10 (1982-2018 St. Bartholome); 3-10 (St.Eus., Venezuela)	Colombia, French Guiana, Guadeloupe, St. Bartholome, St. Eustatius, St. Martin, Venezuela
Nests/yr: recent order of magnitude	10->500	Colombia, Cuba, Guadeloupe, Mexico, St. Bartholome, St. Eustatius, St. Martin, Venezuela	n/a		1586-3955	French Guiana	<10 (Colombia); up to 5000 (Cuba); up to 250 (St. Bartholome, St. Martin); 2,500-5000 (2000-2016) (Mexico, Cuba, Grenada, St. Eustatius, Venezuela, FG)	Colombia, Cuba, French Guiana, Mexico, St. Bartholome, St. Eustatius, St. Martin, Venezuela	<10 (Colombia); 50-400	Colombia, Cuba, Mexico, Venezuela	(10-150 (Colombia, 2014-2018); <25	Colombia, Cuba, Guadeloupe, Mexico, Bartholome, St. Eustatius, St. Martin, Venezuela
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	19	Colombia, Cuba, Guadeloupe, Mexico, St. Eustatius, St. Martin	3	Mexico	2	French Guiana	25	Cuba, French Guiana, Mexico, St. Eustatius, St. Martin	15	Cuba, Mexico	2 (French Guiana)	Colombia, French Guiana
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	67	Colombia, Cuba, Guadeloupe, Mexico, St. Bartholome, St. Eustatius, St. Martin, Venezuela	7	Mexico	2	French Guiana	42	Colombia, Cuba, French Guiana, Mexico, St. Bartholome, St. Eustatius, St. Martin	18	Colombia, Cuba, Venezuela	33	Colombia, Cuba, French Guiana, Mexico, St. Bartholome, St. Eustatius, St. Martin, Venezuela

Nests/yr at "major" sites: recent average (range of years)	173.3 (2009-2018)	Cuba, St. Martin, Mexico	12000 (2009-2015)	Mexico	n/a		>3000 (2000-2018); 50 (St. Martin)	Cuba, Mexico, St. Martin	253.5 (2000-2016); 322.66 (2010-2015 Cuba)	Cuba, Mexico	>1,000 (Colombia)	Colomb
Nests/yr at "minor" sites: recent average (range of years)	5-42 (2010-2017)	Colombia, Cuba, Guadeloupe, Mexico, St. Bartholome, St. Eustatius, St. Martin, Venezuela	n/a		n/a		<10 (Colombia); <50	Colombia, Cuba, Mexico, St. Bartholome, St. Eustatius, St. Martin	<10(Colombia); 19.83 (2010-2015)	Colombia, Cuba	<20 (Mexico, St. Eustatius); <5 (Cuba, St. Bartholome, St. Martin); 10-200 (Colombia)	Colomb Cuba, Mexico, Bartholo St. Eustati St. Mar
Total length of nesting sites (km)	454.83	Cuba, Mexico, St. Bartholome, St. Eustatius, St. Martin, Venezuela	212	Mexico	n/a		425.5	Cuba, Mexico, St. Bartholome, St. Eustatius, St. Martin, Venezuela	266.3	Cuba, Mexico, Venezuela	64.5	St. Bartholo St. Eustati St. Mar Venezu
Nesting females / yr	90 - >1000	Cuba, Mexico, St. Eustatius	5000	Mexico	1700 (2009-2016)	French Guiana	175-4200	Cuba, French Guiana, Guadeloupe, Mexico, St. Eustatius, Venezuela	167	Cuba	100-250 (St. Eustatius, French Guiana)	Cuba Frenc Guiana, Bartholo St. Eustati St. Mar Venezu
Nests / female season (N)	2.51 (>1000)	Cuba, Guadeloupe, Mexico	2	Mexico	1,3 (2012)	French Guiana	2.425 (>5000)	Cuba, French Guiana, Guadeloupe, Mexico	<5	Cuba, Mexico	1 to 8 (French Guiana, Guadeloupe)	Cuba Frenc Guian Guadelo St. Bartholo St. Mar Venezu
Female remigration interval (yrs) (N)	2.56 (>1000)	Cuba, Guadeloupe, Mexico	n/a		n/a		2.428	Cuba, Guadeloupe, Mexico, St. Eustatius, St. Martin, Venezuela	3.37 (>1000)	Cuba, Mexico	2 to 5 (Guadeloupe)	Cuba Guadelo St. Bartholo

												St. Mar Venezu
Sex ratio: Hatchlings (F / Tot) (N)	n/a	Cuba	n/a		n/a		0.8-1.0 (50)	Cuba	0.33(3)-0.90(4)	Cuba	n/a	Cuba, Bartholo St. Mar Venezu
Sex ratio: Immaturess (F / Tot) (N)	0.39 (102)	Mexico	n/a		n/a		n/a		n/a	Cuba	n/a	Cuba, Bartholo St. Mar Venezu
Sex ratio: Adults (F / Tot) (N)	0.76-0.84 (>5000)	Cuba	n/a		n/a		n/a		n/a	Cuba	n/a	Cuba, Franc Atlantic, Bartholo St. Mar Venezu
Min adult size, CCL or SCL (cm)	64 CCL (Cuba), 181.45 CCL (77, Guadeloupe)	Cuba, Mexico, Guadeloupe, St. Eustatius	63.5 CCL	Mexico	n/a		92.5- 95.64 ± 0.43 CCL (>1000)	Cuba, Guadeloupe, Martinique, Mexico, St. Eustatius, Venezuela	80-85 CCL	Cuba	110-145 (St. Eustatius, France, Guadeloupe, Martinique)	Cuba, Franc Guadelo Martiniqu St. Bartholo St. Eustati St. Mar
Age at maturity (yrs)	15-20	Mexico	14-25	Mexico	n/a		14-30 ys	Mexico, St. Eustatius	n/a	Cuba	n/a	Cuba, Bartholo St. Mar Venezu
Clutch size (n eggs) (N)	137.44 (>1000)(Mexico, Cuba, St. Eustatius, Guadeloupe) (148, Col)	Colombia, Cuba, Mexico, Guadeloupe, St. Eustatius	95	Mexico	n/a		121.395 (>500)	Cuba, French Guiana, Guadeloupe, Mexico, St. Eustatius, Venezuela	119.6 (73, colombia); 93- 113.69	Colombia, Cuba, Mexico	80 (>300) (St. Eustatius, Guadeloupe, Martinique)	Cuba, Guadelo Martiniqu St. Bartholo St. Eustati St. Mar Venezu

Emergence success (hatchlings/egg) (N)	95-142.5 (>1000)	Colombia, Cuba, Guadeloupe, Mexico, St. Eustatius	0.57 (10560)	Mexico	n/a		0.75-0.88 (>15000)	Cuba, Guadeloupe, Mexico, St. Eustatius	50(73, colombia); 83.065 (0.72-0.82 (612) Cuba)	Colombia, Cuba, Mexico	12% (>1500) (St. Eustatius)	Cuba, Bartholomeo St. Eustatius, St. Martin, Venezuela
Nesting success (Nests/ Tot emergence tracks) (N)	0.46 (>6500)	Cuba, St. Eustatius	n/a		n/a		0.60-0.70 (17ys)	Cuba, St. Eustatius	0.67 (18 yr)	Cuba	17% (180) (St. Eustatius)	Cuba, Bartholomeo St. Eustatius, St. Martin, Venezuela
<b>Trends</b>												
Recent trends (last 20 yrs) at nesting sites (range of years)	Slightly Down (MEX, 1995-2010); Up (CUB, 1998-2016); Slightly Down (Cuba, 2010-2018)	Cuba, Mexico	Up (1995-2015)	Mexico	(i) stable		Up ≈19% (2010-2018)	Cuba, Mexico, Venezuela	Up ≈6.7% (2000-2016) (Cuba: Up (r=0.48; 1998-2016); 3 up 2 down (2010-2018))	Cuba, Mexico	Up	Cuba, Bartholomeo St. Martin, Venezuela
Recent trends (last 20 yrs) at foraging grounds (range of years)	n/a		n/a		n/a		n/a		n/a	Cuba	n/a	Cuba, French Guiana, Atlantic, Bartholomeo St. Martin, Venezuela
Oldest documented abundance: nests/yr (range of years)	4-300 (1983-1998)	Cuba, Mexico, St. Eustatius, Venezuela			(iii) 3257	French Guiana	20 (CUB, 1982); 200 (VEN, 1979)	Cuba, Venezuela	8 (1983); 58 (1998)	Cuba	10 (2002) (St. Eustatius, French Guiana)	Cuba, French Guiana, Bartholomeo St. Eustatius, St. Martin, Venezuela
<b>Published studies</b>												

Growth rates	Y	Cuba, Mexico	Y	Mexico	N	Venezuela	Y	Cuba, Martinique, Mexico, Venezuela	N	Cuba, Mexico, Venezuela	N	Cuba, St. Bartholome, St. Eustatius, St. Martin, Venezuela
Genetics	Y	Colombia, Cuba, Guadeloupe, Mexico	N	Mexico	N	Venezuela	Y	Colombia, Cuba, French Guiana, Guadeloupe, Martinique, Mexico, Venezuela	Y	Colombia, Cuba, Mexico, Venezuela	Y (France Atlantic)	France, Atlantic, Guadeloupe, Martinique, St. Eustatius
Stocks defined by genetic markers	Y	Colombia, Cuba, Guadeloupe, Mexico	N	Mexico	N	Venezuela	Y	Colombia, Cuba, Guadeloupe, Martinique, Mexico, Venezuela,	Y	Colombia, Cuba	Y (France Atlantic)	France, Atlantic, Guadeloupe, Martinique, St. Eustatius
Remote tracking (satellite or other)	Y	Colombia, Cuba, Guadeloupe, Mexico, St. Bartholome	Y	Mexico	N	French Guiana, Venezuela	Y	Cuba, French Guiana, Guadeloupe, Martinique, Mexico, St. Eustatius, Venezuela	Y	Cuba, Mexico, Venezuela	N	Cuba, France, Guadeloupe, Martinique, St. Bartholome, St. Eustatius, St. Martin, Venezuela
Survival rates	N		N	Mexico	N	Venezuela	Y	Venezuela	N	Cuba, Mexico, Venezuela	N	Cuba, St. Bartholome, St. Eustatius, St. Martin, Venezuela
Population dynamics	Y	Cuba, Guadeloupe, Mexico	N	Mexico	N	Venezuela	Y	Cuba, Guadeloupe, Mexico, Venezuela	Y	Cuba, Mexico	N	Cuba, France, Atlantic, Guadeloupe, St. Bartholome, St. Eustatius

												St. Mar Venezu
Foraging ecology (diet or isotopes)	Y	Cuba, Mexico	Y	Mexico	N	Venezuela	Y	Cuba, Guadeloupe, Martinique, Mexico, Venezuela	N	Cuba, Mexico, Venezuela	N	Cuba Franc Atlantic, Bartholo St. Eustati St. Mar Venezu
Capture-Mark- Recapture	Y	Colombia, Cuba, Martinique, Mexico, Venezuela	Y	Mexico	N	Venezuela	Y	Colombia, Cuba, Martinique, Mexico, St. Eustatius, Venezuela	Y	Cuba, Mexico, Venezuela	Y (Venezuela)	St. Eustatius Venezue
<b>Threats</b>												
Bycatch: presence of small scale / artisanal fisheries?	Y (DLL; SN; DN; Turtle Nets; PLL; FP)	Colombia, Cuba, Mexico, St. Bartholome, St. Eustatius, St. Martin, Venezuela	Y (SN,ST)	Mexico	Y (SN,DN)	Venezuela	Y (PLL, DLL, SN,FP)	Colombia, Cuba, Mexico, St. Bartholome, St. Eustatius, St. Martin, Venezuela	Y (DLL; SN; DN; Turtle Nets)	Cuba, Mexico, Venezuela	Y (DLL; SN; DN; Turtle Nets)	Colomb Cuba Franc Atlanti Grenad Mexico, Bartholo St. Mar Venezu
Bycatch: presence of industrial fisheries?	Y (PLL, DLL, ST, MT, FP)	Cuba, Mexico	Y (ST)	Mexico	Y (ST)		Y (PLL, DLL, ST, MT, FP)	Cuba, Mexico, Venezuela	Y	Cuba	Y	Colombia Cuba, France Atlantic



Bycatch: quantified?	Y	Cuba, Guadeloupe, Martinique, Mexico	Y	Mexico	n/a		Y	Colombia, Cuba, Guadeloupe, Mexico	Y	Cuba, Mexico, Saint Pierre et Miquelon	Y	Cuba, Franco Atlantique Guadeloupe
Take. Intentional killing or exploitation of turtles	Y	Colombia, Cuba, Guadeloupe, Martinique, Mexico, St. Martin, Venezuela	Y	Mexico	N	Venezuela	Y	Colombia, Cuba, Grenada, Guadeloupe, Martinique, Mexico, St. Martin, Venezuela	Y	Colombia, Cuba, Grenada, Mexico, Venezuela	Y	Colombia, St. Martin, Venezuela
Take. Egg poaching	Y	Colombia, Guadeloupe, Mexico	Y	Mexico	N	Venezuela	Y	Guadeloupe, Martinique, Mexico	Y	Colombia, Mexico, Venezuela	Y	Colombia, St. Bartholome, St. Martin
Coastal Development. Nesting habitat degradation	Y	Colombia, Cuba, Guadeloupe, Martinique, Mexico, St. Bartholome, St. Eustatius, St. Martin	Y	Mexico	Y	Venezuela	Y	Colombia, Cuba, Guadeloupe, Mexico, St. Bartholome, St. Eustatius, St. Martin	Y	Colombia, Cuba, Mexico	Y	Colombia, Guadeloupe, Martinique, Mexico, Bartholome, St. Eustatius, St. Martin
Coastal Development. Photopollution	Y	Colombia, Cuba, Guadeloupe, Martinique, Mexico, St. Eustatius, St. Martin, Venezuela	Y	Mexico	Y	Venezuela	Y	Colombia, Cuba, Guadeloupe, Martinique, Mexico, St. Eustatius, St. Martin, Venezuela	Y	Colombia, Cuba, Mexico	Y	Colombia, Guadeloupe, Martinique, Mexico, Martin, Eustatius

Coastal Development. Boat strikes	Y	Colombia, Guadeloupe, Mexico, St. Bartholome, St. Eustatius, St. Martin	Y	Mexico	N		Y	Colombia, Guadeloupe, Martinique, Mexico, St. Bartholome, St. Eustatius, St. Martin	Y		Y	Colombia, Mexico, Venezuela	Colombia, France, Atlantic, Guadeloupe, Mexico, Bartholome, St. Martin, Venezuela
Egg predation	Y	Colombia, Cuba, Guadeloupe, Martinique, Mexico, St. Martin	Y	Mexico	Y		Y	Cuba, Guadeloupe, Martinique, Mexico, St. Martin	Y		Y	Cuba, Mexico	Guadeloupe, Martinique, St. Martin
Pollution (debris, chemical)	Y	Colombia, Guadeloupe, Martinique, Mexico, St. Eustatius, Venezuela	Y	Mexico	Y	Venezuela	Y	Colombia, Cuba, Guadeloupe, Martinique, Mexico, St. Eustatius, Venezuela	Y		Y	Colombia, Mexico, Venezuela	Colombia, France, Guadeloupe, Martinique, Mexico, Eustatius, Venezuela
Pathogens	Y	Mexico, St. Eustatius, Venezuela	n/a		n/a		Y	Cuba, Guadeloupe, Martinique, Mexico, St. Eustatius, Venezuela	Y	Mexico	Y		St. Eustatius
Climate change	Y	Cuba, Mexico, St. Bartholome, St. Eustatius, St. Martin	Y	Mexico	n/a		Y	Cuba, Mexico, St. Bartholome, St. Eustatius, St. Martin, Venezuela	Y		Y	Cuba, Mexico	Colombia, Mexico, Eustatius

Foraging habitat degradation	Y	Colombia, Cuba, Guadeloupe, St. Bartholome, St. Eustatius, St. Martin, Venezuela	n/a		N	Venezuela	Y	Colombia, Cuba, Guadeloupe, Martinique, Mexico, St. Bartholome, St. Eustatius, St. Martin, Venezuela	Y	Colombia, Venezuela	Y	France, Atlantic, Bartholome, St. Martin, Venezuela
Other	Y (see text)	Colombia, Cuba, St. Bartholome, St. Martin	n/a		n/a		Y (see text)	Cuba, St. Bartholome, St. Martin, Venezuela	Y (see text)	Cuba	Y (see text)	St. Bartholome, St. Martin
<b>Long-term projects (&gt;5yrs)</b>												
Monitoring at nesting sites (period: range of years)	Y (1988-ongoing)	Colombia, Cuba, Mexico, St. Bartholome, St. Eustatius, St. Martin	Y (1977-ongoing)	Mexico	Y (1999-ongoing)		Y (1983-ongoing Cuba; 1979-ongoing Venezuela); 1988-on going Mexico, St. Eustatius)	Cuba, Mexico, St. Bartholome, St. Eustatius, St. Martin, Venezuela	Y (1983-ongoing Cuba) (1988- ongoing Mexico)	Cuba, Mexico	Y (1999-ongoing St. Eustatius)	Colombia, St. Bartholome, St. Eustatius, St. Martin
Number of index nesting sites	51	Colombia, Cuba, Martinique, Mexico, St. Bartholome, St. Eustatius, St. Martin	6	Mexico	>=3		56	Cuba, Martinique, Mexico, St. Bartholome, St. Eustatius, St. Martin, Venezuela	22 (Mexico, Cuba)	Cuba, Mexico	9	Colombia, Martinique, St. Bartholome, St. Eustatius, St. Martin

Monitoring at foraging sites (period: range of years)	Y (1992-2006 Cuba; 2000-ongoing Venezuela; 1992- 2017 Mexico, Guatemala, St. Eustatius)	Colombia, Cuba, Mexico, St. Eustatius, Venezuela	N	Mexico	N	Venezuela	Y (2001- on going)	Colombia, Cuba, Mexico, St. Eustatius	Y (2000-ongoing Venezuela; 1988-ongoing Mexico)	Mexico, Venezuela	Y(2000-ongoing Venezuela)	French Atlantic, Venezuela
<b>Conservation</b>												
Protection under national law	Y	Colombia, Cuba, Guadeloupe, Martinique, Mexico, St. Bartholome, St. Eustatius, St. Martin, Venezuela	Y	Mexico	Y	Venezuela	Y	Colombia, Cuba, Mexico, St. Bartholome, St. Eustatius, St. Martin, Venezuela	Y	Colombia, Cuba, Mexico, Venezuela	Y	Colombia, Cuba, Mexico, St. Bartholome, St. Eustatius, St. Martin, Venezuela
Number of protected nesting sites (habitat preservation) (% nests)	>80%	Cuba, Mexico, St. Bartholome, St. Eustatius, St. Martin, Venezuela	50	Mexico	15%		80-100%; 16(85.5%) (St. Eustatius)	Cuba, St. Bartholome, St. Eustatius, St. Martin, Venezuela	80-100%	Cuba, Venezuela	7, 1 (St. Eus.100%); 1 (Venezuela)	St. Bartholome, St. Eustatius, St. Martin, Venezuela
Number of Marine Areas with mitigation of threats	14	Cuba, St. Bartholome, St. Eustatius, St. Martin, Venezuela	0	Mexico	0		13	Cuba, St. Bartholome, St. Eustatius, St. Martin	12	Cuba, Venezuela	5	St. Bartholome, St. Eustatius, St. Martin, Venezuela

N of long-term conservation projects (period: range of years)	7 (1988-ongoing)	Cuba, Mexico, St. Bartholome, St. Eustatius, St. Martin, Venezuela	1 (1975-2011)	Mexico	1 (2009-2023)	Venezuela	>10 (1990-ongoing Mexico, St. Eustatius); 9 (1983-ongoing Cuba; 1979-ongoing Venezuela)	Cuba, Mexico, St. Bartholome, St. Eustatius, St. Martin, Venezuela	5 (1983-ongoing); 10 (1990-ongoing Mexico)	Cuba, Mexico, Venezuela	>6 (1988-ongoing France Atlantic); St. Eustatius, Venezuela)	France Atlantic, Grenada, Bartholome, St. Eustatius, St. Martin, Venezuela
In-situ nest protection (egg cages)	Y	Mexico	Y	Mexico	N		Y	Mexico	Y	Mexico	n/a; N(St. Eustatius)	Cuba, France Atlantic, Mexico, Bartholome, St. Eustatius, St. Martin, Venezuela
Hatcheries	Y	Cuba, Mexico	Y	Mexico	N		Y	Cuba, Mexico	Y	Cuba, Mexico	Y (Colombia); n/a; N(St. Eustatius)	Colombia, Cuba, France Atlantic, Bartholome, St. Eustatius, St. Martin, Venezuela
Head-starting	Y	Colombia, Cuba	N	Mexico	?		Y	Colombia, Mexico	Y Colombia), N	Colombia, Cuba, Mexico, Venezuela	N	France Atlantic, Bartholome, St. Eustatius, St. Martin, Venezuela
By-catch: fishing gear modifications (eg, TED, circle hooks)	Y (Mexico)	Cuba, Mexico, St. Bartholome, St. Martin, Venezuela	Y	Mexico	Y	Venezuela	Y	Colombia, Mexico	Y	Colombia, Mexico	Y	Mexico
By-catch: onboard best practices	Y	Cuba, Mexico	Y	Mexico	Y	Venezuela	Y	Cuba, Mexico, Venezuela	Y	Cuba, Venezuela	Y (ongoing France Atlantic)	France Atlantic,

												Eustati Venezu
By-catch: spatio-temporal closures/reduction	Y	Cuba, Mexico	Y	Mexico	N	Venezuela	Y	Cuba, Mexico	Y	Cuba, Mexico	Y	Mexico
Other	Y (see text)	Cuba, St. Bartholome, St. Martin, Venezuela	N	Mexico	N		Y (see text)	Cuba, St. Bartholome, St. Martin, Venezuela	Y (see text)	Cuba	Y (see text)	St. Bartholome, St. Martin

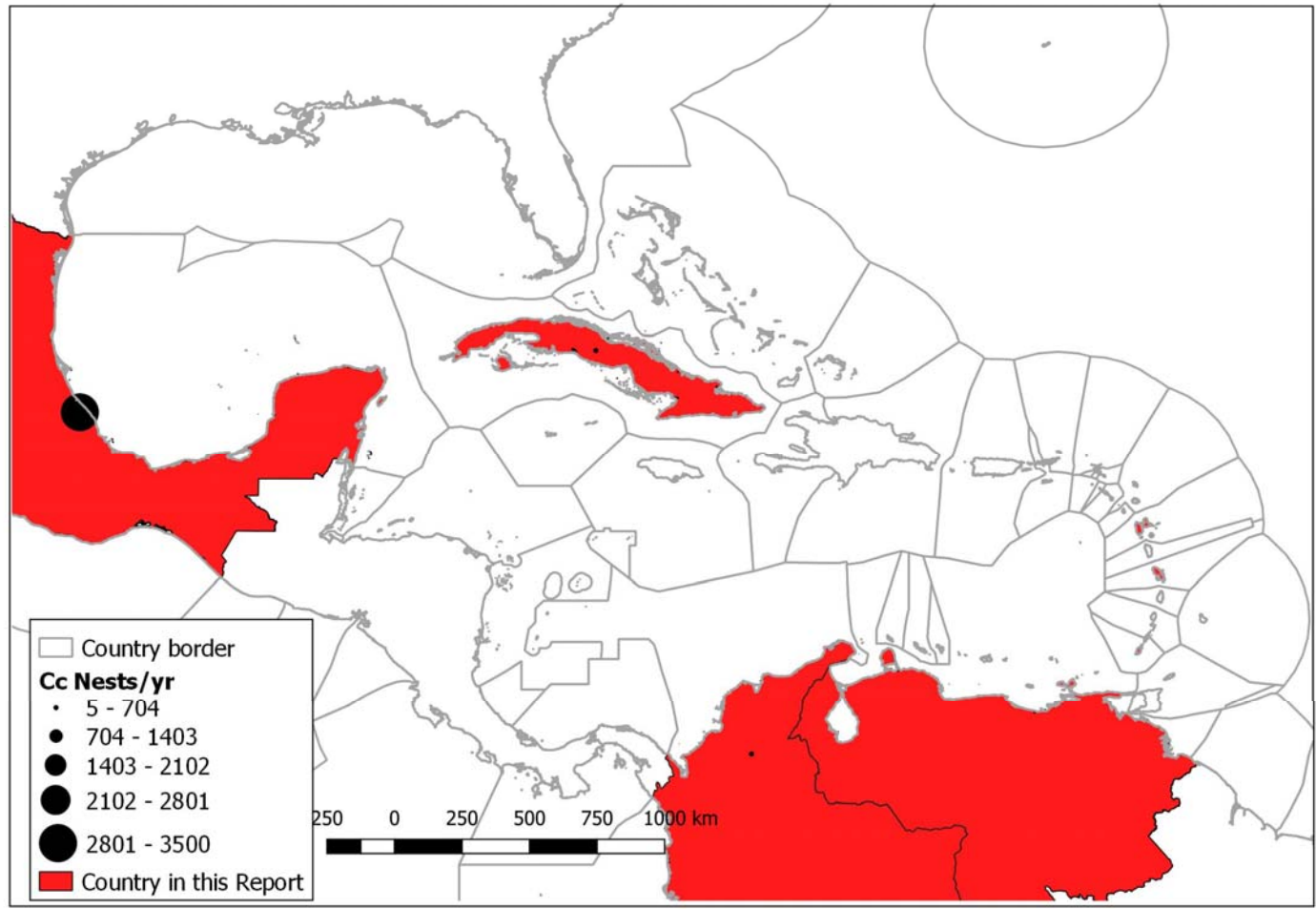


Figure 1.1. Categorized spatial distribution of the sum of reported average nests per year for loggerhead turtles (*Caretta caretta*) in each participant country in the Regional Management Unit Northwest Atlantic.

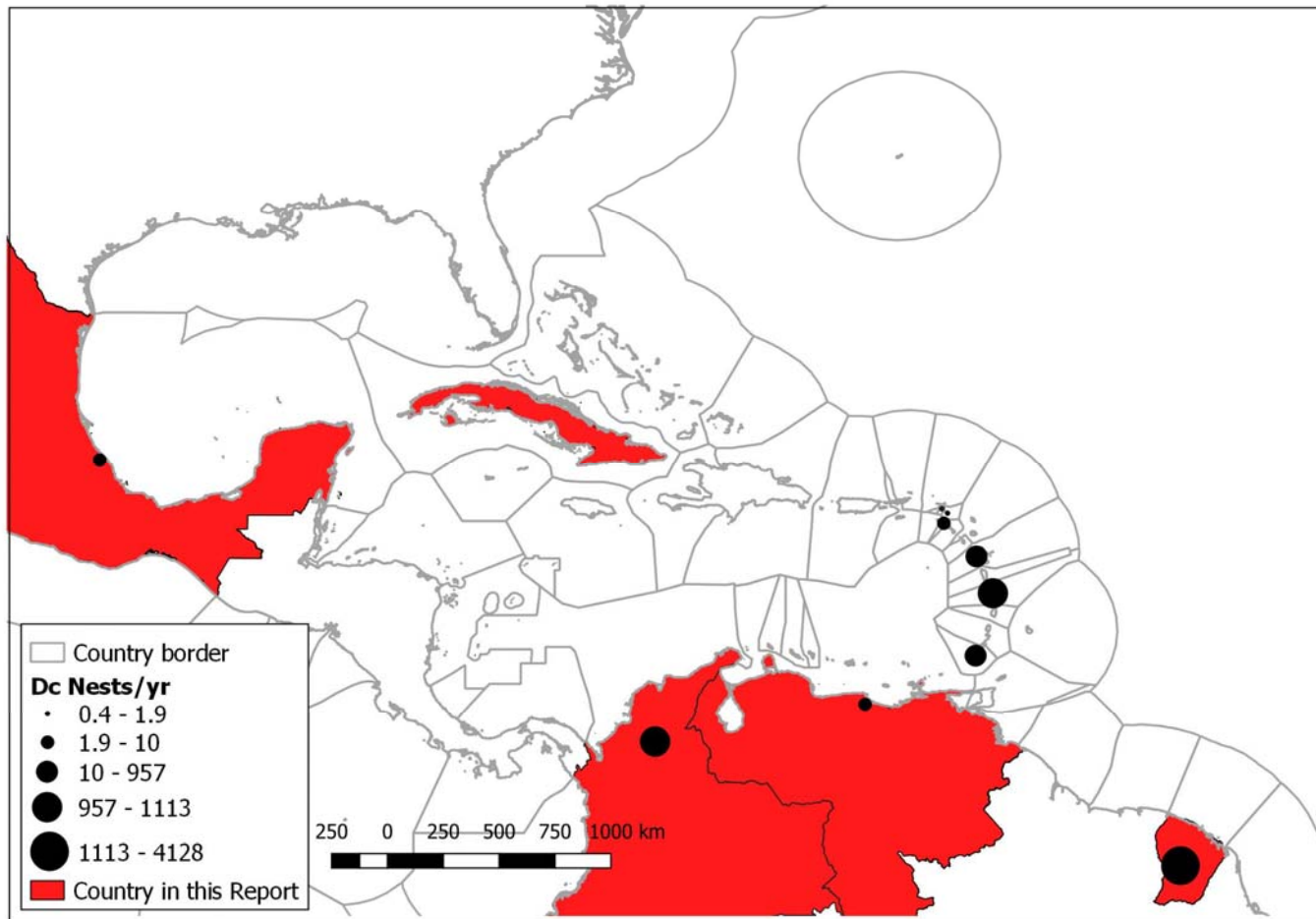


Figure 1.2. Categorized spatial distribution of the sum of reported average nests per year for leatherback turtles (*Dermochelys coriacea*) in each participant country in the Regional Management Unit Northwest Atlantic.



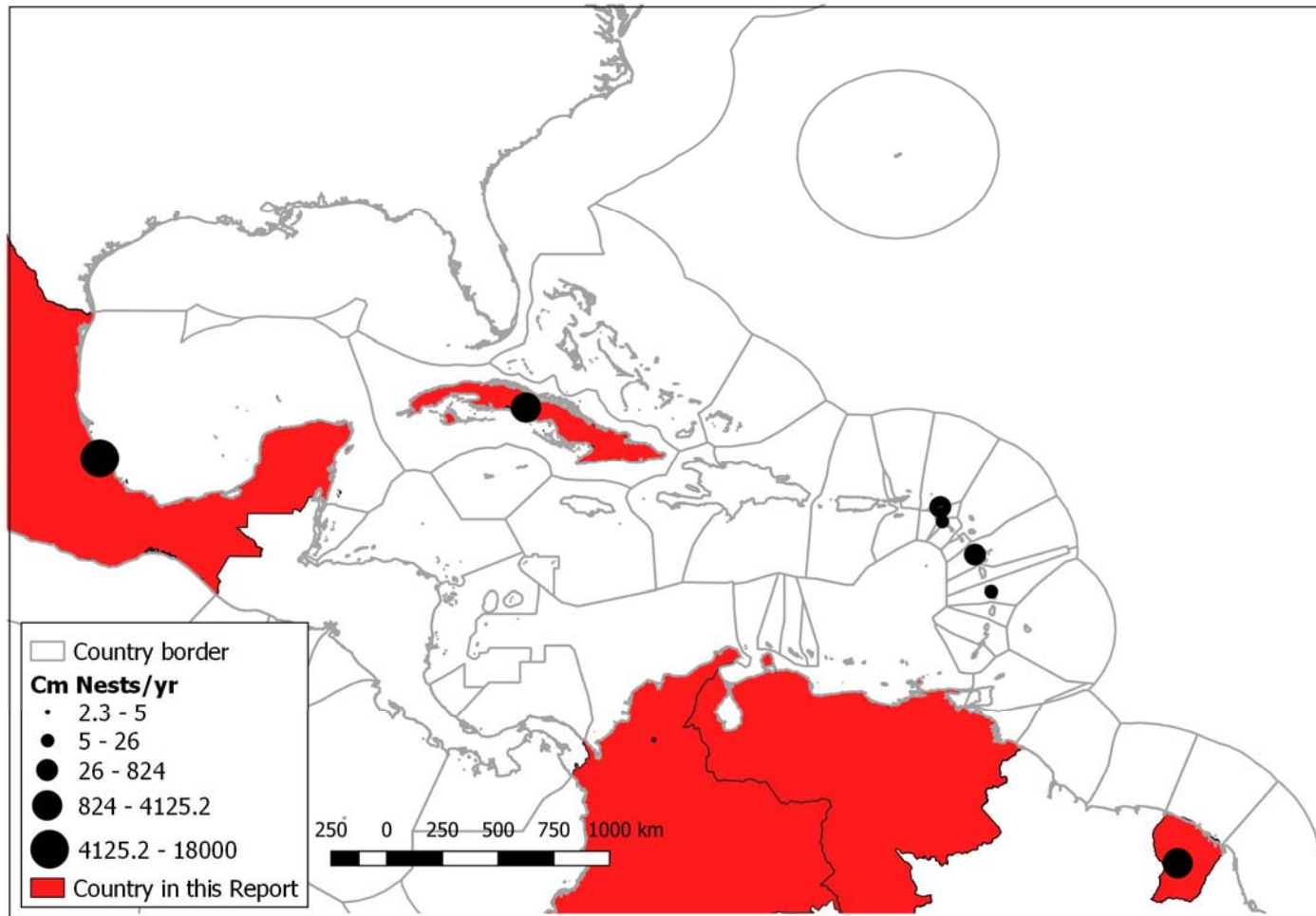


Figure 1.3. Categorized spatial distribution of the sum of reported average nests per year for green turtles (*Chelonia mydas*) in each participant country in the Regional Management Unit Northwest Atlantic.

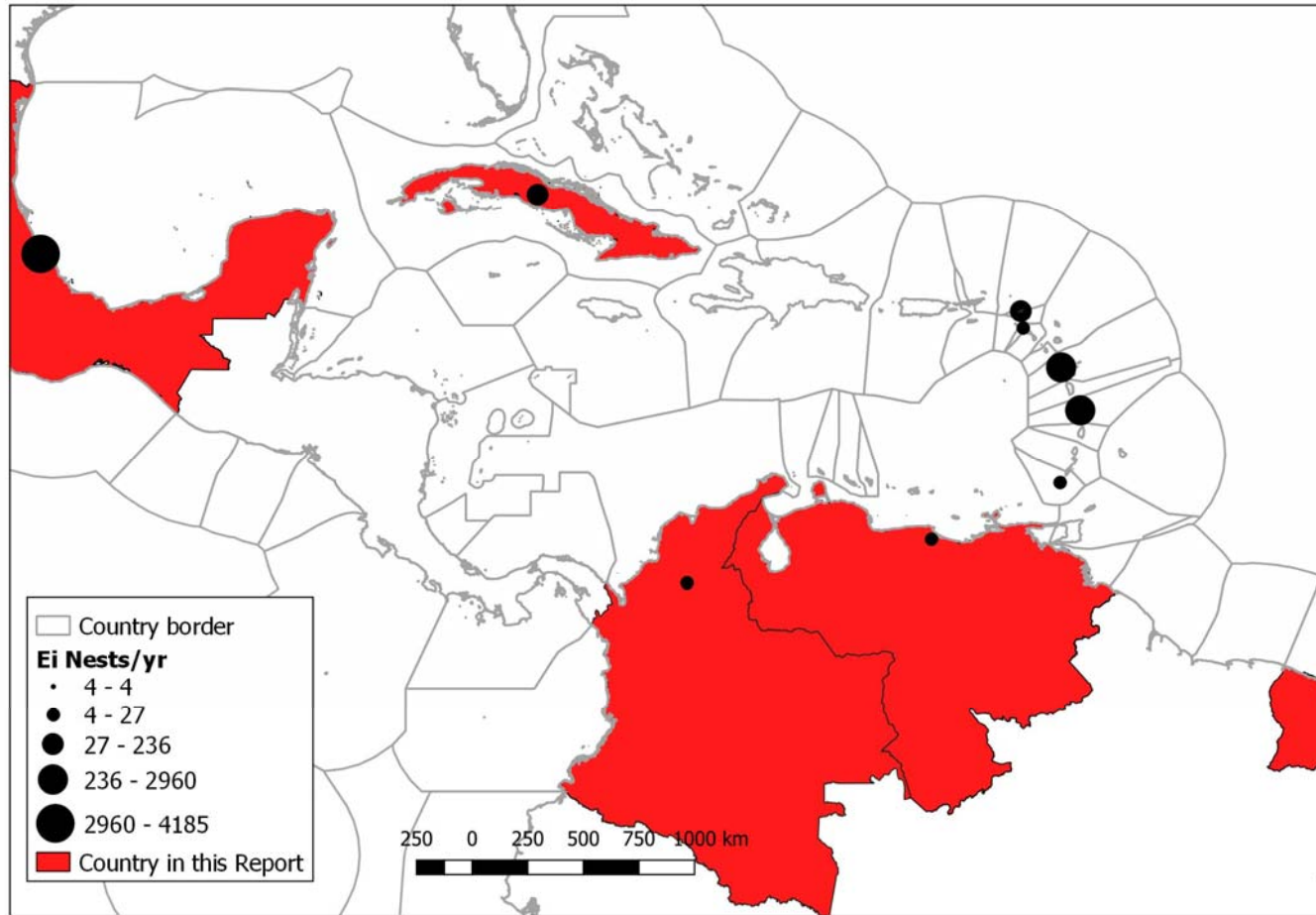


Figure 1.4. Categorized spatial distribution of the sum of reported average nests per year for hawksbill turtles (*Eretmochelys imbricata*) in each participant country in the Regional Management Unit Northwest Atlantic.

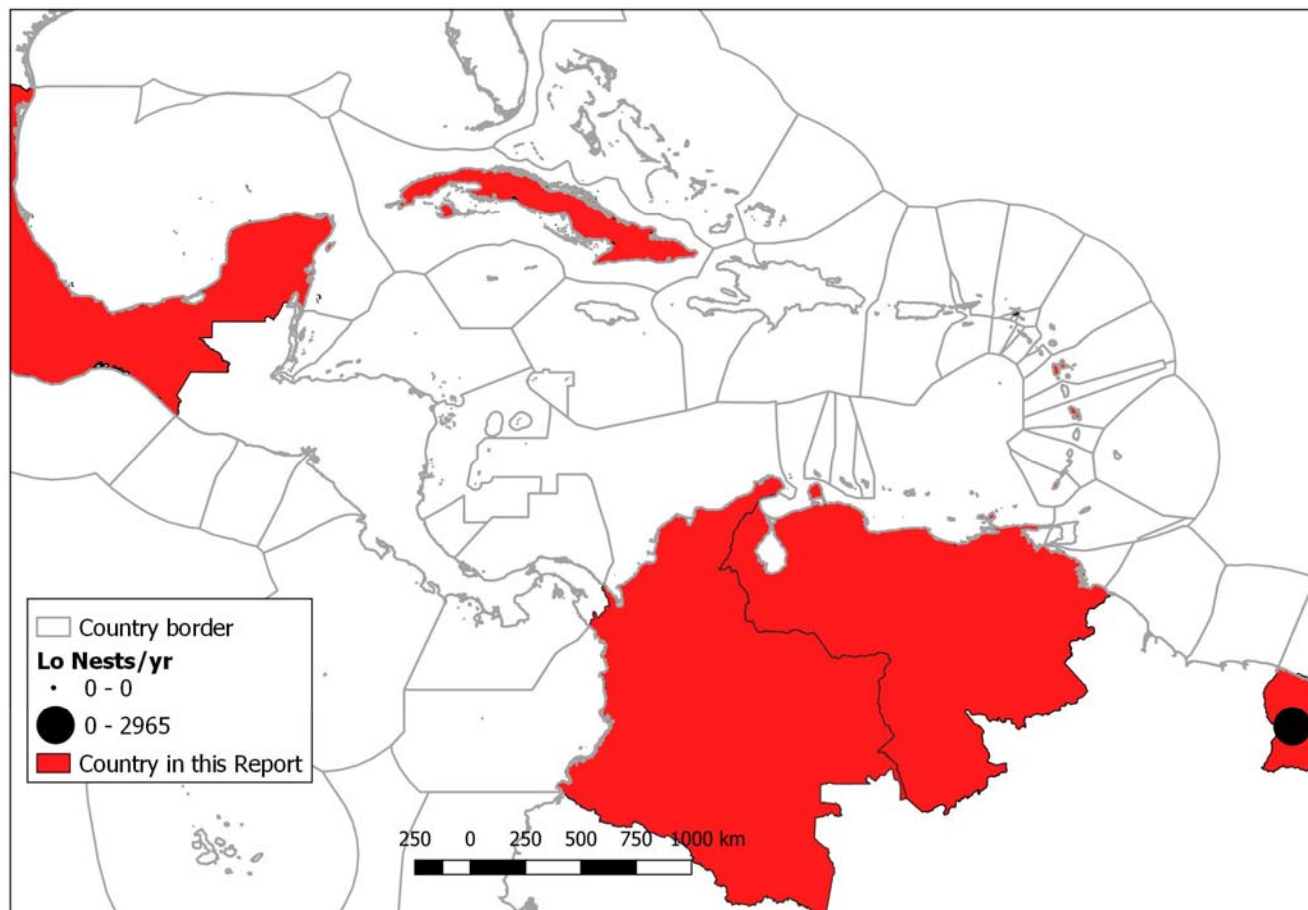


Figure 1.5. Categorized spatial distribution of the sum of reported average nests per year for olive ridley turtles (*Lepidochelys olivacea*) in each participant country in the Regional Management Unit Northwest Atlantic.

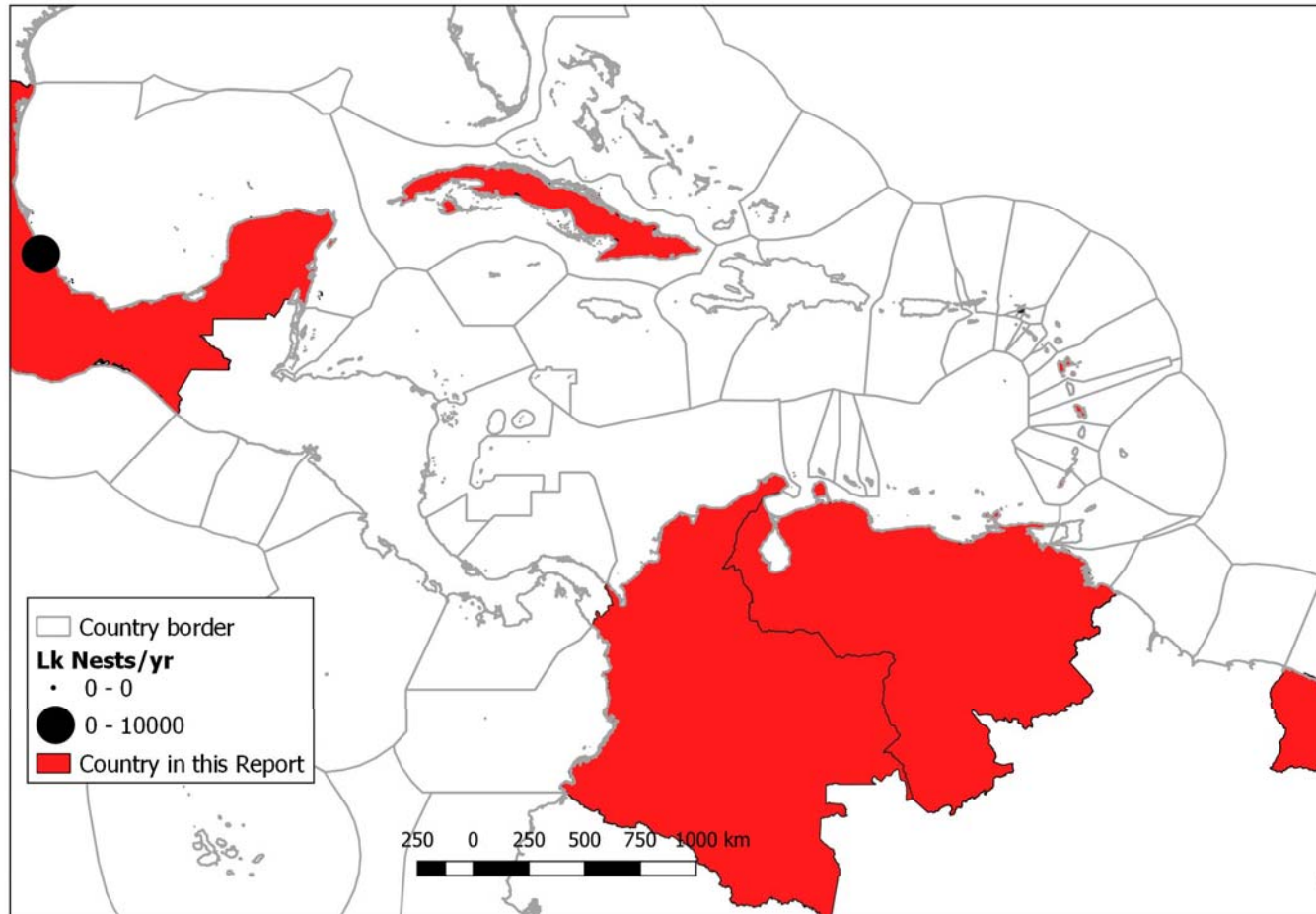


Figure 1.6. Categorized spatial distribution of the sum of reported average nests per year for Kem's Ridley turtles (*Lepidochelys kempii*) in each participant country in the Regional Management Unit Northwest Atlantic.

## Chapter 2: Colombia

Juan M. Rguez-Baron<sup>1,2</sup>, Diego F. Amorocho<sup>3</sup>, Luz Elvira Angarita Jiménez<sup>4</sup>, Lilian Barreto-Sánchez<sup>5</sup>, Carolina Becerra<sup>6</sup>, Dalila Caicedo<sup>6</sup>, Juan P. Caldas<sup>7</sup>, Aureliano Córdoba<sup>8</sup>, María C. Diazgranados<sup>7</sup>, Diego Duque<sup>4</sup>, Rebeca Franke-Ante<sup>4</sup>, Aminta Jáuregui<sup>9</sup>, Gustavo A. Lara<sup>10</sup>, Libardo Maldonado<sup>11</sup>, Héctor Martínez<sup>4</sup>, Luis Merizalde<sup>7</sup>, Vanessa Paredes<sup>12</sup>, Carlos Pinzón<sup>13</sup>, Tito Rodríguez<sup>4</sup>, Jhovany Rosado<sup>4</sup>, Patricia Saldaña<sup>4</sup>, Nestor Sánchez<sup>14</sup>, Fernando Trujillo<sup>6</sup>

<sup>1</sup>JUSTSEA Foundation, Carrera 13 No. 152-80, Torre 1, 406, Bogotá, Colombia

<sup>2</sup>Biology and Marine Biology Department, University of North Carolina Wilmington, 601 S. College Road, Wilmington NC, 28403, USA

<sup>3</sup>WWF Colombia, Carrera 35 No. 4A-25, Cali, Colombia

<sup>4</sup>Parques Nacionales Naturales de Colombia, Dirección Territorial Caribe, Calle 17 No. 4-06, Santa Marta, Colombia

<sup>5</sup>Fundación Conservación Ambiente Colombia, Bogotá, Colombia

<sup>6</sup>Fundación Omacha, Calle 84 No. 21-64, Bogotá, Colombia

<sup>7</sup>Conservación Internacional Colombia, Carrera 13 No. 71-41, Bogotá, Colombia

<sup>8</sup>Consejo Comunitario de Comunidades Negras de la Cuenca del Río Tolo y Zona Costera Sur COCOMASUR, Colombia

<sup>9</sup>Universidad Jorge Tadeo Lozano, Sede Santa Marta, Carrera 2 No. 11-68, El Rodadero, Santa Marta, Colombia

<sup>10</sup>Dirección de Asuntos Marinos, Costeros y Recursos Acuáticos, Ministerio de Ambiente y Desarrollo Sostenible, Calle 37 No. 8-40, Bogotá, Colombia

<sup>11</sup>ACEPEX, Tasajera, Pueblo Nuevo, Magdalena, Colombia

<sup>12</sup>Corporación para el Desarrollo Sostenible del Urabá CORPOURABA, Calle 92 No. 98-39, Apartadó, Antioquia, Colombia

<sup>13</sup>Fundación Tortugas Marinas de Santa Marta, Santa Marta, Magdalena, Colombia

<sup>14</sup>Asociación para la Conservación Ambiental y el Ecoturismo ACAETUR, Colombia

### General remarks

The distribution, abundance, and conservation status of sea turtles in the Colombian Caribbean have been studied for more than five decades. Historical estimations from field sightings and interviews with fishermen provided information about the high number of nesting females of four species (*Caretta caretta*, *Chelonia mydas*, *Eretmochelys imbricata*, and *Dermochelys coriacea*) in the 1960s [35]. More recently, characterizations of environmental and geomorphological factors have been made on beaches, establishing that at least 127 beaches are conducive for sea turtle nesting in the region. Also, assessments of oceanographic and taxonomic features in seagrasses beds and coral reefs have identified potential foraging areas along the coast [5]. However, the current low number of females and consequently effective nesting events on most beaches provide an idea of the critical conservation status of sea turtles in the Colombian Caribbean. There is an urgent need to strengthen data gathering protocols and monitoring programs. Thus, it is necessary to standardize methodologies for the evaluation of the population assemblies present in the feeding grounds and transit corridors of turtles.

## 2.1. Distribution, abundance, trends

### 2.1.1. Nesting sites

#### *Caretta caretta*

Loggerhead turtles are distributed throughout the Colombian Caribbean. Their nesting season runs from April to August, with a peak of nesting in June [21]. Historical reports indicate that this species was once the most abundant in the Colombian Caribbean [33]. The beaches of the Departamento of Magdalena (Mendihuaca, Guachaca, Buritaca, Don Diego and Quintana) between 11 ° 16 'N -73 ° 51' W and 11 ° 15 'N -73 ° 39' W, congregated approximately 200 nesting females a year in the 1960s [35]. Currently, based on information from a systematic monitoring program by the Turtle and Marine Mammal Conservation Program (ProCTMM) of the Jorge Tadeo Lozano University, we know that no more than five females arrive annually at each of these beaches (Table 2).

Another systematic monitoring area is Tayrona National Park. The Territorial Directorate of National Parks in the Caribbean is in charge of monitoring 11 beaches (Boca del Saco, El Medio, Cabo San Juan del Guía, Arrecifes, Cañaveral, Castilletes, La Gumarra, San Felipe, La Piscina, El Medio, and Playa Escondida). Loggerheads nest on eight of these beaches at very low density, despite the fact that the protected area was established in 1969 (Table 2). Another protected area where turtle nesting is monitored is Sierra Nevada de Santa Marta National Park. An average of nine nesting loggerheads annually have been recorded at Quintana Beach, however, we only have data from two years of monitoring.

The Guajira Peninsula is located in the northern part of the country and is populated by the Wayuu ethnic group. Since 2009, Conservation International Colombia, Cerrejón, Fondo Acción, and, the Regional Autonomous Corporation of la Guajira – CORPOGUAJIRA, have worked with the Wayuu people in a novel, community-based conservation project focused on sea turtle nesting monitoring and a bycatch assessment. Although that nesting density is low, this initiative is highly valuable given that it generates economic income mechanisms for the community, such as community ecotourism and the sale of artisanal products [16].

For the insular zone of the Colombian Caribbean, there is no updated information available, although there are records of up to 31 nesting events in the Serrana and Serranilla keys, which belong to the Archipiélago de San Andrés, Providencia, and Santa Catalina (SAPSC) [6]. Currently, annual expeditions led by the Comisión Colombiana del Océano are underway, where multiple NGOs collaborate to update information on the nesting and habitat use of sea turtles in the archipelago.

#### *Dermochelys coriacea*

Here, we present the most updated available leatherback nesting data for the Colombian Caribbean. This information comes from five departments (Magdalena, Chocó, Antioquia, Guajira and Córdoba). Historically, sporadic nesting has also been reported in the department of Bolívar. Leatherback nesting season in the area takes place from late February to early June, with nesting peaks in April and May [28].

In the department of Antioquia is located in the Sanctuary of Fauna Acandí, Playón, Playona (SFAPP). The Sanctuary was declared in 2013, largely because of the importance of the area for leatherback turtle nesting. SFAPP and adjacent beaches such as Capitancito and Playeta in Colombia, and Armila in Panama, are recognized as important for the regional conservation of the species, given the high density of nests per year [24]. The data on effective nests reported by Patino-Martinez et al. [24] for the 2006 and 2007 seasons were significantly larger than those collected by the National Parks in 2014. This may be caused by differences in the monitoring; however, at the regional level, the number of nests has declined by approximately 60% (-7.9% annually) in the Northwest Atlantic subpopulation [38].

Work by local community members to monitor of reproductive activities has been of special importance. Since 2000, a group of local researchers—currently called the Fundación Mama Basilia—has led monitoring and education activities. These efforts have been coordinated with the Consejo

Comunitario de Comunidades Negras de la Cuenca del Río Tolo y Zona Costera Sur – COCOMASUR, and more recently with the National Natural Parks.

An additional example of communities engaged in sea turtle conservation in the region is the Asociación para la Conservación Ambiental y el Ecoturismo – ACAETUR. This local association conducts a holistic conservation program with the support of the Corporación para el Desarrollo Sostenible del Urabá –CORPOURABA, and the Fundación Conservación Ambiente Colombia. This community organization monitors Bobalito beach, another index nesting beach for leatherbacks in the country (Table 2).

This report also includes information generated by the National Natural Parks on the sporadic nesting of leatherback on 12 beaches in the northern and central Colombian Caribbean (Table 2).

#### *Chelonia mydas*

The nesting density of green turtles is the lowest in the Colombian Caribbean. Their nesting season occurs between July and November [22]. Although green turtle nests were reported on multiple beaches in seven departments a few decades ago (Antioquia, San Andres Archipelago, Providencia and Santa Catalina, Atlántico, Bolívar, Córdoba, La Guajira and Sucre), the present report only contains quantitative information on a few nests in the departments of Antioquia, La Guajira, and Magdalena (Table 2). We do not present data from Tayrona National Park; however, between 2001 and 2002 there was an average of 16 nests in the park [19].

#### *Eretmochelys imbricata*

The hawksbill sea turtle is distributed throughout the Colombian Caribbean and nests at low densities on many beaches. Its nesting activities have been reported in multiple beaches in the departments of La Guajira, Magdalena, Bolívar, Sucre, Córdoba, Antioquia, Chocó, and the Archipiélago de San Andres Providencia and Santa Catalina [3]. Its nesting season runs from April to November, with two peaks in May and September [3].

The Caribbean islands of Colombia are frequent hawksbill nesting areas. When comparing the data in this report with the information in the literature, we found a significant decrease of nesting females and, consequently, nesting events in these insular areas [6, 9]. Both, in SAPSC and the San Bernardo and Rosario archipelagos, Environmental authorities have led the monitoring processes.

**Table 2.1. Main biology and conservation aspects of sea Regional Management Units (RMU) occurring in Colombian Caribbean.**

Topic	<i>Eretmochelys imbricata</i> Northwest Atlantic	Ref#	<i>Caretta caretta</i> Northwest Atlantic	Ref#	<i>Dermochelys coriacea</i> Northwest Atlantic	Ref#	<i>Chelonia mydas</i> Northwest Atlantic	Ref#
<b>Occurrence</b>								
Nesting sites	Y	1,2,3,5,6,8,9,17,19,20	Y	1,2,4,5,6,8,16,17,19,20	Y	1,2,4,5,6,8,17,19,20,24	Y	1,2,4,5,6,8,16,17,19
Pelagic foraging grounds	Y	29	Y	29, 34	Y	29	Y	29
Benthic foraging grounds	JA	5,6,8,9,17,30	JA	5,6,17	N	n/a	JA	5,6,8,9,16,17,30
<b>Key biological data</b>								
Nests/yr: recent average (range of years)	Table 2		Table 2		Table 2		Table 2	
Nests/yr: recent order of magnitude	Table 2		Table 2		Table 2		Table 2	
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	1	PS	n/a	n/a	1	24, PS	n/a	n/a
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	Table 2		Table 2		Table 2		Table 2	
Nests/yr at "major" sites: recent average (range of years)	Table 2		Table 2		Table 2		Table 2	
Nests/yr at "minor" sites: recent average (range of years)	Table 2		Table 2		Table 2		Table 2	
Total length of nesting sites (km)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Nesting females / yr	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
Female remigration interval (yrs) (N)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Sex ratio: Hatchlings (F / Tot) (N)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Sex ratio: Immatures (F / Tot) (N)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Sex ratio: Adults (F / Tot) (N)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Min adult size, CCL or SCL (cm)	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
Clutch size (n eggs) (N)	138 (148)	9	119.6 (73)	16	n/a	n/a	n/a	n/a
Emergence success (hatchlings/egg) (N)	0.6 (148)	9	50 (73)	16	n/a	n/a	n/a	n/a



Nesting success (Nests/ Tot emergence tracks) (N)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>Trends</b>								
Recent trends (last 20 yrs) at nesting sites (range of years)	Table 2		Table 2		Table 2		Table 2	
Recent trends (last 20 yrs) at foraging grounds (range of years)	(1999-2017)	9, see texts	(2003-2016)	16, see text				
Oldest documented abundance: nests/yr (range of years)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>Published studies</b>								
Growth rates								
Genetics	Y	7,13,31	Y	10,11,12,15	n/a	n/a	Y	32
Stocks defined by genetic markers	Y	31	Y	10,12			Y	32
Remote tracking (satellite or other)	Y	23						
Survival rates								
Population dynamics								
Foraging ecology (diet or isotopes)								
Capture-Mark-Recapture	Y	9,30					Y	9,30
<b>Threats</b>								
Bycatch: presence of small scale / artisanal fisheries?	SN	6,30			SN	28	SN,FP,PLL	6,16,30
Bycatch: presence of industrial fisheries?	n/a	n/a	n/a	n/a	ST, PT, PLL	28	n/a	n/a
Bycatch: quantified?	n/a	n/a	n/a	n/a	n/a	n/a	Y	16
Take. Intentional killing or exploitation of turtles	Y	6	Y	6	Y	28	Y	6
Take. Egg poaching	Y	9	Y	6	Y	28		

Coastal Development. Nesting habitat degradation	Y	6,9,20	Y	6,20	Y	20,28	Y	6
Coastal Development. Photopollution	Y	6	Y	6	Y	20	Y	6
Coastal Development. Boat strikes	Y	6	Y	6	Y	20	Y	6
Egg predation								
Pollution (debris, chemical)	Y	6,30	Y	6	Y	28	Y	6,30
Pathogens								
Climate change	n/a	n/a	n/a	n/a	Y	25	n/a	n/a
Foraging habitat degradation	Y	6	Y	6	n/a	n/a	Y	6,9
Other	Y	see text						
<b>Long-term projects</b>								
Monitoring at nesting sites	Y	9			Y	24		
Number of index nesting sites	1	PS	n/a	n/a	Y	24, PS	n/a	n/a
Monitoring at foraging sites	Y	9					Y	9
<b>Conservation</b>								
Protection under national law	Y	18,27	Y	18,27	Y	18,27	Y	18,27
Number of protected nesting sites (habitat preservation)		6,9		6		28		6
Number of Marine Areas with mitigation of threats		6,9		6		28		6
Long-term conservation projects (number)		9, see text				24, see text		9, see text
In-situ nest protection (eg cages)								
Hatcheries					Y	26		
Head-starting	Y	see text	Y	see text	n/a	n/a	Y	see text
By-catch: fishing gear modifications (eg, TED, circle hooks)			Y	4			Y	14
By-catch: onboard best practices								
By-catch: spatio-temporal closures/reduction								
Other								

**Table 2.2. Sea turtle nesting beaches in the Colombian Caribbean. \*There is not an specific number of nests corresponding each beach of Santuario de Fauna Acandí, Playón, Playona.**

RMU / Nesting beach name	Index site	Nests/yr: recent average (range of years)	Western limit		Eastern limit		Central point		Length (km)	% Monitored	Reference #	Monitoring Level (1-2)	Monitoring Protocol (A-F)
			Long	Lat	Long	Lat	Long	Lat					
<b>EI-NW-ATL</b>													
Mendihuaca	N	3 (2018)	n/a	n/a	n/a	n/a	-73.55519	11.190577	7	n/a	PS	1	B
La Gumarra	N	1 (2012)	-73.572	11.192	-73.564	11.1954	-73.563552	11.184996	0.603	n/a	PS	1	B
Boca del Saco	N	0.6 (2007-2013)	-73.5844	11.2015	-73.583	11.2003	-73.195582	11.195582	0.671	n/a	PS	1	B
El Medio	N	1 (2012)	-73.5826	11.2001	-73.582	11.2002	-73.589	11.195078	0.308	n/a	PS	1	B
Cabo San Juan del Guia	N	2 (2013)	-73.5795	11.19796	-73.578	11.19705	-73.575178	11.194283	0.289	n/a	PS	1	B
Arrecifes	N	1.2 (2006-2013)	-73.572	11.19199	-73.564	11.1954	-73.56588	11.185748	1.1	n/a	PS	1	B
Cañaveral	N	1.2 (2007-2011)	n/a	n/a	n/a	n/a	-73.55435	11.183295	1	n/a	PS	1	B
La Piscina	N	1 (2013)	n/a	n/a	n/a	n/a	-73.57362	11.192779	0.15	n/a	PS	1	B
Castillete	N	1 (2009)	n/a	n/a	n/a	n/a	-73.5406	11.2100	1.1	n/a	PS	1	B
Playa Escondida	N	1 (2008-2009)	n/a	n/a	n/a	n/a	-73.5524	11.182723	0.1	n/a	PS	1	B
Baru	N	1 (2007-2009)	n/a	n/a	n/a	n/a	-75.39909	10.10154	4.3	n/a	PS	1	B
Playa Blanca	N	7 (2007-2008)	n/a	n/a	n/a	n/a	-75.36447	10.13512	n/a	n/a	PS	1	B
Isla Rosario	N	4 (2008-2010)	n/a	n/a	n/a	n/a	-75.44407	10.14086	1.6	n/a	1, 9	1	B
Punta Gigante	N	3 (2009)	n/a	n/a	n/a	n/a	-75.44801	10.14525	0.1	n/a	1, 9	1	B
Isla Tesoro	N	6.4 (2007-2010)	n/a	n/a	n/a	n/a	-75.44182	10.14043	n/a	n/a	1	1	B
Playa Palitos	N	3 (2010)	n/a	n/a	n/a	n/a	-75.36481	10.15331	0.2	n/a	1, 9	1	B
Isla Fuerte	N	3 (2010)	n/a	n/a	n/a	n/a	-76.11208	9.23213	n/a	n/a	PS	1	B
Playa Salina	N	3 (2010)	n/a	n/a	n/a	n/a	-75.36401	9.53172	n/a	n/a	PS	1	B
Playa Chichiman	N	1 (2010)	n/a	n/a	n/a	n/a	-75.37004	9.50339	n/a	n/a	PS	1	B
<b>Santuario de Fauna Acandí, Playon, Playona*</b>	Y	14 (2014)	n/a	n/a	n/a	n/a	-77.26666	8.53549	n/a	n/a	PS	1	B
Atazcosa	N	1 (2007)	n/a	n/a	n/a	n/a	-74.29394	10.58537	n/a	n/a	PS	1	B

Bobalito	Y	61.3 (2012-2017)	n/a	n/a	n/a	n/a	-76.56524	8.33241	13.5	84	PS	1	B
Punta los Guamachitos	N	1 (2010)	n/a	n/a	n/a	n/a	-73.07307	11.24445			PS	1	B
Isla Tortuguilla	N	10 (2015)	n/a	n/a	n/a	n/a	-76.33932	9.030338	n/a	n/a	1	1	B
Punta los Guamachitos	N	1 (2010)	n/a	n/a	n/a	n/a	-73.07307	11.24445	n/a	n/a	PS	1	B
<b>CC-NW-ATL</b>													
La Gumarra	N	0.8 (2009-2013)	-73.572	11.192	-73.564	11.1954	-73.563552	11.184996	0.603	n/a	PS	1	B
Boca del Saco	N	0.6 (2007-2013)	-73.5844	11.2015	-73.583	11.2003	-73.195582	11.195582	0.671	n/a	PS	1	B
El Medio	N	3 (2012)	-73.5826	11.2001	-73.582	11.2002	-73.589	11.195078	0.308	n/a	PS	1	B
Cabo San Juan del Guia	N	2 (2013)	-73.5795	11.19796	-73.578	11.19705	-73.575178	11.194283	0.289	n/a	PS	1	B
Arrecifes	N	0.75 (2006-2013)	-73.572	11.19199	-73.564	11.1954	-73.56588	11.185748	1.1	n/a	PS	1	B
Cañaveral	N	2.7 (2007-2013)	n/a	n/a	n/a	n/a	-73.55435	11.183295	1	n/a	PS	1	B
Castillete	N	1.3 (2007-2012)	n/a	n/a	n/a	n/a	-73.5406	11.2100	1.1	n/a	PS	1	B
Playa Escondida	N	5 (2007)	n/a	n/a	n/a	n/a	-73.5524	11.182723	0.1	n/a	PS	1	B
Don Diego	N	6 (2014-2018)	n/a	n/a	n/a	n/a	-73.40298	11.151151	7.3	n/a	PS	1	B
Mendihuaca	N	1.5 (2015-2018)	n/a	n/a	n/a	n/a	-73.55519	11.190577	7	n/a	PS	1	B
Quintana	N	9 (2013-2015)	n/a	n/a	n/a	n/a	-73.42162	11.15313	n/a	n/a	PS	1	B
Atazcosa	N	1 (2014)	n/a	n/a	n/a	n/a	-74.29394	10.58537	n/a	n/a	PS	1	B
Punta Gallinas	N	6 (2009-2013)	n/a	n/a	n/a	n/a	-71.67761	12.45351	n/a	n/a	16	1	B
Bahia Hondita	N	5.5 (2009-2016)	-71.4312	12.26105	-71.421	12.26288	n/a	n/a	4	n/a	4, 16	1	B
<b>DC-NW-ATL</b>													
La Gumarra	N	1.75 (2006-2013)	-73.572	11.192	-73.564	11.1954	-73.563552	11.184996	0.603	n/a	PS	1	B
Boca del Saco	N	1 (2009)	-73.5844	11.2015	-73.583	11.2003	-73.195582	11.195582	0.671	n/a	PS	1	B
El Medio	N	1 (2012)	-73.5826	11.2001	-73.582	11.2002	-73.589	11.195078	0.308	n/a	PS	1	B
Arrecifes	N	1.5 (2006-2010)	-73.572	11.19199	-73.564	11.1954	-73.56588	11.185748	1.1	n/a	PS	1	B
San Felipe	N	1 (2006)	-73.5643	11.18739	-73.563	11.18709	-73.562345	11.184386	0.168	n/a	PS	1	B
Cañaveral	N	3 (2008-2013)	n/a	n/a	n/a	n/a	-73.55435	11.183295	1	n/a	PS	1	B
Castillete	N	2.5 (2006-2007)	n/a	n/a	n/a	n/a	-73.5406	11.2100	1.1	n/a	PS	1	B
Mendihuaca	N	3.5 (2015-2018)	n/a	n/a	n/a	n/a	-73.55519	11.190577	7	n/a	PS	1	B

Quintana	N	2 (2014)	n/a	n/a	n/a	n/a	-73.42162	11.15313	n/a	n/a	PS	1	B
Don Diego	N	5 (2017)	n/a	n/a	n/a	n/a	-73.40298	11.151151	7.3	n/a	PS	1	B
Santuario de Fauna Acandi, Playon, Playona*	Y	187.8 (2006-2014)	n/a	n/a	n/a	n/a	-77.26666	8.53549	n/a	n/a	PS	1	B
Capitancito	N	45 (2006-2007)	-77.1818	8.3503	-77.183	8.3513	n/a	n/a	0.7	n/a	24	1	B
Acandi	Y	1071 (2006-2007)	-77.1518	8.2926	-77.163	8.3009	n/a	n/a	2.4	n/a	24	1	B
Playona	Y	1482.5 (2006-2007)	-77.0959	8.2557	-77.146	8.2816	n/a	n/a	12	n/a	24	1	B
Playeta	N	25 (2006-2007)	-77.0813	8.2452	-77.086	8.2506	n/a	n/a	1.5	n/a	24	1	B
Pueblo Nuevo	N	10 (2006)	-76.5309	8.3601	-76.562	8.3307	n/a	n/a	8	n/a	24	1	B
Atazcosa	N	2 (2015)	n/a	n/a	n/a	n/a	-74.29394	10.58537		n/a	PS	1	B
Moñitos	N	2 (2013)	n/a	n/a	n/a	n/a	-76.13137	9.24657		n/a	PS	1	B
Bobalito	Y	112.7 (2012-2017)	n/a	n/a	n/a	n/a	-76.56524	8.33241	13.5	84	PS	1	B
Bahia Hondita	N	6 (2009)	-71.4312	12.26105	-71.421	12.26288	n/a	n/a	4	n/a	4	1	B
<b>CM-NW-ATL</b>													
Quintana	N	1 (2015)	n/a	n/a	n/a	n/a	-73.42162	11.15313		n/a	PS	1	B
Atazcosa	N	1 (2015)	n/a	n/a	n/a	n/a	-74.29394	10.58537		n/a	PS	1	B
Bobalito	Y	6.2 (2012-2017)	n/a	n/a	n/a	n/a	-76.56524	8.33241	13.5	84	PS	1	B
Punta Gallinas	N	2 (2013)	n/a	n/a	n/a	n/a	-71.67761	12.45351	n/a	n/a	PS, 4	1	B

### 2.1.2. Marine areas

#### *Caretta caretta*

There is anecdotal information, mainly by fishermen, about the use of neritic habitats by *C. caretta* [5, 6, 17] along the continental and insular waters of the Colombian Caribbean. There is no monitoring program to estimate the number of turtles or the size class composition of individuals of this species in the area. Through traditional tagging (Monel tags) and satellite tracking, connectivity between foraging areas in Colombia and other countries in the Caribbean and North Atlantic has been demonstrated [34, ProCTMM unpublished data].

Sea turtles' behaviors at offshore aggregation areas are an unexplored issue in Colombia.

Through observations from opportunity platforms—vessels of drilling, support, research or seismic vessels, and navy ships—Fundación Omacha confirmed the presence of sea turtles from the departments of Magdalena, La Guajira, Sucre, and the Gulf of Uraba. Sightings were taken of four species (*Caretta caretta*, *Chelonia mydas*, *Eretmochelys imbricata*, and *Dermochelys coriacea*) [29].

#### *Dermochelys coriacea*

There is anecdotal information, mainly from fishermen, on the use of neritic and oceanic habitats by *D. coriacea* throughout the continental zone of the Colombian Caribbean [5, 17]. There is no monitoring program to estimate the number of turtles of this species, but through satellite tracking, connectivity between nesting beaches in Colombia and foraging areas in the North Atlantic has been demonstrated [37].

Sea turtles' behaviors at offshore aggregation areas are an unexplored issue in Colombia.

Through observations from opportunity platforms—vessels of drilling, support, research or seismic vessels, and navy ships—Fundación Omacha confirmed the presence of sea turtles from the departments of Magdalena, La Guajira, Sucre, and the Gulf of Uraba. Sightings were taken of four species (*Caretta caretta*, *Chelonia mydas*, *Eretmochelys imbricata*, and *Dermochelys coriacea*) [29].

#### *Chelonia mydas*

The Colombian Caribbean is considered an area of great importance as a feeding ground and for the development of green turtles. Seagrasses and macroalgae are distributed across more than 43,000 Ha along the continental coast and the SAPSC [17]. These seagrasses and seaweeds are the main dietary components of juveniles, subadults and adults of green turtles in the Caribbean [42]. The protection of these areas is critical since *C. mydas* can remain in its feeding grounds for more than 20 years before migrating to breeding areas [43].

There is evidence of the use of seagrass beds in the Alta Guajira area. The bycatch mitigation program advanced in that zone includes tagging animals and its preliminary results indicate that juveniles show fidelity to the marine area of Bahía Hondita [16]. In the San Bernardo Archipelago, through in-water census and bycatch assessments, we have information on the use of seagrasses beds by juvenile, subadult, and adult individuals, as well as high fidelity to the feeding grounds [9, 16, 17, 30].

Sea turtles' behaviors at offshore aggregation areas are an unexplored issue in Colombia.

Through observations from opportunity platforms—vessels of drilling, support, research or seismic vessels, and navy ships—Fundación Omacha confirmed the presence of sea turtles from the departments of Magdalena, La Guajira, Sucre, and the Gulf of Uraba. Sightings were taken of four species (*Caretta caretta*, *Chelonia mydas*, *Eretmochelys imbricata*, and *Dermochelys coriacea*) [29].

#### *Eretmochelys imbricata*

The total area of live coral coverage in the Colombian Caribbean is estimated at more than 1,000 km<sup>2</sup>, of which 75% is located in the SAPSC, 12% in the San Bernardo Islands, 6% in the Rosario

Islands, and the Barú Peninsula, and the remaining 7% along the Caribbean coast between La Guajira and the Urabá Gulf [17]. These are the areas where multiple life-stage hawksbill turtles are sighted. In 2002, Ceballos-Fonseca [5] in her analysis of the conservation status of sea turtles in the Colombian Caribbean reported that fishermen in the region expressed their thoughts on the decreased numbers of hawksbills in their traditional foraging and transit areas.

Between 1998 and 2010, 1,249 hawksbill turtles, including juveniles, subadults, and adults, were caught incidentally in the Corales del Rosario Park and Rosario Islands. There is no information on how many of these animals were sacrificed [9]. This is a significant number for a species that is Critically Endangered, so this data highlights the importance of this area for the recovery of the species. As for the SAPSC, occasional sightings are reported near San Andres Island, and in the Serrana, Quitasueño, and Roncador keys [6].

Sea turtles' behaviors at offshore aggregation areas are an unexplored issue in Colombia.

Through observations from opportunity platforms—vessels of drilling, support, research or seismic vessels, and navy ships—Fundación Omacha confirmed the presence of sea turtles from the departments of Magdalena, La Guajira, Sucre, and the Gulf of Uraba. Sightings were taken of four species (*Caretta caretta*, *Chelonia mydas*, *Eretmochelys imbricata*, and *Dermochelys coriacea*) [29].

## 2.2. Threats

### 2.2.1. Nesting sites

#### *Caretta caretta*

According with Paez et al. [21] *C. caretta* is near to the local extinction due to long-term and unsustainable harvesting of eggs and adult females, alterations of nesting beaches, and a lack of systematic governance for the species' protection. Other threats include the are erosion of nesting beaches and sand extraction [5].

#### *Dermochelys coriacea*

Leatherback eggs are still consumed in Colombia. There are historical reports of the consumption of this species; however, to date, we do not have updated data on the consumption of leatherback turtles in the area. In 2015, the Red List of Reptiles of Colombia was updated, and in addition to those listed above, the following threats were identified in nesting beaches: habitat loss and degradation, looting of nests by domestic animals, and illegal mining [28].

#### *Chelonia mydas*

The main threat that green turtles are facing is the consumption of nesting females and eggs, especially in La Guajira [22], but alterations of the anthropic origin of nesting beaches, (understood as erosion, urbanization, and deregulated tourism), are also having significant impacts on the green turtle's reproductive activities [17, 22].

#### *Eretmochelys imbricata*

Turtle meat and eggs are still sold in traditional restaurants in Riohacha [Rguez-Baron, pers. observ.], and hawksbill is one of the most commercialized sea turtles in La Guajira [5]. This is also true near Cartagena, in the Departamento de Bolívar [5]. In Corales del Rosario y San Bernardo Natural Park, the loss of habitat through the construction of homes, docks and spurs, tourist infrastructure, and beach erosion is evident [5, 9, 30].

### 2.2.2. Marine Areas

#### *Caretta caretta*

There is no information available on the effect of loggerheads bycatch in the Colombian Caribbean. It has been determined through interviews with fishermen, that juvenile and adult turtles are consumed when caught incidentally [5], even in protected areas [20]. The presence of organic waste is also considered a threat, although its concentrations and effects on sea turtles have not been characterized and/or quantified [5, 20].

#### *Dermochelys coriacea*

In general terms, we do not have quantitative information on the effect of leatherback bycatches in the Colombian Caribbean. It is known through interviews with fishermen that juvenile and adult turtles are caught by artisanal and industrial vessels, by multiple fishing gear [28], even in protected areas [20]. Bycatch in gillnets is estimated to cause the deaths of up to 20 adult females per year in the Urabá Gulf [28].

#### *Chelonia mydas*

The bycatch of immature, subadult, and adult individuals in foraging grounds is frequent. Near the coast of the Departamento de Bolívar and the Rosario and San Bernardo Islands, several bycatch events have been reported in different seasons and different years [5]. The types of fishing gears with the greatest number of interactions with green turtles are gillnets and harpoons.

Green turtles are followed by hawksbills as the most commercialized turtles for human consumption in La Guajira [17]. In Bahía Hondita, between May and August 2016, a community working group in collaboration with Conservation International received 40 juveniles and subadults that were caught during fishing operations. Seven of these animals were captured directly; and the others were caught incidentally. Fifteen of these turtles died because of their interactions with fishing gear. The fishing gear that most impacts the population health of green turtles is the lobster traps, which caused death by drowning in 100% of individuals (n = 8). In this area, turtles are also frequently caught by gillnets.

#### *Eretmochelys imbricata*

Several threats exist in marine areas, where targeted and incidental catches remain the greatest threat to the hawksbill turtle [3, 30]. The trade of artisanal products made of hawksbill shell has declined thanks to the coordinated work of several organizations and local authorities; however, it continues to be sold illegally in some places in Cartagena. The intake of plastics is an additional new threat in forage areas [3].

### 2.3. Conservation of sea turtles in the Colombian Caribbean

In the last five decades in Colombia, various efforts have been made to protect, conserve, and research sea turtles. However, there are no rigorous population assessments for any of the species in Colombia. It is thus necessary to implement information management systems on demographic aspects to determine key information for the implementation of effective management measures in nesting beaches and in development and foraging areas [36].

Colombia has signed several treaties that ensure the management and protection of sea turtles. Among these are the Convention of International Trade in Endangered Species of Wild Fauna and Flora (Appendix I), the Bonn Convention (Appendices I and II), the Specially Protected Areas and Wildlife (Appendix II), and the Convention on Biological Diversity. Therefore, it is necessary to generate mechanisms to strengthen compliance with the guidelines set forth in instruments and initiatives directed at the recovery and conservation of species, such as the National Program for the



Conservation of Marine and Continental Turtles [18 ] and the National Migratory Species Plan [27], which have objectives such as “collecting and producing information related to the populations of migratory species present in Colombia”, “Designing, adopting, implementing and administering a specialized system of public information on species migratory,” and “Establish[ing] mechanisms and rules that allow the exchange of information between entities and organizations dedicated to the study and conservation of migratory species at the national level.”

#### **2.4. Research**

##### *Caretta caretta*

Most research conducted on loggerheads in the country are genetic studies by the Genetics Molecular Biology and Bioinformatics Lab, at Jorge Tadeo Lozano University [10, 11, 12, 15]. Those studies include the definition of population stocks by genetic markers [10, 12]. The ProCTMM from the same university, by its head-starting project maintains neonates for up to one year, to care for the individuals for later release them to the environment after conducting research on their geometric morphometry, behavior, and genetics. The results of these studies are not yet published.

##### *Dermochelys coriacea*

All published research studies on leatherbacks have been conducted in the Urabá Gulf area, particularly in the SFAPP and nearby beaches. Some demographic and reproductive aspects have been characterized, the importance of the area for the conservation of the species has been stimulated [24, 39, 40, 41], the effect of climate change on the sex proportion of the offspring has been modeled [25 ], and the effect of hatchery techniques on the embryonic development has been evaluated[26].

##### *Chelonia mydas*

In the northeastern-most part of La Guajira, a study was conducted to assess the submerged aquatic vegetation—seagrasses and macroalgae—with in-water surveys. The quality of those habitats for green turtles was inferred from individual distribution, body condition, and genetic diversity pattern of green turtles in those feeding grounds, and their significance for the Atlantic populations, revealed that resident juveniles come from Costa Rica, Mexico, Aves Island and the U.S. Virgin Islands; other minor contributions were Bioko and Guinea-Bissau in Africa [32].

In 2002, the physical and biological characterization of foraging areas was conducted alongside annotations on the behavior and use of habitat of green turtles in the San Bernardo archipelago [30]. From the analysis of stomach contents of turtles caught incidentally, the main dietary components of juveniles of green turtles in the area were determined [30].

##### *Eretmochelys imbricata*

Currently, an assessment of hawksbill population trends in foraging at the Corales del Rosario and San Bernardo Natural Park, the Santuario of Fauna and Flora Mono Hernández, Isla Fuerte, and the coasts of Bolívar and Sucre is being developed [9]. Data are available on juvenile capture/recapture since 2005 demonstrating the high fidelity of turtles to the area. This contrasts with the results obtained through the satellite tagging of a juvenile (52.6cm CCL) by ProCTMM in the Departamento del Magdalena, which traveled 1,463.66 km in 64 days before reaching Bocas del Toro, Panama [23].

**Table 2.3. International conventions protecting sea turtles and signed in Colombia.**

International Conventions	Signed	Binding	Compliance measured and reported	Species	Conservation actions	Relevance to sea turtles
<b>CBD: Convention on Biological Diversity</b>	Y		Y	ALL	To conserve the biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources, taking into account all rights over those resources and to technologies, and by appropriate funding.	Marine turtle conservation is relevant to the agreement given the species' importance to overall biological diversity. For example, text in Article 8 states that each contracting party shall: "promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings" (CBD, 1992).
<b>CITES: Convention on International Trade in Endangered Species of Wild Fauna and Flora.</b>	Y	Y	Y	ALL	An international agreement between governments, the aim of which is to ensure that international trade in specimens of wild animals and plants does not threaten their survival.	All seven species listed in Appendix I of CITES.
<b>Ramsar Convention</b>	Y		Y		It is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.	Based on a MOU between IAC and Ramsar, of the Parties to both Conventions in order to identify and strengthen conservation and wise use of Ramsar Sites ( <a href="https://www.ramsar.org/sites/default/files/documents/library/mou_seaturtlesconvention_eng_8-7-12.pdf">https://www.ramsar.org/sites/default/files/documents/library/mou_seaturtlesconvention_eng_8-7-12.pdf</a> ).

**Table 2.4. Organizations and agencies related with sea turtle research and conservation in the Colombian Caribbean.**

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<b>Government Agencies</b>
Ministerio de Ambiente y Desarrollo Sostenible
Instituto de Investigaciones Marinas y Costeras
Parques Nacionales Naturales de Colombia
Corporación para el Desarrollo sostenible del Urabá
Corporación Autónoma Regional de Sucre
Corporación Autónoma Regional del Atlántico
Corporación Autónoma Regional de los Valles del Sinú y del San Jorge
Corporación Autónoma Regional de la Guajira
Corporación Autónoma Regional del Magdalena
Corporación para el Desarrollo Sostenible del Archipiélago de San Andrés, Providencia y Santa Catalina

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<b>Community groups</b>
Fundación Mamá Basilia
Consejo Comunitario Cocomasur
Asociación para la Conservación Ambiental y el Ecoturismo ACAETUR

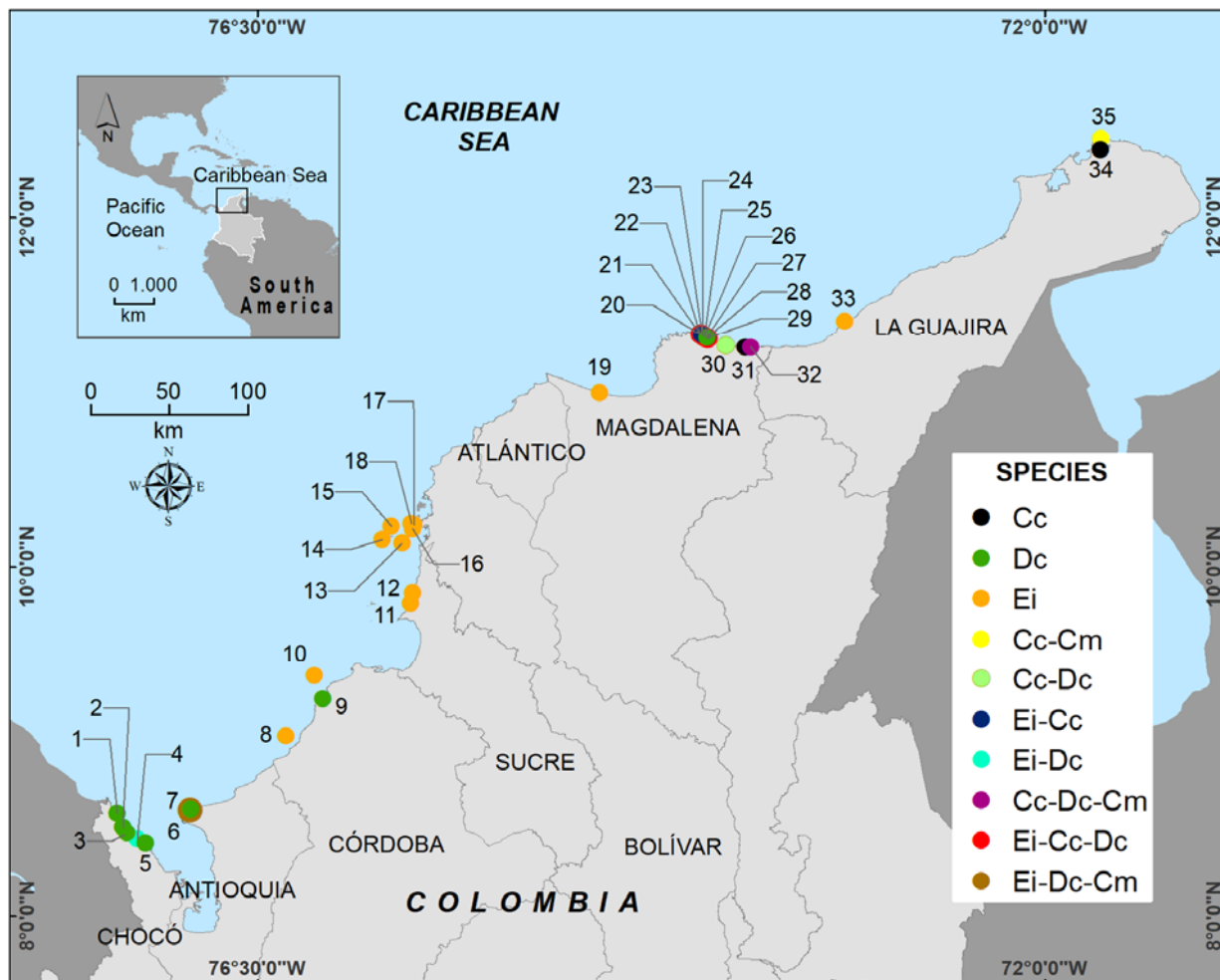
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<b>NGOs</b>
JUSTSEA Foundation
World Wildlife Fund Colombia
Conservación Internacional Colombia
Fundación Tortugas del Mar
Fundación Conservación Ambiente Colombia
Fundación Omacha
Fundación Tortugas Marinas de Santa Marta
Fundación Natura
Asociación para la Conservación de las Especies en Vías de Extinción
Fundación Coriacea

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<b>Universities</b>
Universidad Jorge Tadeo Lozano
Universidad de Antioquia
Universidad de los Andes
Universidad Javeriana
Universidad de la Guajira

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**Figure 2.1.** Biogeography and nesting beaches of sea turtles in the Colombian Caribbean. 1. Capitancito, 2. Acandí, 3. Playona, 4. Santuario de Fauna Acandí, Playón, Playona, 5. Playeta, 6. Bobalito, 7. Pueblo Nuevo, 8. Isla Tortuguilla, 9. Moñitos, 10. Isla Fuerte, 11. Playa Chichimán, 12. Playa Salina, 13. Barú, 14. Isla Rosario, 15. Isla Tesoro, 16. Playa Blanca, 17. Playa Palitos, 18. Punta Gigante, 19. Atazcosa, 20. Boca del Saco, 21. El Medio, 22. Cabo San Juan del Guía, 23. Playa Escondida, 24. La Piscina, 25. Arrecifes, 26. La Gumarra, 27. Castillete, 28. San Felipe, 29. Cañaveral, 30. Mendihuaca, 31. Don Diego, 32. Quintana, 33. Punta Los Guamachitos, 34. Bahía Hondita, 35. Punta Gallinas.

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## Chapter 3: Cuba

Julia Azanza Ricardo<sup>1,2</sup>, Félix Moncada Gavilán<sup>3,2</sup>, Yanet Forneiro Martín-Viaña<sup>4</sup> and José Luis Gerhartz Muro<sup>5</sup>

1. Instituto Superior de Tecnología y Ciencias Aplicadas, Universidad de La Habana, MES Ciudad Habana, Cuba; [julia\\_dragmarino@yahoo.es](mailto:julia_dragmarino@yahoo.es)
2. Widecast, Cuba
3. Centro de Investigaciones Pesqueras. MINAL. [fmoncada@cip.alinet.cu](mailto:fmoncada@cip.alinet.cu)
4. Empresa Nacional para la Protección de la Flora y la Fauna. MINAG. [yanetfmv@yahoo.com](mailto:yanetfmv@yahoo.com)
5. Corredor Biológico en el Caribe [jose.gerhartz@un.org](mailto:jose.gerhartz@un.org)

### 3.2. Distribution, abundance, trends.

#### 3.1.1. Nesting sites.

Nesting activity within the Cuban archipelago is monitored in 78 beaches in total (Table 2.1 and 2.2), with different levels of monitoring (11 % level 1) and types of protocols (21 % B protocol and the rest E protocol). The southwestern region is where most important nesting areas are concentrated (Figure 3.1), with Cayo Largo, Cayos de San Felipe, Guanahacabibes peninsula and Isla de la Juventud as the main nesting sites in order of importance [10,18,33]. However, Jardines de la Reina (Gardens of the Queen), in the southeastern region, also present high levels of nesting, being important for hawksbill [10,18,33]. Green turtle (*Chelonia mydas*), is the most frequent nesting turtle accounting for 85 % of all nesting, which occurs from June to September [10,18,33]. Loggerhead (*Caretta caretta*) accounts for 10 % of nesting and it occurs mainly from April to July [10,18,33]. Hawksbills (*Eretmochelys imbricata*) only accounts for 5 % of nesting, preferably from October to February although reported year-round; while leatherback (*Dermochelys coriacea*) is very infrequent with only sporadic nesting reported [10,18,33].

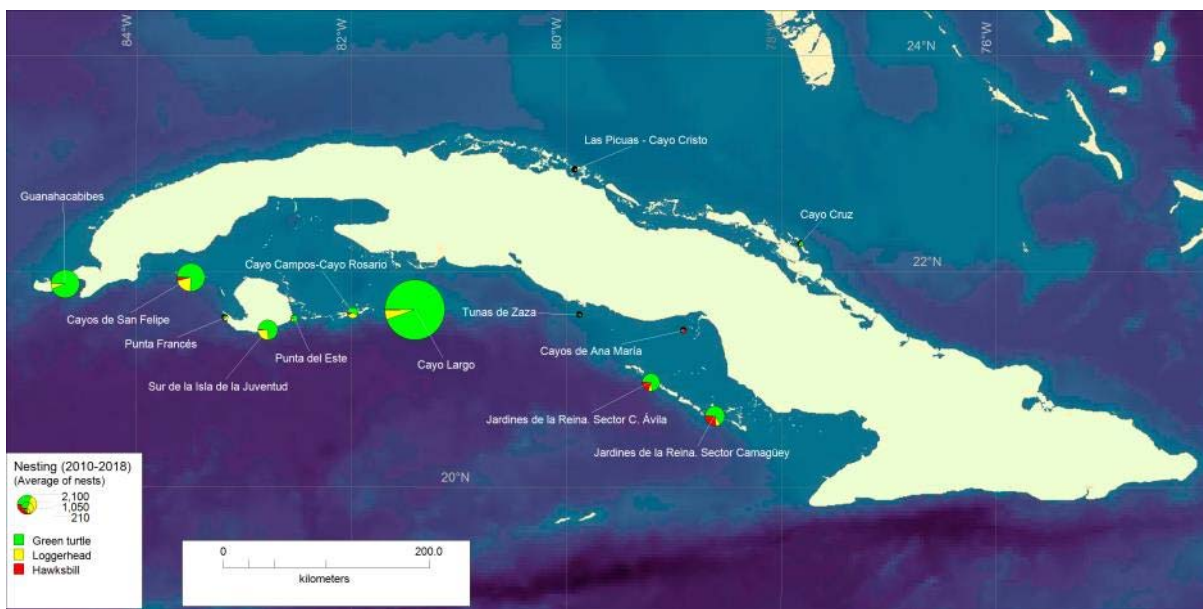


Figure 3.1. Main sea turtle nesting beaches for four species in Cuban archipelago.



**Table 3.1. Main biology and conservation aspects of sea turtle Regional Management Units (RMU) occurring in Cuba.**

Topic	Regional management units							
	<i>Caretta caretta</i> North West Atlantic	Ref #	<i>Chelonia mydas</i> North West Atlantic	Ref #	<i>Eretmochelys</i> <i>imbricata</i> North West Atlantic	Ref #	<i>Dermochelys</i> <i>coriacea</i> North West Atlantic	Ref #
<b>Occurrence</b>								
Nesting sites	Y	10,18,33	Y	10,18,33	Y	10,18,33	Y	18
Pelagic foraging grounds	N		N		N		JA	
Benthic foraging grounds	JA	57	JA	17,57	JA	57	N	
<b>Key biological data</b>								
Nests/yr: recent average (range of years)	318,2 (2010-2018)	33,64, 110	3488 (2010-2018)	33,64, 110	149,57 (2010-2018)	33,64	n/a	
Nests/yr: recent order of magnitude	150-400	33,64	2500-5000	33,64	100-250	33,64	<10	33
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	7	33,64	8	33,64	4	33,64	N	
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	3	6,33,64	3	33,64	4	33,64	1	33
Nests/yr at "major" sites: recent average (range of years)	322,66 (2010-2015)	33,64,109	3028,66 (2010-2015)	33,64,109	151,5 (2010-2015)	33,64,109	n/a	
Nests/yr at "minor" sites: recent average (range of years)	19,83 (2010-2015)	33,64,109	32 (2010-2015)	33,64,109	12 (2010-2015)	33,64,109	n/a	
Total length of nesting sites (km)	184	18	191	18	105	18	n/a	
Nesting females / yr	167	B10/B18	1441	D10/D18	94	F10/F18	n/a	
Nests / female season (N)	1-2 (49a)(22b)	a:16;b:92	Mean: 1.95 (1480) Min: 1.4 (83) Max: 2.22 (32)	15	1.45 ±0.07 (29)	74	n/a	
Female remigration interval (yrs) (N)	4.08 (12a); 2.77 (13b)	a: Azanza per. com;b: Moncada per. com	Mean: 2.67±1.71 (202a); Min: 1 (30a); Max: 13 (1a)	a:Azanza per. com	2.4 ±0.5 (12)	74	n/a	
Sex ratio: Hatchlings (F / Tot) (N)	0.33a (3); 0.90b (4)	24	1.0a (16);0,80b (34)	24	n/a	73,74	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		0.84 (2087); 0.76 (1322); 0.77 (722)	66;74;28	n/a	
Min adult size, CCL or SCL (cm)	80-84 CCL;85 CCL	61;93	95.64±0.43 CCL (607)	15,62	64 CCL(Fb); 68 SCL (Ma)	a:66; b:74	n/a	
Age at maturity (yrs)	n/a		n/a		n/a		n/a	

Clutch size (n eggs) (N)	93 (7-22);103.9 (921)	16;93	114,96 ±3,36 (230)	15	130,87 (772)	74	n/a	
Emergence success (hatchlings/egg) (N)	0.74-0.82 (80);0.72 (532)	51;64	0.75 (230);0.75-0.88 (117);0.80 (1945)	19;51;64	0.69 (512);0,58 (374);0,61(283)	66;49;64	n/a	
Nesting success (Nests/ Tot emergence tracks) (N)	0.67 (18 yr)	16	0.60-0.70 (17 yr)	5,11	0.4 (228)	48	n/a	
<b>Trends</b>								
Recent trends (last 20 yrs) at nesting sites (range of years)	Up (r=0.48;1998-2016); 3 up 2 down (2010-2018)	16;10	Up (2010-2018)	10	1 up 2 down (2010-2018)	10	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)	8 (1983); 58 (1998)	93;16	20 (1982); 12 (1998)	94;15	4 (1988)	66	n/a	
<b>Published studies</b>								
Growth rates	N		Y	102	Y	22,31,50,101,102	n/a	
Genetics	Y	106	Y	12,2,105	Y	32,34,35	n/a	
Stocks defined by genetic markers	Y	106	Y	12,2,105	N		n/a	
Remote tracking (satellite or other)	Y	61	Y	62	Y	70	n/a	
Survival rates	N		N		N		n/a	
Population dynamics	Y	67,87	Y	67	Y	67,70-72	n/a	
Foraging ecology (diet or isotopes)	N		Y	108	Y		n/a	
Capture-Mark-Recapture	Y	16,93	Y	36,37	Y	67,70-72	n/a	
Foto-ID	Y	3	Y	3	Y	3	n/a	
Natural and artificial diet	Y	2	Y	2	Y	2,4,39	n/a	
GIS	N		Y	8	Y		n/a	
Ecotouristic value of turtles	Y	41	Y	41,91	Y	41	n/a	
Reproductive succes	Y	18,51	Y	18,19,51	Y	48,49,52,53	n/a	
Effect of vegetation on nesting and hatching success	N		Y	113,114	Y	52		
<b>Threats</b>								
Bycatch: presence of small scale / artisanal fisheries?	Y	69	Y	69	Y	69	Y	69
Bycatch: presence of industrial fisheries?	Y	69	Y	69	Y	69	Y	69
Bycatch: quantified?	Y (97)	69	Y (342)	69	Y (298)	27,29,30,69	Y (8)	69
Take. Intentional killing or exploitation of turtles	Y	10,64	Y	10,64	Y	10,64	n/a	
Take. Egg poaching	N	10	N	10	N	10	n/a	

Coastal Development. Nesting habitat degradation	Y	10	Y	10	Y	10	n/a	
Coastal Development. Photopollution	Y	10	Y	10	N	10	n/a	
Coastal Development. Boat strikes	N	10	N	10	N	10	n/a	
Egg predation	Y	93	Y	94,7,19	Y	52	n/a	
Pollution (debris, chemical)	n/a		Y	10	n/a		n/a	
Pathogens	n/a		Y	7	n/a		n/a	
Climate change	Y	16,17,40,63,78,103	Y	16,17,40,63,78,103	N		n/a	
Foraging habitat degradation	N		Y	108	Y	115	n/a	
Hurricanes impact	Y	17	Y	17	N		N	
Fibropapilloma	Y	57	Y	57,108	Y	57		
<b>Long-term projects (&gt;5yrs)</b>								
Monitoring at nesting sites (period: range of years)	Y (1983-ongoing;1998-ongoing;2002-ongoing)	93;16;54	Y (1983-ongoing;1998-ongoing;2002-ongoing)	94,15,54	1988-ongoing;1995-ongoing	80,66	n/a	
Number of index nesting sites	14	64	14	64	11	64	n/a	
Monitoring at foraging sites (period: range of years)	n/a		2013-ongoing	107	1992-2006	4,75	n/a	
<b>Conservation</b>								
Protection under national law	Y	10,55,64,90,82,83,86	Y	10,55,64,90,82,83,86	Y	10,55,64,90,45,46,82	Y	10,55,64,90,45,46,82
Number of protected nesting sites (habitat preservation) (% nests)	10 (90 %) (43 %)	38,64	10 (90 %) (80 %)	38,64	10 (90 %) (97 %)	38,64	0	
Number of Marine Areas with mitigation of threats	11	10,93, 43	11	10,94, 43	11	10	0	
N of long-term conservation projects (period: range of years)	4 (1983-ongoing;1998-ongoing (2);2002-ongoing)	93;16;54;21	4 (1983-ongoing;1998-ongoing (2);2002-ongoing)	94,15,54;21	2 (1988-ongoing;1995-ongoing)	80,66;21	0	
In-situ nest protection (eg cages)	n/a		n/a		n/a		n/a	
Hatcheries	Y	93	Y	47,94	N		n/a	
Head-starting	N		N		Y	95-100	n/a	
By-catch: fishing gear modifications (eg, TED, circle hooks)	N		n/a				n/a	
By-catch: onboard best practices	Y	23	Y	23	Y	23	n/a	
By-catch: spatio-temporal closures/reduction	Y	10,23,25,68,69	Y	10,23,68,69	Y	10,23,68,69	n/a	10,58,89
Education outreach	Y	9,13,14,25,42,43,44	Y	9,13,14,25	Y	9,13,14,25	N	

As observed in Figure 3. 1, Cuban nesting beaches are widely distributed around the archipelago, with 68 % of them having lengths of 2 km or less and representing 26 % of the total monitored area (Table 3.2). However, those beaches host 31 % of loggerhead's nesting, 67 % of hawksbills and 76 % of green turtles. As a result, there are high density areas such as Caleta de los Piojos and La Barca beaches in Guanahacabibes National Park, with an average of 21 and 16 loggerhead nests per km respectively; while Los Cocos beach in Cayo Largo cay, and Caleta de los Piojos beach have an average of 765.28 and 426,92 green turtle nests per km respectively. In the case of hawksbill, El Faro and el Dátiri beaches, in Jardines de la Reina National Park have the highest average densities (26.67 and 12.22 nests per km respectively).

**Table 3.2. Nesting activity (clutches and crawls) for the compiled sea turtle nesting beaches for four species (*L. kempii* (Lk), *E. imbricata* (Ei), *C. mydas* (Cm), *C. caretta* (Cc)) in Cuban beaches.**

We also include the length of the beaches, the coordinates and the monitoring level and protocol implemented.

**NOTE:** Column “% Monitored” represents the beach’s monitoring geographical coverage, at the last time it occurred. However, many of the beaches have not been monitored in the last 5 years (\*)

Beach ID*	RMU / Nesting beach name	Index site	Crawls/yr: recent average (range of years) (2010-2015)			Central point		Length (km)	% Monitored	Reference #	Monitoring Level (1-2)	Monitoring Protocol (A-F)
			Cc	Ei	Cm	Long	Lat					
	<b>CC-NW ATL</b>											
CU1	Los Cayuelos	N	6,7	1,0	19,5	-84,9318	21,8339	0,6	100	18,64,65	2	B
CU2	Caleta Larga	N	3,3	1,0	24,2	-84,9066	21,8251	0,7	100	18,64,65	2	B
CU3	Caleta de los Piojos	Y	4,0		69,8	-84,8523	21,8175	0,13	100	18,64,65	1	B
CU4	El Holandés	Y	7,7		50,0	-84,7735	21,8278	1,02	100	18,64,65	1	B
CU5	La Barca	<b>Y</b>	<b>12,4</b>		<b>193,0</b>	-84,7565	21,847	0,525	100	18,64,65	1	B
CU6	Las Cadenas	N	2,0		21,3	-84,7514	21,8551	0,3	100	18,64,65	2	B
CU7	Perjuicio	N	3,0		52,3	-84,706	21,8844	0,5	100	18,64,65	2	B
CU8	Resguardo	N	2,3		21,6	-84,6786	21,8954	0,15	100	18,64,65	2	B
CU9	Antonio	Y	2,7		60,8	-84,6634	21,9002	0,325	100	18,64,65	1	B
CU10	Las Canas	N	1,0		42,0	-84,513	21,7856	0,8	100	18,64,65	2	E
CU11	Juan García	N	8,8	4,0	8,0	-83,38	21,59	2	100	18,64,65	1	B
CU12	Real Oeste	N	64,5	4,5	332,3	-83,36	21,58	4	100	18,64,65	2	B
CU13	El Sijú	Y	56,3	20,7	92,8	-83,3	21,57	4	100	18,64,65	1	B
CU14	El Coco	N	2,5	1,0	9,5	-83,24	21,57	4,5	100	18,64,65	2	B
CU15	Punta Francés	N	13,5	3,0	5,0	-83,1737	21,5987	2	100	18,64,65	1	B
CU16	Playa Larga	N	13,5		7,5	-82,7379	21,4757	4	100	18,64,65	2	E
CU17	El Guanál	Y	63,8	2,3	211,2	-82,8045	21,4523	8	100	18,64,65	1	B
CU18	Punta del Este	N	7,5	2,0	42,0	-82,5728	21,5453	5	100*	18,64,65	2	E
CU19	Cayo Campos	N	12,0	7,0	16,0	-81,5368	21,6366	10	100*	18,64,65	2	E
CU20	Cayo Estopa	N	16,0		2,0	-81,5368	21,6366	10	100*	18,64,65	2	E
CU21	Cayo Rosario	N	26,5	2,0	63,0	-81,5368	21,6366	10	100	18,64,65	2	E
CU22	Rico Peraces	N	24,5	3,5	7,0	-81,4526	21,6788	10	100*	18,64,65	2	E
CU23	Los Majaes	N		5,0		-81,4526	21,6788	10	100*	18,64,65	2	E
CU24	Sirena	N			7,5	-81,5706	21,6061	0,07	100	18,64,65	2	E
CU25	Paraíso	N				-81,5612	21,6003	1,08	100	18,64,65	2	E
CU26	Mal Tiempo	N			579,5	-81,5568	21,5895	2,03	100	18,64,65	2	E
CU27	Lindamar	N				-81,5227	21,5998	4,06	100	18,64,65	2	E
CU28	P. Blanca	N			533,0	-81,4999	21,6060	2	100	18,64,65	2	E
CU29	Los Cocos	N	1,0		826,5	-81,4205	21,6550	1,08	100	18,64,65	2	E
CU30	Tortuga	N			200,0	-81,4101	21,6646	1,06	100	18,64,65	2	E
CU31	Cinco Balas	N	9,5	19,8	24,8	-79,3316	21,0559	3,4	100	18,64,65	2	E

Beach ID*	RMU / Nesting beach name	Index site	Crawls/yr: recent average (range of years) (2010-2015)			Central point		Length (km)	% Monitored	Reference #	Monitoring Level (1-2)	Monitoring Protocol (A-F)
			Cc	Ei	Cm	Long	Lat					
	<b>CC-NW ATL</b>											
CU32	Alcatracito	N	1,0	3,5	7,0	-79,3107	21,0431	0,722	100	18,64,65	2 E	
CU33	Alcatraz	N	2,0	7,7	12,0	-79,2953	21,0373	2	100	18,64,65	2 E	
CU34	Boca Grande	N		5,5	9,5	-79,2313	21,0079	2,5	100	18,64,65	2 E	
CU35	El Almendrón	N		1,0	10,0	-79,1992	20,9805	1,882	100	18,64,65	2 E	
CU36	Boca de Guano	N	2,0	4,5	29,0	-79,1629	20,9643	1,1	100	18,64,65	2 E	
CU37	Los Cocos	N	4,5	3,0	50,3	-79,1443	20,9436	0,6	100	18,64,65	2 E	
CU38	Los Bayameses	N	1,0	2,0	56,5	-79,0942	20,9033	0,3	100	18,64,65	2 E	
CU39	El Guincho	Y	7,3	9,0	38,2	-79,0298	20,8576	1,97	100	18,64,65	2 E	
CU40	La Piedra	N		4,5	68,5	-79,1146	20,9149	0,75	100	18,64,65	2 E	
CU41	P. Bonita	Y	2,7	3,0	18,3	-79,0492	20,8682	0,8	100	18,64,65	2 E	
CU42	Caballones Oeste	Y	1,3	12,8	11,0	-78,9668	20,8542	1,46	100	18,64,65	2 E	
CU43	La Yana	N	3,5	4,5	14,2	-79,0057	20,8496	0,8	100	18,64,65	2 E	
CU44	Caballones Este	Y	1,0	6,8	6,7	-78,945	20,8147	3,54	100	18,64,65	2 E	
CU45	El Dátiri	Y	4,0	11,0	14,2	-78,9495	20,798	0,9	100	18,64,65	2 E	
CU46	Los Pinos	N	4,5	3,7	25,3	-78,931	20,7874	1,28	100	18,64,65	2 E	
CU47	La Canita	N	2,0	2,0	23,8	-78,9145	20,7816	0,2	100	18,64,65	2 E	
CU48	La Cana	N	1,0	2,3	16,8	-78,9012	20,7774	1	100	18,64,65	2 E	
CU49	El Manchado	N	1,0	1,3	14,2	-78,8749	20,7731	1,5	100	18,64,65	2 E	
CU50	El Partío	N	4,0	1,0	1,0	-78,8630	20,7767	0,6	100	18,64,65	2 E	
CU51	B.P Chiquita	N	3,0	3,4	7,5	-78,8051	20,7377	0,3	100	18,64,65	2 E	
CU52	Las Cruces	N	1,7	11,2	10,8	-78,7778	20,7101	1	100	18,64,65	2 E	
CU53	Crucesitas	N		1,7	10,3	-78,7705	20,7084	0,61	100	18,64,65	2 E	
CU54	Cachiboca	Y	1,5	3,6	12,2	-78,7528	20,6956	1,7	100	18,64,65	2 E	
CU55	El Faro	Y	1,0	6,4	7,4	-78,7484	20,6776	0,24	100	18,64,65	2 E	
CU56	La Ballena	Y	4,0	5,8	7,6	-78,7367	20,6746	1,36	100	18,64,65	2 E	
CU57	Indio Grande	N	3,0	1,0	3,6	-78,7131	20,6604	0,4	100	18,64,65	2 E	
CU58	Indio Chiquito	N		1,0	6,0	-78,7112	20,6564	0,45	100	18,64,65	2 E	
CU59	Los Hierros	N	1,0		1,7	-78,7044	20,6514	0,3	100	18,64,65	2 E	
CU60	Carabineros	N	3,0	7,0	14,5	-78,6823	20,6541	0,95	100	18,64,65	2 E	
CU61	Bártula	N		3,7	4,5	-78,6377	20,6467	0,4	100	18,64,65	2 E	
CU62	Juan Grin	Y		1,5	3,0	-78,5582	20,6259	0,2	100	18,64,65	2 E	
CU63	Boca Seca	Y	3,3	5,7	4,8	-78,5269	20,6183	2,29	100	18,64,65	2 E	
CU64	Boca Rica	N		1,0	2,0	-78,4818	20,6072	0,1	100	18,64,65	2 E	
CU65	Campo Santo	N	1,0	1,0		-78,4209	20,5859	0,1	100	18,64,65	2 E	
CU66	Caguama	N	6,2	6,3	9,0	-78,3917	20,5536	5	100	18,64,65	2 E	
CU67	Tío Joaquín	N		10,5	4,0	-78,76	21,4331	1,5	100	18,64,65	2 E	
CU68	Las Canas	N		6,0	1,0	-78,7848	21,392	2	100	18,64,65	2 E	
CU69	Obispo	N	2,7	3,5	3,5	-80,1943	23,1091	4	100	18,64,65	2 E	
CU70	Mulata	N	3,0			-80,0855	23,0711	2	100	18,64,65	2 E	
CU71	Roteño	N				-80,0644	23,0634	2	100	18,64,65	2 E	
CU72	La Quebrada Punta Cocina	N	3,0		12,3	-77,8192	22,2433	20	100	18,64,65	1 B	
CU73	Cayo Blanco	N			6,0	-79,5972	21,5960	1,5	100	18,64,65	2 E	
CU74	Majahuevo	N	2,0	1,0	5,2	-79,5677	21,6402	2	100	18,64,65	2 E	

The number of nesting females per year has been estimated as a proportion of the number of nests per species (Table 2.1). Green turtle has an average of 1441 females nesting per year, although tagging programs have identified so far 2383 females since 2001 (except for Isla de la Juventud). The other two species have lower levels of nesting and, as a result, less nesters per year (94 hawksbill and 167 loggerheads). Tagging programs for the latter species has been able to identify 74 hawksbills just in Jardines de la Reina and 216 loggerheads in Guanahacabibes peninsula, Isla de la Juventud and Cayo Largo where tagging program has been conducted. Loggerhead is the species with the longest remigration interval reported, followed by green turtle.

Trends in nesting population have only been assessed for most important nesting areas [10]. Green turtle populations show positive trends in all nesting areas except in South of Isla de la Juventud where illegal take is the most severe amongst protected areas. In the latter area, as well as in San Felipe National Park, loggerhead and hawksbill populations are also declining.

Reproductive success indicators are presented in Table 7.1. Hawksbill had the higher clutch size despite its smaller carapace length but the other indicators of success like hatchling emergences and nesting success are the lowest of the three species. Green turtle has the highest reproductive success indicators of the three species.

### **3.1.2. Marine areas.**

Sea turtle studies in marine waters have been limited in Cuba due to logistic and financial constraints. Most of the studies have been focuses on hawksbill feeding grounds in Jardines de la Reina archipelago [10,18,33,72,73,75], although other biological information like migration routes, diet and sex and size distribution in fishery areas is also available for hawksbill [10,18,33] as well as for other species [60,61,62,67,69,84] including reports of presence of leatherback [58,89] and olive ridley [59,81].

Using the information available about migratory routes, potential feeding grounds for green turtle, loggerhead and hawksbill have been identified in the southern shelf of Cuba, mostly in the Ana María Gulf, where satellites tracks of specimens of the three species have converged. Sea turtles nesting sites in Cuba also show close interaction with feeding grounds elsewhere in the Caribbean, such as Yucatán peninsula, Florida and Nicaragua's bank.

Recently, we started studies on marine habitat quality at a feeding ground of green turtle juveniles in the north coast of Cuba [108].

### **3.2. Other biological data**

We also gather regularly information about spatial nesting distribution within nesting areas [109], spatial and temporal variation of females nesting size [109] and hatchling production [110].

### **3.3. Threats.**

#### **3.3.1. Nesting sites.**

#### **3.3.2. Marine areas.**

A national analysis of actual and potential threats affecting nesting sites and marine habitats of sea turtles in Cuba was carried out [10]. Illegal take is the main threat identified. However, climate change, hurricane impacts, and pollution were also identified as threats of importance for sea turtle conservation. A summary of all threats analyzed is presented also in Table 3.1.

### **3.4. Conservation**

After more than 20 years of marine turtle conservation in Cuba, several populations are showing signs of recovery. This has been possible with the implementation of several action measurements (Table 3.3) within a National System of protected areas combined with a legal protection of all the species [10]. In 2008, the Ministry of the Fishery Industry, with the Resolution 009/2008 declared a total prohibition of legal turtle catch while in 2011, the Ministry of Science, Technology, and Environment (Ministerio de Ciencia, Tecnología y Medio Ambiente, or CITMA) banned any capture,

use, or traffic of marine turtles, except for research and conservation purposes with the Resolution 160/2011.

Cuba is also signatory of several international conventions that promote biodiversity conservation, including marine turtles (Table 3.3).

**Table 3.3. International conventions protecting sea turtles and signed in Cuba**

International Conventions	Signed	Binding	Compliance measured and reported	Species	Conservation actions	Relevance to sea turtles
CITES	Y	Y	Y	CM, CC	National and international commerce prohibit	Harvesting prohibited
SPAW	Y	Y	Y	DC		
CMS	Y	Y	Y	ALL	Identification and conservation of migratory routes	Marine protected areas, fishing season closed during migration period
CBD	Y		Y	ALL	Conserve biological diversity	Conservation actions and Protected areas established

Marine turtle conservation program in Cuba have strengthened over the last decades with the establishment of a national monitoring protocol for nesting [10], feeding grounds [111] and nesting temperature [112]. However, some monitoring sites have been active for over 36 years (since 1983) while others started in 1998 or later and have 20 years of results or less. Conservation efforts is not the same in all areas; that is why an analysis was also performed on monitoring effectiveness [18] and management capacity in protected areas, in order to address threats to marine turtles [10]. Despite the diversity of monitoring conditions, the Cuban program gathers information on 79 nesting beaches and almost all the important nesting beaches are included in protected areas, where in situ conservation actions are undertaken.

The Cuban Marine Turtle Conservation Program have invested significant efforts on capacity building and public awareness activities. Capacity building activities have been important to maintain well-trained personnel and environmental educators in both protected areas and coastal communities. As for public awareness a national campaign was developed, with activities and materials addressing children environmental education, but also turtle awareness of fishers and consumers. The national campaign makes use of different educational platforms, such as photo exhibitions, printed T-shirts, press conferences, community festivals and large format publicity, among other actions. Although the impacts of the campaign are not enough to mitigate the threat posed by illegal trade, most of the surveyed people expressed that they now perceive their role as consumers of turtle products differently, and that they know what they can do to reduce illegal trade.

### 3.5. Research

In Cuba there are not many specialists devoted to marine turtle research, since most monitoring is carried out by conservation staff or volunteers. As a result, 85 % of the 114 references presented in this report involve at least one out of the six currently most active Cuban marine turtle specialists. However, national and international collaboration as well as student degree and postgraduate research made possible the development of different research in Cuba. Main topics were: growth

rates [22,31,50,101,102], genetics [2,12, 32,34,35, 105, 106], stocks defined by genetic markers [2,12, 106, 105], tracking (satellite or other) [61, 62, 70], population dynamics [67,70-72, 87], foraging ecology (diet) [108], capture-tagging-recapture [16,93 36,37 67,70-72], Photo-ID [3], natural and artificial diet [2,4,39], application of Geographic Information Systems [8], ecotourism value of turtles [41,91] and reproductive success [18,19,48,49,51,52,53], in particular, the influence of vegetation in this success [52,113,114]. Ongoing projects are presented in Table 2.4.



**Table 3.4. Sea turtle conservation projects in Cuba.**

#	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)
T4.1	CC and CM NW ATL; EI-NW ATL-WC-USA	Cuba	Caribbean	Protortugas Cuba Database	Nesting, reproductive success, Tagging, Threats, Cuba	2010	Ongoing	ENPFF	Public	CIP, INSTEC	<a href="#">Monitoring protocols, Biennial Reports</a>	None	Yanet Forneiro (tortugas@ua.f fauna.co.cu)	Julia Azanza (julia_dragmarino@yahoo.es)
T4.2	CC and CM NW ATL; EI-NW ATL-WC-USA	Cuba	Caribbean	Prevention of the effect of Climate Change on endangered species	Incubation temperature, sex proportion, beach dynamic, Cuba	2010	Ongoing	InSTEC-UH	Public	ENPFF, CIP	Final report (2019); publications	Ocean Foundation Ccambio (Fundación Nuñez-Jiménez)	Julia Azanza (julia_dragmarino@yahoo.es)	Yanet Forneiro (tortugas@ua.f fauna.co.cu)
T4.3	CC and CM NW ATL; EI-NW ATL-WC-USA	Cuba	Caribbean	Study and conservation of marine turtles in Cuba	Nesting, Tagging, Cuba	1996	Ongoing	CIP-MINAL	Public	ENPFF, INSTEC	CIP annual reports to MINAL; publications	MINAL	Félix Moncada (fmoncada@cip.alinet.cu)	Yanet Forneiro ( <a href="mailto:tortugas@ua.f fauna.co.cu">tortugas@ua.f fauna.co.cu</a> ), Julia Azanza (julia_dragmarino@yahoo.es)

Table 3.4. continuation

#	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	N	BD-Protortugas	All	2010	Ongoing	N	Y	Y	N	N	N	109
T4.2	N	BD-Cambio Climático	Península de Guanahacabibes, San Felipe, Cayo Largo and Jardines de la Reina	2010	Ongoing	N	N	N	N	N	N	110
T4.3	N	BD-CIP	All	2010	Ongoing	N	Y	Y	N	N	N	111

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## Chapter 4: French Guiana

Rachel Berzins<sup>1</sup>, Johan Chevalier<sup>2</sup>, Damien Chevalier<sup>3</sup>, Benoît De Thoisy<sup>4</sup>, Lauren Kelle<sup>5</sup>, Marie-Clélia Lankester<sup>6</sup>, and Michel Nalovic<sup>7</sup>

1. ONCFS Guyane, Campus agronomique, BP316, 97379 Kourou cedex.  
[rachel.berzins@oncfs.gouv.fr](mailto:rachel.berzins@oncfs.gouv.fr)
2. RNN Amana, Réserve Naturelle de l'Amana. [J.chevalier.rna@gmail.com](mailto:J.chevalier.rna@gmail.com)
3. CNRS-IPHC, UMR 7178-CBRS Unistra, 23 rue Becquerel, 67087 Strasbourg cedex 2.  
[damien.chevallier@iphc.cnrs.fr](mailto:damien.chevallier@iphc.cnrs.fr)
4. KWATA, 16 avenue Louis Pasteur 97300 Cayenne. [benoit@kwata.net](mailto:benoit@kwata.net)
5. WWF Guianas, Bat B, 2 avenue Gustave Charlery, 97300 Cayenne. [lkelle@wwf.fr](mailto:lkelle@wwf.fr)
6. RNN Amana, Maison de la Réserve, 270 avenue 31 décembre 1988, 97319 Awala-Yalimapo. [mc.lankaster.rna@gmail.com](mailto:mc.lankaster.rna@gmail.com)
7. CRPMEM, Dock du Larivot, 97351 Matoury. [bigsharkchum@yahoo.com](mailto:bigsharkchum@yahoo.com)

**Table 4.1. Main biology and conservation aspects of sea turtle Regional Management Units (RMU) occurring in French Guiana.**

TOPIC	REGIONAL MANAGEMENT UNIT					
	<i>Chelonia mydas</i> North West Atlantic		<i>Dermochelys coriacea</i> North West Atlantic		<i>Lepidochelys olivacea</i> North West Atlantic	
	CM	Ref #	DC	Ref #	LO	Ref #
<b>Occurrence</b>						
Nesting sites	Y	1 to 8; 14	Y	1 to 8; 14; 19	Y	1 to 8; 14
Pelagic foraging grounds	N	9;10;11	Y	13;23;21	Y	12;16
Benthic foraging grounds	Y	9;10;11	N	13;21;25	Y	12;16
<b>Key biological data</b>						
Nests/yr: recent average (range of years)	2530 (2008-2016)	1 to 8; 14	7961 (2008-2016)	1 to 8; 14	2997 (2008-2016)	1 to 8; 14
Nests/yr: recent order of magnitude	809-4634	1 to 8; 14	3244-16309	1 to 8; 14	1586-3955	1 to 8; 14
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	2	1 to 8; 14	2	1 to 8; 14	2	1 to 8; 14
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	2	1 to 8; 14	2	1 to 8; 14	2	1 to 8; 14
Nests/yr at "major" sites: recent average (range of years)						
Nests/yr at "minor" sites: recent average (range of years)						
Total length of nesting sites (km)	20	see note	20	see note	20	see note
Nesting females / yr	886 (2010-2016)	1 to 8; 14	1972 (2009-2016)	1 to 8; 14	1700 (2009-2016)	1 to 8; 14
Nests / female season (N)	2,27 (2012)	5	3,55 (2012)	5	1,3 (2012)	5
Female remigration interval (yrs) (N)	<=3	5;22	2 to 3	22	1.3	see note
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)						
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)	(iii) decreasing	23	(iii)stable to decreasing (West)	23	(iii) stable	23
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		50 000 (1988;1992)	19	(iii) 3257	18
<b>Published studies</b>						
Growth rates	N		N		N	
Genetics	Y	15	Y	26	Y	30
Stocks defined by genetic markers	N		Y	26	N	
Remote tracking (satellite or other)	Y	9;10;11;14	Y	13;14;20;25	Y	12;16;30
Survival rates	N		N		N	
Population dynamics	N		N		N	
Foraging ecology (diet or isotopes)	N		Y	20;21	N	
Capture-Mark-Recapture	N		N		N	
<b>Threats</b>						
Bycatch: presence of small scale / artisanal fisheries?	Y (SN,DN)	31	Y (SN,DN)	31	Y (SN,DN)	31
Bycatch: presence of industrial fisheries?	Y (ST)	31	Y (ST)	24;31	Y (ST)	31
Bycatch: quantified?	Y ST 0/Yr, N SN DN	31	Y ST 0/Yr, N SN DN	31	Y ST 0/Yr, N SN DN	31
Take. Intentional killing or exploitation of turtles	N		N		N	
Take. Egg poaching	Y	1 to 8	Y	1 to 8	N	
Coastal Development. Nesting habitat degradation	Y		Y		Y	
Coastal Development. Photopollution	Y	1 to 8	Y	1 to 8	Y	1 to 8
Coastal Development. Boat strikes	N		N		N	

Egg predation	Y	1 to 8	Y	1 to 8	Y	1 to 8
Pollution (debris, chemical)	NA		NA		NA	
Pathogens	Y	17	n/a		n/a	
Climate change	n/a		n/a		n/a	
Foraging habitat degradation	n/a		n/a		n/a	
Other	n/a		n/a		n/a	
<b>Long-term projects (&gt;5yrs)</b>						
Monitoring at nesting sites (period: range of years)	Y (1999-ongoing)	1 to 8	Y (1987-ongoing)	1 to 8	Y (1999-ongoing)	1 to 8
Number of index nesting sites	>=3	1 to 8	>=3	1 to 8	>=3	1 to 8
Monitoring at foraging sites (period: range of years)	N		N		N	
<b>Conservation</b>						
Protection under national law	Y	27	Y	27	Y	27
Number of protected nesting sites (habitat preservation) (% nests)	15%	<i>see note</i>	15%	<i>see note</i>	15%	<i>see note</i>
Number of Marine Areas with mitigation of threats	0		0		0	
N of long-term conservation projects (period: range of years)	1 (2009-2023)	28;29	1 (2009-2023)	28;29	1 (2009-2023)	28;29
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)	Y	32	Y	32	Y	32
By-catch: onboard best practices	Y	33	Y	33	Y	33
By-catch: spatio-temporal closures/reduction	N		N		N	
Other	N		N		N	

Note: **Tab 4.1 Line 16 Total length of nesting sites** / There is no report which details the length of the beaches. They are evaluated in agreement with the monitoring partners. Moreover, in French Guiana the beaches come back and forth because of the phases of erosion /accretion. So 20km is an approximate size of the nesting beaches. **Number of protected nesting sites (habitat preservation - line 67)** In theory, the nesting sites located in Amana Natural Reserve are protected. **Female migration interval (years) *Lepidochelys olivacea*, 1,3 years** > Calculated on data from CMR.

**Table 4.2. Sea turtle nesting beaches in the French Guiana.**

	Index site	Species	Nests/yr: recent average (2014-2016)	Crawls/ yr: recent average	Western limit		Eastern limit		Central point		Length (km)	% Monitore d	Referen ce #	Monitor ing Level (1-2)	Monitoring Protocol (A- F)
					Lon g	Lat	Lon g	Lat	Long	Lat					
NW Atlan tic	Awala Yalimapo	<i>Chelonia mydas</i>	1333 (2014- 2016)						53.947 422	5.7457 61	3.00	100	see note	level 1	Day patrols 3-5 times per week
NW Atlan tic	Azteque	<i>Chelonia mydas</i>	160 (2014- 2016)						53.742 747	5.6919 44	5.00	100	see note	level 2	Other
NW Atlan tic	Kourou	<i>Chelonia mydas</i>	51 (2015- 2016)						52.644 328	5.1736 75	5.00	90	see note	level 2	Weekly day patrols
NW Atlan tic	Ile de Cayenne	<i>Chelonia mydas</i>	54 ((2014- 2016)						52.270 484	4.9227 20	7.50	80	see note	level 2	Daily patrols
NW Atlan tic	Awala Yalimapo	<i>Dermochelys coriacea</i>	655 (2014- 2016)						53.947 422	5.7457 61	3.00	100	see note	level 1	Day patrols 3-5 times per week
NW Atlan tic	Azteque	<i>Dermochelys coriacea</i>	3 (2014- 2016)						53.742 747	5.6919 44	5.00	100	see note	level 2	Other
NW Atlan tic	Kourou	<i>Dermochelys coriacea</i>	48 (2015- 2016)						52.644 328	5.1736 75	5.00	90	see note	level 2	Weekly day patrols
NW Atlan tic	Ile de Cayenne	<i>Dermochelys coriacea</i>	4077 (2014- 2016)						52.270 484	4.9227 20	7.50	80	see note	level 1	Daily patrols
NW Atlan tic	Awala Yalimapo	<i>Lepidochelys olivacea</i>	8 (2014- 2016)						53.947 422	5.7457 61	3.00	100	see note	level 1	Night patrols 3-5 times per week



NW Atlantic	Azteque	<i>Lepidochelys olivacea</i>	4 (2014-2016)					53.742 747	5.6919 44	5.00	100	see note	level 2	Other
NW Atlantic	Kourou	<i>Lepidochelys olivacea</i>	35 (2015-2016)					52.644 328	5.1736 75	5.00	90	see note	level 2	Weekly day patrols
NW Atlantic	Ile de Cayenne	<i>Lepidochelys olivacea</i>	2918 (2014-2016)					52.270 484	4.9227 20	7.50	80	see note	level 1	Daily patrols

**Tab 4.1 Line 16 Total length of nesting sites / Tab 4.2 - Beaches length**

There is no report which details the length of the beaches. They are evaluated in agreement with the monitoring partners. Moreover, in French Guiana the beaches come back and forth because of the phases of erosion /accretion. So 20km is an approximate size of the nesting beaches.

**Table 4.3. International conventions protecting sea turtles and signed in French Guiana.**

International Conventions	Signed	Binding	Compliance measured and reported	Species	Conservation actions	Relevance to sea turtles
CBD: Convention on Biological Diversity (1992).	Y	Y	Y	ALL	To conserve the biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources, taking into account all rights over those resources and to technologies, and by appropriate funding.	Marine turtle conservation is relevant to the agreement given the species' importance to overall biological diversity. For example, text in Article 8 states that each contracting party shall: "promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings" (CBD, 1992).
CMS: Convention on the Conservation of Migratory Species of Wild Animals (1979). Also known as the Bonn Convention. CMS instruments can be both binding and non-binding.	Y	Y	Y	ALL	To conserve migratory species and take action to this end, paying special attention to migratory species the conservation status of which is unfavourable, and taking individually or in co-operation appropriate and necessary steps to conserve such species and their habitat.	All seven species of marine turtles are listed within the convention text (CMS, 2014). A specific agreement has been developed for marine turtles under CMS. The Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia (IOSEA), for example, to which the UK and France are individual EU country signatories. CMS has a specific resolution on bycatch detailing various

						actions needed to reduce bycatch of migratory species that will include marine turtles ( <i>UNEP/CMS/Resolution 9.18 on Bycatch</i> ).
Convention on the Conservation of European Wildlife and Natural Habitats (1979). Also known as the Bern Convention and is binding.	Y	Y	Y	ALL	To conserve wild flora and fauna and their natural habitats, especially those species and habitats whose conservation requires the co- operation of several States, and to promote such co-operation.	Conserving European natural heritage is a key element of this convention (CoE, 2014) and this will include marine turtle populations in the Mediterranean, for example. The EU aims to fulfil its obligations under the Bern Convention through its Habitats Directive (a directive designed to ensure the conservation of rare, threatened, or endemic animal and plant species) .
CITES: Convention on International Trade in Endangered Species of Wild Fauna and Flora.	Y	Y	Y	ALL	An international agreement between governments, the aim of which is to ensure that international trade in specimens of wild animals and plants does not threaten their survival.	All seven species listed in Appendix I of CITES.
Convention of Carthagene (1986)	Y	Y	Y	ALL	A Caribbean agreement for the protection and enhancement of the Caribbean Sea	

**Table 4.4. Sea turtle conservation projects in French Guiana.**

#	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		France	Guyane	Base de données de pontes tortues marines de Guyane	counting, marking	1987	still going	DEAL Guyane/ ONCFS	Private	8 Signatories of the convention: DEAL, ONCFS, KWATA, CNRS-IPHC, PNRG, Kulalasi, WWF, SEPANGUY			Hélène DELVAUX, helene.delvaux@developpement-durable.gouv.fr	Rachel BERZINS Rachel.berzins@oncfs.gouv.fr
T4.2		France	Guyane	Pépinière Interdisciplinaire Guyane (PIG): ANTIDOT project	satellite tracking, genetic	2014	still going	CNRS-IPHC	Public/ Private	Institut Pasteur Guyane, BGenDiv, Université Fédéral Minas Gerais			Damien Chevallier damien.chevallier@iphc.cnrs.fr	Benoît de Thoisy benoit@kwata.net

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## Chapter 5: Guadeloup

Caroline Cremades and Sophie Lefèvre

ONF, Jardin Botanique, 97100 Basse Terre. [caroline.cremades@onf.fr](mailto:caroline.cremades@onf.fr); [sophie.lefevre@onf.fr](mailto:sophie.lefevre@onf.fr)

**Table 5.1. Main biology and conservation aspects of sea turtle Regional Management Units (RMU) occurring in Guadeloup.**

Topic	REGIONAL MANAGEMENT UNIT									
	<i>Chelonia mydas</i> North West Atlantic		<i>Dermochelys coriacea</i> North West Atlantic		<i>Eretmochelys imbricata</i> North West Atlantic		<i>Caretta caretta</i> North West Atlantic		<i>Lepidochelys olivacea</i> North West Atlantic	
	CM	Ref #	DC	Ref #	Ei	Ref #	CC	Ref #	LO	Ref #
<b>Occurrence</b>										
Nesting sites	Y	18	Y	18	Y	18	N		N	
Pelagic foraging grounds	Y	13	n/a		Y	13	n/a		n/a	
Benthic foraging grounds	Y	13	n/a		Y	13	n/a		n/a	
<b>Key biological data</b>										
Nests/yr: recent average (range of years)	1315 (2007-2008)	7, Tab 4,1	353 (2007-2008)	7, Tab 4,1	3061 (2007-2008)	7, Tab 4,1	n/a		n/a	
Nests/yr: recent order of magnitude	179 - 2873	7	64 - 870	7	1435 - 6415	7	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)	2,93 (9 populations)	25, 26	6,17 (4 populations)	25, 26	4,5 (212 ind.)	25, 27	n/a		n/a	
Female remigration interval (yrs) (N)	2,86 (9 populations)	25, 26	2,28 (5 populations)	25, 26	2,69 (86)	25, 27	n/a		n/a	
Sex ratio: Hatchlings (F / Tot) (N)	0,71 (55)	16	n/a		0,71 (35)	16	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)	75 CCL	Tab 4,1	87 CCL	Tab 4,1	73,5 CCL	Tab 4,1	n/a		n/a	
Age at maturity (yrs)	n/a		n/a		n/a		n/a		n/a	



Clutch size (n eggs) (N)	112,8 (24 populations)	22	100	22	155 (93 nests)	25, 27	n/a		n/a	
Emergence success (hatchlings/egg) (N)	0,81 (29)	16	n/a		0,91 (19)	16	n/a		n/a	
Nesting success (Nests/ Tot emergence tracks) (N)	n/a		n/a		n/a		n/a		n/a	
<b>Trends</b>										
Recent trends (last 20 yrs) at nesting sites (range of years)	n/a		n/a		n/a		n/a		n/a	
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	
<b>Published studies</b>										
Growth rates	N		N		N		N		N	
Genetics	Y	9	Y	10	Y	11	N		N	
Stocks defined by genetic markers	Y	9	Y	10	Y	11	N		N	
Remote tracking (satellite or other)	Y	5, 12, 13, 1	Y	15	Y	17	N		N	
Survival rates	N		N		N		N		N	
Population dynamics	Y	7, 17, 16	Y	7, 17	Y	14, 16, 7, 17	N		N	
Foraging ecology (diet or isotopes)	Y	1, 12,13	N		N		N		N	
Capture-Mark-Recapture	Y	1	N		N		N		N	
<b>Threats</b>										
Bycatch: presence of small scale / artisanal fisheries?	Y (SN, FP)	6, 8	Y (SN, FP)	6, 8	Y (SN, FP)	6, 8	Y (SN, FP)	6, 8	Y (SN, FP)	6, 8
Bycatch: presence of industrial fisheries?	N		N		N		N		N	
Bycatch: quantified?	500 (SN, FP)	8, 2, 3, 6	n/a	8, 2, 3, 6	200 (SN, FP)	8, 2, 3, 6	n/a		n/a	
Take. Intentional killing or exploitation of turtles	Y	2, 3	n/a		Y	2, 3	n/a		n/a	
Take. Egg poaching	Y	2, 3	n/a		Y	2, 3	n/a		n/a	
Coastal Development. Nesting habitat degradation	Y	2, 3, 18	Y	2, 3, 18	Y	2, 3, 18	n/a		n/a	
Coastal Development. Photopollution	Y	2, 3, 19	Y	2, 3, 19	Y	2, 3, 19	n/a		n/a	
Coastal Development. Boat strikes	Y	2, 3	Y	2, 3	Y	2, 3	Y	2, 3	Y	2, 3

Egg predation	Y	2, 3, 4	Y	2, 3, 4	Y	2, 3, 4	n/a		n/a	
Pollution (debris, chemical)	Y	2, 3, 21	Y	2, 3, 21	Y	2, 3, 21	Y	2, 3	Y	2, 3
Pathogens	Y	2, 3, 20	n/a		n/a		n/a		n/a	
Climate change	n/a		n/a		n/a		n/a		n/a	
Foraging habitat degradation	Y	2, 3, 23	n/a		Y	24	n/a		n/a	
Other	N		N		N		n/a		n/a	
<b>Long-term projects (&gt;5yrs)</b>										
Monitoring at nesting sites (period: range of years)	Y (1999-ongoing)		Y (1999-ongoing)		Y (1999-ongoing)		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 (2003 - 2014)		n/a		Y (2003 - 2014)		n/a		n/a	
<b>Conservation</b>										
Protection under national law	Y	28	Y	28	Y	28	Y	28	Y	28
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/a		n/a		n/a		n/a		n/a	
N of long-term conservation projects (period: range of years)	>1 (1999-2027)	28	>1 (1999-2027)	28	>1 (1999-2027)	28	>1 (1999-2027)	28	>1 (1999-2027)	28
In-situ nest protection (eg cages)	N		N		N		n/a		n/a	
Hatcheries	N		N		N		n/a		n/a	
Head-starting	N		N		N		n/a		n/a	
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	

Note: No idea if increasing or declining, Data not published yet.

**Table 5.2. Sea turtle nesting beaches in the Guadeloup.**

RMU / Nesting beach name	Index site	Species	Nests/yr: recent average (range of years)	Crawls/yr: recent average (2012, 2013, 2014)	Western limit		Eastern limit		Central point		Length (km)	% Monitored	Reference #	Monitoring Level (1-2)	Monitoring Protocol (A-F)
					Long	Lat	Long	Lat	Long	Lat					
North West Atlantic	Secteur 1 : Grand Cul-de-Sac Marin	<i>Eretmochelys imbricata</i>		1105.3					61.535331	16.332888		89	T4.2	1	
North West Atlantic	Secteur 1 : Grand Cul-de-Sac Marin	<i>Dermochelys coriacea</i>		85.0					61.535331	16.332888		89	T4.2	1	
North West Atlantic	Secteur 1 : Grand Cul-de-Sac Marin	<i>Chelonia mydas</i>		38.2					61.535331	16.332888		89	T4.2	1	
North West Atlantic	Secteur 2 : Basse Terre - Côte sous le vent	<i>Eretmochelys imbricata</i>		515.3					61.774859	16.151056		90	T4.2	1	
North West Atlantic	Secteur 2 : Basse Terre - Côte sous le vent	<i>Dermochelys coriacea</i>		59.6					61.774859	16.151056		90	T4.2	1	
North West Atlantic	Secteur 2 : Basse Terre - Côte sous le vent	<i>Chelonia mydas</i>		47.9					61.774859	16.151056		90	T4.2	1	
North West Atlantic	Secteur 3 : Basse Terre - Côte au vent	<i>Eretmochelys imbricata</i>		126.3					61.564317	16.031895		69	T4.2	1	
North West Atlantic	Secteur 3 : Basse Terre - Côte au vent	<i>Dermochelys coriacea</i>		82.2					61.564317	16.031895		69	T4.2	1	
North West Atlantic	Secteur 3 : Basse Terre - Côte au vent	<i>Chelonia mydas</i>		22.6					61.564317	16.031895		69	T4.2	1	
North West Atlantic	Secteur 4 : Façade littorale nord-est de Grande Terre	<i>Eretmochelys imbricata</i>		126.3					61.370591	16.219534		82	T4.2	1	
North West Atlantic	Secteur 4 : Façade littorale nord-est de Grande Terre	<i>Dermochelys coriacea</i>		0.6					61.370591	16.219534		82	T4.2	1	
North West Atlantic	Secteur 4 : Façade littorale nord-est de Grande Terre	<i>Chelonia mydas</i>		0.7					61.370591	16.219534		82	T4.2	1	
North West Atlantic	Secteur 5 : Façade littorale sud-est de Grande Terre	<i>Eretmochelys imbricata</i>		52.5					61.374918	16.340537		67	T4.2	1	

North West Atlantic	Secteur 5 : Façade littorale sud-est de Grande Terre	<i>Dermochelys coriacea</i>		0.0				61.3749 18	16.34053 7		67	T4.2	1
North West Atlantic	Secteur 5 : Façade littorale sud-est de Grande Terre	<i>Chelonia mydas</i>		157.8				61.3749 18	16.34053 7		67	T4.2	1
North West Atlantic	Secteur 6 : la Désirade et Petite Terre	<i>Eretmochelys imbricata</i>		398.7				61.0966 39	16.28912 4		100	T4.2	1
North West Atlantic	Secteur 6 : la Désirade et Petite Terre	<i>Dermochelys coriacea</i>		42.2				61.0966 39	16.28912 4		100	T4.2	1
North West Atlantic	Secteur 6 : la Désirade et Petite Terre	<i>Chelonia mydas</i>		701.1				61.0966 39	16.28912 4		100	T4.2	1
North West Atlantic	Secteur 7 : Marie-Galante	<i>Eretmochelys imbricata</i>		1975.8				61.3275 70	15.92918 7		67	T4.2	1
North West Atlantic	Secteur 7 : Marie-Galante	<i>Dermochelys coriacea</i>		0.3				61.3275 70	15.92918 7		67	T4.2	1
North West Atlantic	Secteur 7 : Marie-Galante	<i>Chelonia mydas</i>		5.3				61.3275 70	15.92918 7		67	T4.2	1
North West Atlantic	Secteur 8 : Iles des Sainte	<i>Eretmochelys imbricata</i>		32.6				61.6032 23	15.92918 7		85	T4.2	1
North West Atlantic	Secteur 8 : Iles des Sainte	<i>Dermochelys coriacea</i>		0.3				61.6032 23	15.85385 8		85	T4.2	1
North West Atlantic	Secteur 8 : Iles des Sainte	<i>Chelonia mydas</i>		4.3				61.6032 23	15.85385 8		85	T4.2	1
North West Atlantic	Secteur 10 : île de Saint Martin	<i>Eretmochelys imbricata</i>		107.4				63.0520 71	18.10727 9		88	T4.2	1
North West Atlantic	Secteur 10 : île de Saint Martin	<i>Dermochelys coriacea</i>		0.0				63.0520 71	18.10727 9		88	T4.2	1
North West Atlantic	Secteur 10 : île de Saint Martin	<i>Chelonia mydas</i>		257.4				63.0520 71	18.10727 9		88	T4.2	1

**Table 5.3. International conventions protecting sea turtles and signed in Guadeloup.**

International Conventions	Signed	Binding	Compliance measured and reported	Species	Conservation actions	Relevance to sea turtles
CBD: Convention on Biological Diversity (1992).	Y	Y	Y	ALL	To conserve the biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources, taking into account all rights over those resources and to technologies, and by appropriate funding.	Marine turtle conservation is relevant to the agreement given the species' importance to overall biological diversity. For example, text in Article 8 states that each contracting party shall: "promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings" (CBD, 1992).
CMS: Convention on the Conservation of Migratory Species of Wild Animals (1979). Also known as the Bonn Convention. CMS instruments can be both binding and non-binding.	Y	Y	Y	ALL	To conserve migratory species and take action to this end, paying special attention to migratory species the conservation status of which is unfavourable, and taking individually or in co-operation appropriate and necessary steps to conserve such species and their habitat.	All seven species of marine turtles are listed within the convention text (CMS, 2014). A specific agreement has been developed for marine turtles under CMS. The Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia (IOSEA), for example, to which the UK and France are individual EU country signatories. CMS has a specific resolution on bycatch detailing various actions needed to reduce bycatch of migratory species that will include marine turtles ( <i>UNEP/CMS/Resolution 9.18 on Bycatch</i> ).
Convention on the Conservation of European Wildlife and Natural Habitats (1979). Also known as the Bern Convention and is binding.	Y	Y	Y	ALL	To conserve wild flora and fauna and their natural habitats, especially those species and habitats whose conservation requires the co-operation of several States, and to promote such co-operation.	Conserving European natural heritage is a key element of this convention (CoE, 2014) and this will include marine turtle populations in the Mediterranean, for example. The EU aims to fulfil its obligations under the Bern Convention through its Habitats Directive (a directive designed to ensure the conservation of rare, threatened, or endemic animal and plant species).
CITES: Convention on International Trade in Endangered Species of Wild Fauna and Flora.	Y	Y	Y	ALL	An international agreement between governments, the aim of which is to ensure that international trade in specimens of wild animals and plants does not threaten their survival.	All seven species listed in Appendix I of CITES.
Convention of Carthage (1986)	Y	Y	Y	ALL	A Caribbean agreement for the protection and enhancement of the Caribbean Sea	

**Table 5.4. Sea turtle conservation projects in Guadeloup.**

#	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)
T4.1	North West Atlantic	France	Guadeloupe et Saint Martin	Base de données de pontes tortues marines de Guadeloupe et Saint Martin	Database, crawls, monitoring beaches	2000	still going	Reseau Tortues Marines de Guadeloupe (actually ONF)	Public				Caroline CREMADES, caroline.cremades@onf.fr
T4.2	North West Atlantic	France	Guadeloupe et Saint Martin	Swot database	Nesting Data, crawls	2012	2014	SWOT	Public				

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## Chapter 6: Martinique

Caroline Cremades and Sophie Lefèvre

ONF, Jardin Botanique, 97100 Basse Terre. [caroline.cremades@onf.fr](mailto:caroline.cremades@onf.fr); [sophie.lefevre@onf.fr](mailto:sophie.lefevre@onf.fr)

**Table 6.1. Main biology and conservation aspects of sea turtle Regional Management Units (RMU) occurring in Martinique**

	REGIONAL MANAGEMENT UNIT					
	<i>Chelonia mydas</i> North West Atlantic		<i>Dermochelys coriacea</i> North West Atlantic		<i>Eretmochelys imbricata</i> North West Atlantic	
Topics	CM	Ref #	DC	Ref #	Ei	Ref #
<b>Occurrence</b>						
Nesting sites	Y	8	Y	8	Y	8
Pelagic foraging grounds	NA		n/a		NA	
Benthic foraging grounds	NA		n/a		NA	
<b>Key biological data</b>						
Nests/yr: recent average (range of years)	n/a		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)	n/a		n/a		n/a	
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	n/a		n/a		n/a	
Nests/yr at "major" sites: recent average (range of years)	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)	n/a		n/a		n/a	
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)	70.00	T 4,1	105 CCL	T 4,1	70 CCL	T 4,1
Age at maturity (yrs)	n/a		n/a		n/a	
Clutch size (n eggs) (N)	110 to 130	6	100	6	110 to 180	6
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		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	
<b>Published studies</b>						
Growth rates	Y	5	N		N	
Genetics	Y	10	N	11	Y	12
Stocks defined by genetic markers	Y	10	Y	11	Y	12
Remote tracking (satellite or other)	Y	5	N		Y	3
Survival rates	N		N		N	

Population dynamics	N		N		N	
Foraging ecology (diet or isotopes)	Y	2,3,4,5	N		N	
Capture-Mark-Recapture	Y	3.5	N		Y	3.5
<b>Threats</b>						
Bycatch: presence of small scale / artisanal fisheries?	Y (SN, FP)	19.2	Y (SN, FP)	19.2	Y (SN, FP)	19.2
Bycatch: presence of industrial fisheries?	N		N		N	
Bycatch: quantified?	500 (SN, FP)	9,19,20	n/a		200 (SN, FP)	9,19,20
Take. Intentional killing or exploitation of turtles	Y	T4.3	n/a		Y	T4.3
Take. Egg poaching	n/a		n/a		n/a	
Coastal Development. Nesting habitat degradation	Y	8	Y	8	Y	8
Coastal Development. Photopollution	Y	8.15	Y	8.15	Y	8.15
Coastal Development. Boat strikes	n/a		n/a		n/a	
Egg predation	Y	21	Y	21	Y	21
Pollution (debris, chemical)	Y	16	Y	16	Y	16
Pathogens	n/a		n/a		n/a	
Climate change	n/a		n/a		n/a	
Foraging habitat degradation	Y	2.5	n/a		n/a	
Other	N		N		N	
<b>Long-term projects (&gt;5yrs)</b>						
Monitoring at nesting sites (period: range of years)	Y (2004-2015)	T 4.1	Y (2004-2015)	T 4.1	Y (2004-2015)	T 4.1
Number of index nesting sites	Y	8	Y	8	Y	8

Monitoring at foraging sites (period: range of years)	Y (2013/2017)	3.4	n/a		n/a	
<b>Conservation</b>						
Protection under national law	Y	23	Y	23	Y	23
Number of protected nesting sites (habitat preservation) (% nests)	n/a		n/a		n/a	
Number of Marine Areas with mitigation of threats	n/a		n/a		n/a	
N of long-term conservation projects (period: range of years)	>1 (1999-2027)	23	>1 (1999-2027)	23	>1 (1999-2027)	23
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 6.2. Sea turtle nesting beaches in the Martinique.**

RMU / Nesting beach name	Index site	Species	Nests/yr: recent average (range of years)	Crawls/yr: recent average (2011, 2013, 2014)	Western limit		Eastern limit		Central point		Length (km)	% Monitored	Reference #	Monitoring Level (1-2)
					Long	Lat	Long	Lat	Long	Lat				
North West Atlantic	Secteur 1 : Le Diamant	<i>Eretmochelys imbricata</i>		282.745	2.58				61.030619	14.477817		100	T4.2	1
North West Atlantic	Secteur 1 : Le Diamant	<i>Dermochelys coriacea</i>		26.6	2.58				61.030619	14.477817		100	T4.2	1
North West Atlantic	Secteur 1 : Le Diamant	<i>Chelonia mydas</i>		9.8	2.58				61.030619	14.477817		100	T4.2	1
North West Atlantic	Secteur 2 : Le Prêcheur-Anse à Voile	<i>Eretmochelys imbricata</i>		155.7	0.25				61.215379	14.847575		100	T4.2	1
North West Atlantic	Secteur 2 : Le Prêcheur-Anse à Voile	<i>Dermochelys coriacea</i>		33.6	0.25				61.215379	14.847575		100	T4.2	1
North West Atlantic	Secteur 3 : Le Prêcheur-Anse Lévrier	<i>Eretmochelys imbricata</i>		200.2	0.19				61.218319	14.845833		100	T4.2	1
North West Atlantic	Secteur 3 : Le Prêcheur-Anse Lévrier	<i>Dermochelys coriacea</i>		21.3	0.19				61.218319	14.845833		100	T4.2	1
North West Atlantic	Secteur 3 : Le Prêcheur-Anse Lévrier	<i>Chelonia mydas</i>		21.5	0.19				61.218319	14.845833		100	T4.2	1
North West Atlantic	Secteur 4 : Lorrain-Crabière	<i>Eretmochelys imbricata</i>		84.7	0.25				61.062900	14.839132		100	T4.2	1
North West Atlantic	Secteur 4 : Lorrain-Crabière	<i>Dermochelys coriacea</i>		200.5	0.25				61.062900	14.839132		100	T4.2	1
North West Atlantic	Secteur 5 : Lorrain-Grande Anse Lorrain	<i>Eretmochelys imbricata</i>		39.8	0.93				61.059124	14.835802		100	T4.2	1
North West Atlantic	Secteur 5 : Lorrain-Grande Anse Lorrain	<i>Dermochelys coriacea</i>		107.5	0.93				61.059124	14.835802		100	T4.2	1

North West Atlantic	Secteur 6 : Sainte-Marie Anse Charpentier	<i>Eretmochelys imbricata</i>		20.18	0.35				61.018503	14.809475		100	T4.2	1
North West Atlantic	Secteur 6: Sainte-Marie Anse Charpentier	<i>Dermochelys coriacea</i>		145.0	0.35				61.018503	14.809475		100	T4.2	1
North West Atlantic	Secteur 7 :Sainte-Anne Anse-à-Prune	<i>Eretmochelys imbricata</i>		94.4	0.51				60.865665	14.396859		100	T4.2	1
North West Atlantic	Secteur 7 :Sainte-Anne Anse-à-Prune	<i>Dermochelys coriacea</i>		110.3	0.51				60.865665	14.396859		100	T4.2	1
North West Atlantic	Secteur 8: Sainte-Anne Anse Four à Chaux	<i>Eretmochelys imbricata</i>		200.5	0.36				60.813481	14.475579		100	T4.2	1
North West Atlantic	Secteur 8 : Sainte-Anne Anse Four à Chaux	<i>Dermochelys coriacea</i>		79.3	0.36				60.813481	14.475579		100	T4.2	1
North West Atlantic	Secteur 9 : Sainte- Anne Anse Grosse Roche	<i>Eretmochelys imbricata</i>		113.915	0.92				60.813505	14.483792		100	T4.2	1
North West Atlantic	Secteur 9 : Sainte- Anne Anse Grosse Roche	<i>Dermochelys coriacea</i>		252.385	0.92				60.813505	14.483792		100	T4.2	1
North West Atlantic	Secteur 10 : Sainte-Anne Anse Meunier	<i>Eretmochelys imbricata</i>		45.115	0.8				60.885675	14.413924		100	T4.2	1
North West Atlantic	Secteur 10 : Sainte-Anne Anse Meunier	<i>Dermochelys coriacea</i>		45.395	0.8				60.885675	14.413924		100	T4.2	1
North West Atlantic	Secteur 10 : Sainte-Anne Anse Meunier	<i>Chelonia mydas</i>		4.61	0.8				60.885675	14.413924		100	T4.2	1
North West Atlantic	Secteur 11 : Sainte-Anne Anse Trabaud	<i>Eretmochelys imbricata</i>		220.48	1.5				60.849511	14.410617		100	T4.2	1
North West Atlantic	Secteur 11 : Sainte-Anne Anse Trabaud	<i>Dermochelys coriacea</i>		113.29	1.5				60.849511	14.410617		100	T4.2	1
North West Atlantic	Secteur 12: Sainte-Anne Grande Terre	<i>Eretmochelys imbricata</i>		325.7	0.56				60.871888	14.396360		100	T4.2	1

North West Atlantic	Secteur 12: Sainte-Anne Grande Terre	<i>Dermochelys coriacea</i>		116.0	0.56				60.871888	14.396360		100	T4.2	1
North West Atlantic	Secteur 13 : Sainte-Anne Grande Anse Salines	<i>Dermochelys coriacea</i>		150	1.3				60.878734	14.403352		100	T4.2	1
North West Atlantic	Secteur 13 : Sainte-Anne Grande Anse Salines	<i>Eretmochelys imbricata</i>		150	1.3				60.878734	14.403352		100	T4.2	1
North West Atlantic	Secteur 14 : Vauclin Grand Macabout	<i>Eretmochelys imbricata</i>		25.9	1.47				60.823730	14.497353		100	T4.2	1
North West Atlantic	Secteur 14 : Vauclin Grand Macabout	<i>Dermochelys coriacea</i>		268.46	1.47				60.823730	14.497353		100	T4.2	1

**Table 6.3. International conventions protecting sea turtles and signed in Martinique.**

International Conventions	Signed	Binding	Compliance measured and reported	Species	Conservation actions	Relevance to sea turtles
CBD: Convention on Biological Diversity (1992).	Y	Y	Y	ALL	To conserve the biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources, taking into account all rights over those resources and to technologies, and by appropriate funding.	Marine turtle conservation is relevant to the agreement given the species' importance to overall biological diversity. For example, text in Article 8 states that each contracting party shall: "promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings" (CBD, 1992).
CMS: Convention on the Conservation of Migratory Species of Wild Animals (1979). Also known as the Bonn Convention. CMS instruments can be both binding and non-binding.	Y	Y	Y	ALL	To conserve migratory species and take action to this end, paying special attention to migratory species the conservation status of which is unfavourable, and taking individually or in co-operation appropriate and necessary steps to conserve such species and their habitat.	All seven species of marine turtles are listed within the convention text (CMS, 2014). A specific agreement has been developed for marine turtles under CMS. The Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia (IOSEA), for example, to which the UK and France are individual EU country signatories. CMS has a specific resolution on bycatch detailing various



						actions needed to reduce bycatch of migratory species that will include marine turtles ( <i>UNEP/CMS/Resolution 9.18 on Bycatch</i> ).
Convention on the Conservation of European Wildlife and Natural Habitats (1979). Also known as the Bern Convention and is binding.	Y	Y	Y	ALL	To conserve wild flora and fauna and their natural habitats, especially those species and habitats whose conservation requires the co- operation of several States, and to promote such co-operation.	Conserving European natural heritage is a key element of this convention (CoE, 2014) and this will include marine turtle populations in the Mediterranean, for example. The EU aims to fulfil its obligations under the Bern Convention through its Habitats Directive (a directive designed to ensure the conservation of rare, threatened, or endemic animal and plant species) .
CITES: Convention on International Trade in Endangered Species of Wild Fauna and Flora.	Y	Y	Y	ALL	An international agreement between governments, the aim of which is to ensure that international trade in specimens of wild animals and plants does not threaten their survival.	All seven species listed in Appendix I of CITES.
Convention of Carthagene (1986)	Y	Y	Y	ALL	A Caribbean agreement for the protection and enhancement of the Caribbean Sea	

**Table 6.4. Sea turtle conservation projects in Martinique.**

#	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)
T4.1		France	Martinique	Base de données de pontes tortues marines de Martinique	Database, crawls, monitoring beaches	2004	2015	Reseau Tortues Marines de Martinique (actually ONF)	Public				Caroline CREMADES, caroline.cremades@onf.fr
T4.2		France	Martinique	Swot database	Nesting Data, crawls	2011	2014	SWOT	Public				
T4.3		France	Martinique	tableau récapitulatif des menaces avérées entre 2004 et 2015	poaching, predation, disturbance, crawls	2004	2015	ONCFS	Public				

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- 23 Plan d'action pour les tortues marines de la Martinique 2008/2012

## Chapter 7: Mexico

Eduardo Cuevas<sup>1</sup>, Vicente Guzmán-Hernández<sup>2</sup>, Adriana Laura Sarti-Martínez<sup>3</sup>, Melania López-Castro<sup>4</sup>, Miriam Tzeek-Tuz<sup>5</sup>, Diana Lira-Reyes<sup>4</sup>, Leonel Gómez Nieto<sup>5</sup>, David Gerardo Castañeda-Ramírez<sup>6</sup>, Sandra Gallegos-Fernández<sup>7</sup>, Cristóbal Cáceres-G-Cantón<sup>8</sup>, Antonio Ortíz-Hernández<sup>6</sup>, and Guadalupe Quintana-Pali<sup>5</sup>

1. CONACYT-Universidad Autónoma del Carmen, Centro de Investigación de Ciencias Ambientales. Cd. Del Carmen, Campeche, México. [amir.cuevas@gmail.com](mailto:amir.cuevas@gmail.com)
2. Área de Protección de Flora y Fauna Laguna de Términos, Comisión Nacional de Áreas Naturales Protegidas, Ciudad del Carmen, Campeche, México. [vguzman@conanp.gob.mx](mailto:vguzman@conanp.gob.mx)
3. Dirección de Especies Prioritarias, Comisión Nacional de Áreas Naturales Protegidas. Ciudad de México, México. [lsarti@conanp.gob.mx](mailto:lsarti@conanp.gob.mx)
4. Pronatura Península de Yucatán, A. C. Mérida, Yucatán, México. [mlopez@pronaturapppy.org.mx](mailto:mlopez@pronaturapppy.org.mx)
5. Flora, Fauna y Cultura de México, A. C. Playa del Carmen, Quintana Roo, México. [tortugasmarinas1@florafaunaycultura.org](mailto:tortugasmarinas1@florafaunaycultura.org)
6. Fundación Palace. Puerto Morelos, Quintana Roo, México. [dcastaneda@palaceresorts.com](mailto:dcastaneda@palaceresorts.com)
7. CINVESTAV-IPN, Unidad Mérida. Mérida, Yucatán, México. [sagafe18@gmail.com](mailto:sagafe18@gmail.com)
8. Reserva de la Biosfera Ría Lagartos, Comisión Nacional de Áreas Naturales Protegidas. Mérida, Yucatán, México. [ccaceres@conanp.gob.mx](mailto:ccaceres@conanp.gob.mx)

### 7.1. Distribution, abundance, trends.

#### 7.1.1. Nesting sites.

In this Regional Management Unit (RMU) we have nesting activity of hawksbill (*Eretmochelys imbricata*), Kemp's ridley (*Lepidochelys kempii*), green (*Chelonia mydas*), loggerhead (*Caretta caretta*) and leatherback (*Dermochelys coriacea*) (1, 2, 36, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 40, 41, 42, 43, 44, 45, 52, 53, 58, 59).

The nesting beaches are located all over the Mexican littoral in the Gulf of Mexico (GoM) and Caribbean Sea (Table 7.1), with hawksbills presenting the highest nesting intensity in the Yucatan Peninsula (Figure 7.1a), the of Kemp's ridleys in northwestern GoM (Figure 7.1b), greens having the widest distribution in the GoM and Caribbean (Figure 1c), and loggerheads mainly restricted to the Caribbean Sea (Figure 7.1d).

**Table 7.1. Main biology and conservation aspects of sea turtle Regional Management Units (RMU) occurring in Mexico.**

Topic	<i>Eretmochelys imbricata</i> Northwest Atlantic	Ref #	<i>Lepidochelys kempii</i> Northwest Atlantic	Ref #	<i>Chelonia mydas</i> Northwest Atlantic	Ref #	<i>Caretta caretta</i> Northwest Atlantic	Ref #	<i>Dermochelys coriácea</i> Northwest Atlantic
<b>Occurrence</b>									
Nesting sites	Y	1,2	Y	36	Y	8,9,10,11,12,13,14,15,16,17,18,40,41,42,43,44,45,58	Y	52,53,58,59	Y
Pelagic foraging grounds	Y	3	Y		n/a		n/a	52,53	Y
Benthic foraging grounds	Y	4,5,6,7,7a	Y		Y	46	Y	46	N
<b>Key biological data</b>									
Nests/yr: recent average (range of years)	3578 (1995-2016)	8,9,10,11,12,13,14,15,16,17,18	12000 (2009-2015)	36	13505 (2000-2016)	8,9,10,11,12,13,14,15,16,17,18,40,41,42,43,44,45,61,62,63,64,65,66	1713 (2000-2016)	40,41,42,43,44,45,61,62,63,64,65,66	n/a
Nests/yr: recent order of magnitude	>500	8,9,10,11,12,13,14,15,16,17,18			>3500 (2000-2016)		1713 (2000-2016)		<20
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	5	8	3	37	14		8		<10
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	6	8	7	37	4				5
Nests/yr at "major" sites: recent average (range of years)	500		12000 (2009-2015)		>3,500		184.5 (2000-2016)		n/a

Nests/yr at "minor" sites: recent average (range of years)	n/a		n/a		<50		n/a		n/a
Total length of nesting sites (km)	275	8	212	36,37	160	8,9,10,11,12, 13,14, 15,16,17,18, 40,41,42, 43,44,45,61, 62,63,64,65,66	30	40,41,42, 43,44,45,61, 62,63,64, 65,66	n/a
Nesting females / yr	>1000 (1995-2016)	8	5000	37	4220	8,9,10,11,12,13, 14,15,16,17, 18,40,41, 42,43,44,45	n/a		n/a
Nests / female season (N)	2.5 (>500)	8,19	2	37	3.85 (>2000)	8,9,10,11,12, 38,57,60	2.33	52,54,57	n/a
Female remigration interval (yrs) (N)	3.21 (>500)	8,19	n/a		2.27 (>500)	38	2.63	52	n/a
Sex ratio: Hatchlings (F / Tot) (N)	n/a		n/a		n/a		n/a		n/a
Sex ratio: Immatures (F / Tot) (N)	60M:40F (102)	20	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)	89.95 CCL	20.00	63.5 CCL	37.00	108.01 SCL	39	n/a		n/a
Age at maturity (yrs)	15-20yr	20	14-25	36,37,67	14-25yr	39	n/a		n/a
Clutch size (n eggs) (N)	138.78 (>1000)	19,20	95(xxx)	37	108.86 (>1000)	8,9,10,11,12,13, 14,15,16,17, 18,40,41,42, 43,44,45,61, 62,63,64,65,66	109.86	40,41,42, 43,44,45,54	n/a
Emergence success (hatchlings/egg) (N)	78.35 (>3000)(2006- 2016)	8,9,10,11, 12,13, 14,15,16, 17,18	0.57 (10560)	36	80.62 (>1000)	8,9,10,11,12,13, 14,15,16,17,18,40, 41,42,43,44,45	81.98	54	<40%
Nesting success (Nests/ Tot emergence tracks) (N)	n/a		n/a		n/a		n/a		n/a

<b>Trends</b>									
Recent trends (last 20 yrs) at nesting sites (range of years)	Slightly Down (1995-2016)	8,9,10,11,12,13,14,15,16,17,18	Up (1995-2015)	36,37	Up ≈19% (2000-2016)	8,9,10,11,12,13,14,15,16,17,18,40,41,42,43,44,45,61,62,63,64,65,66	Up ≈6.7% (2000-2016)	40,41,42,43,44,45,61,62,63,64,65,66	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
<b>Published studies</b>									
Growth rates	Y	4	Y		Y	46,47,56	N		n/a
Genetics	Y	21,22	N		Y	48,49	Y		n/a
Stocks defined by genetic markers	Y	22	N		Y	49	n/a		n/a
Remote tracking (satellite or other)	Y	23,24	Y		Y	50,51	Y	53	n/a
Survival rates	N		N		N		N		n/a
Population dynamics	Y	25	N		Y		Y		n/a
Foraging ecology (diet or isotopes)	Y		Y		Y		N		n/a
Capture-Mark-Recapture	Y	25	Y		Y	38	Y		n/a
<b>Threats</b>									
Bycatch: presence of small scale / artisanal fisheries?	Y (PLL, DLL, SN,FP)	26	Y (SN,ST)	37	Y (PLL, DLL, SN,FP)	26	Y		Y
Bycatch: presence of industrial fisheries?	Y (PLL, DLL, ST, MT, FP)	27	Y (ST)	37	Y (PLL, DLL, ST, MT, FP)	26	N		N
Bycatch: quantified?	Y	26	Y		Y	26	Y		N



Take. Intentional killing or exploitation of turtles	Y		Y		Y		Y	54	N
Take. Egg poaching	Y	8,9,10,11,12	Y	37	Y		Y		N
Coastal Development. Nesting habitat degradation	Y	8,9,10,11,12,28	Y		Y		Y		Y
Coastal Development. Photopollution	Y	29	Y		Y		Y		Y
Coastal Development. Boat strikes	Y		Y		Y		Y		Y
Egg predation	Y	8,9,10,11,12	Y		Y		Y		N
Pollution (debris, chemical)	Y	29,30,31,32	Y	37	Y		Y		Y
Pathogens	Y	33	n/a		Y		Y		n/a
Climate change	Y	34,35	Y	37	Y		Y		Y
Foraging habitat degradation	n/a		n/a		Y		n/a		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 (1988-ongoing)		Y (1977-ongoing)		Y (1988-ongoing)	8,9,10,11,12,13,14,15,16,17,18,40,41,42,43,44,45	Y (1988-ongoing)		n/a
Number of index nesting sites	9		6	36	13		8		n/a
Monitoring at foraging sites (period: range of years)	Y (2001-ongoing)		N		Y (2001-ongoing)	46	Y		n/a
<b>Conservation</b>									
Protection under national law	Y		Y		Y		Y		Y
Number of protected nesting sites (habitat preservation) (% nests)	MAIN NESTING SITE PROTECTED		50		n/a		n/a		n/a
Number of Marine Areas with mitigation of threats			0		n/a		n/a		n/a

N of long-term conservation projects (period: range of years)	>5 (1990-ongoing)		1 (1975-2011)		>5 (1990-ongoing)		>10 (1990-ongoing)		n/a
In-situ nest protection (eg cages)	Y		Y	36	Y		Y		Y
Hatcheries	Y		Y	36	Y		Y		Y
Head-starting	N		N	36	Y		N		N
By-catch: fishing gear modifications (eg, TED, circle hooks)	Y		Y	37	Y		Y		Y
By-catch: onboard best practices	Y		Y		Y		N		N
By-catch: spatio-temporal closures/reduction	Y		Y		Y		Y		Y
Other	n/a				n/a		n/a		n/a

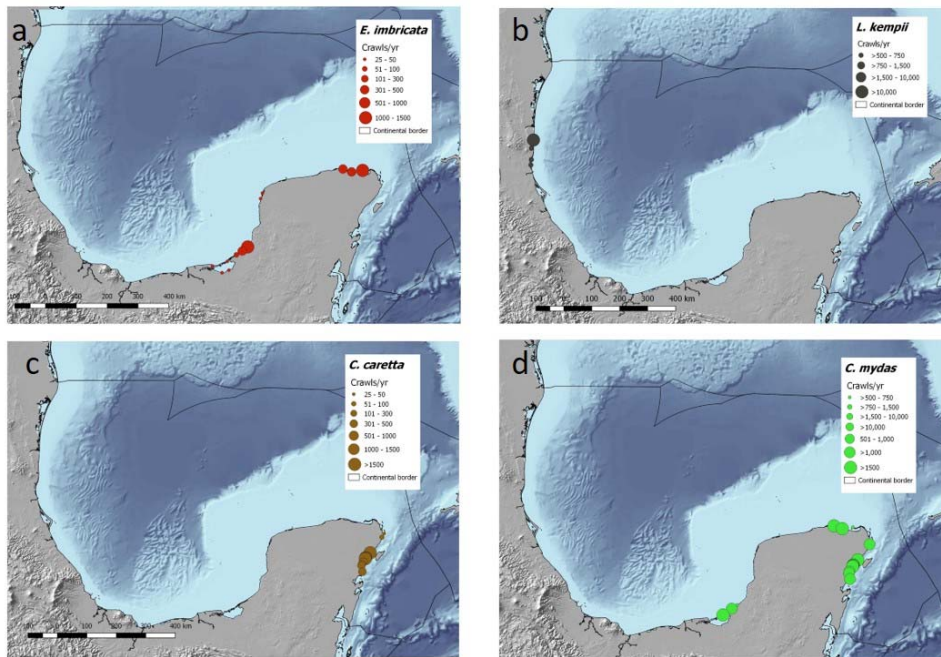


Figure 7.1. Main sea turtle nesting beaches for four species in Mexican littoral in the Gulf of Mexico.

Western GoM is underrepresented in these maps, there are very important Kemp's Ridley and green turtles nesting beaches, as well as some peculiar hawksbill nesting zones in islands of a reef system in front of Veracruz, and minor nesting beaches for this same species in the south-central littoral in GoM.

Some of the nesting beaches in the map are considered Index nesting beaches in the region, representing general trends for these species in Mexico. The range of crawl/year activity in the region is highly variable, going from 25 to more than 1,500, and in the case of Kemp's Ridley to even more than 15,000 crawls/yr (Table 7.1).

Also, the length of the nesting beaches is highly variable, going from some hundreds of meters to several dozens of kilometers, but all of them with Monitoring level 1, and protocol B.

**Table 7.2. Nesting activity (clutches and crawls) for the compiled sea turtle nesting beaches for four species (*L. kempii* (Lk), *E. imbricata* (Ei), *C. mydas* (Cm), *C. caretta* (Cc)) in the Mexican littoral in the Gulf of Mexico and Caribbean Sea.**

We also include the length of the beaches, the coordinates and the monitoring level and protocol implemented.

Nesting beach name	Index site	Average number of Crawls per year				Central point		Length (km)	% Monitored	Reference #	Monitoring Level (1-2)	Monitoring Protocol (A-F)
		Lk	Ei	Cm	Cc	Long	Lat					
<b>LK-NW-ATL</b>												
Rancho Nuevo	Y	>10000				-97.7703	23.3332	30	100	36	1	B
Barra del Tordo	Y	>1500				-97.83755	23.055269	45	100	36	1	B
Altamira	Y	>750				-97.840297	22.6705944	19	100	36	1	B
Miramar	Y	>500				-97.856527	22.49375	20	100	36	1	B
<b>EI-NW ATL</b>												
San Lorenzo	Y		100-300			-90.453814	20.702917	1.8	100	8	1	B
Punta Xen			1001-1500			-90.845167	19.232956	30	100	8	1	B
Chenkan	Y		501-1000			-91.013167	19.107806	18	100	8	1	B
Sabancuy			301-500			-91.188833	18.991528	24.5	100	8	1	B
Isla Aguada	Y		301-501			-91.466387	18.792072	28.2	100	8	1	B
Chacahito			50-100			-91.419386	18.524425	9	100	8	1	E
Xicalango			50-101			-91.9167	18.6489	9	100	8	1	E
Victoria			50-102			-91.625689	18.446986	14	100	8	1	E
Celestun	Y		100-300			-90.39771	20.86853	24	100	13,14,15,16,17,18	1	B
Las Coloradas	Y		501-1000			-87.94328	21.60462	21.5	100	13,14,15,16,17,18	1	B
El Cuyo	Y		501-1000			-87.67949	21.51783	25	100	13,14,15,16,17,18	1	B
Holbox	Y		1001-1500			-87.34255	21.563952	24	100	13,14,15,16,17,18	1	B
<b>CM-NW-ATL</b>												
Chenkan	Y			25-50		-91.013167	19.107806	18	100	8	1	B
Sabancuy				1001-1500		-91.188833	18.991528	24.5	100	8	1	B

Isla Aguada	Y		>1500		-91.466387	18.792072	28.2	100	8	1	B
Las Coloradas	Y		>1500		-87.94328	21.60462	21.5	100	13,14,15,16,17,18	1	B
El Cuyo	Y		>1500		-87.67949	21.51783	25	100	13,14,15,16,17,18	1	B
Cancun			100-300		-86.741667	21.138889	0.3	100	40,41,42,43,44,45	1	B
Tamul			1001-1500		-86.81336	21.02236	9	100	40,41,42,43,44,45	1	B
Paamul	Y		>1500		-87.1878	20.5281	2.5	100	61,62,63,64,65	1	B
Aventuras DIF	Y		>1500		-87.3325	20.3681	1.5	100	61,62,63,64,65	1	B
Chemuyil	Y		>1500		-87.3386	20.3517	0.3	100	61,62,63,64,65	1	B
Xcachel	Y		>1500		-87.3436	20.3408	2.5	100	61,62,63,64,65	1	B
Xel-Ha	Y		>1500		-87.3519	20.3189	0.3	100	61,62,63,64,65	1	B
Kanzul	Y		1001-1500		-87.4511	20.1669	4	100	61,62,63,64,65	1	B
Cahpechen	Y		1001-1500		-87.4664	20.1225	8.5	100	61,62,63,64,65	1	B
San Juan	Y		1001-1500		-87.4364	19.9264	5	100	61,62,63,64,65	1	B
Holbox	Y		100-300		-87.34255	21.563952	24	100	13,14,15,16,17,18	1	B
<b>CC-NW-ATL</b>											
Cancun				<25	-86.741667	21.138889	0.3	100	40,41,42,43,44,45	1	B
Tamul				50-100	-86.81336	21.02236	9	100	40,41,42,43,44,45	1	B
Paamul	Y			301-500	-87.1878	20.5281	2.5	100	61,62,63,64,65	1	B
Aventuras DIF	Y			301-500	-87.3325	20.3681	1.5	100	61,62,63,64,65	1	B
Chemuyil	Y			301-500	-87.3386	20.3517	0.3	100	61,62,63,64,65	1	B
Xcachel	Y			301-500	-87.3436	20.3408	2.5	100	61,62,63,64,65	1	B
Tankah	Y			100-300	-87.4072	20.2464	0.3	100	61,62,63,64,65	1	B
Kanzul	Y			100-300	-87.4511	20.1669	4	100	61,62,63,64,65	1	B
Cahpechen	Y			100-300	-87.4664	20.1225	8.5	100	61,62,63,64,65	1	B
San Juan	Y			100-300	-87.4364	19.9264	5	100	61,62,63,64,65	1	B

Regarding the abundances of nesting females, the smallest number is for hawksbill turtles with some more individuals than 1,000 each year in the past 21 years for all this RMU, the green turtle rookeries are the next with more than 4,000 individuals per year, and the highest number is of course the Kemp's Ridley nesting populations up to 5,000 individuals per year in the whole RMU (Table 7.2).

**Table 7.2. Summary of the abundance levels for nesting populations in this RMU. (Ei: *E. imbricata*; Lk: *L. kempii*; Cm: *C. mydas*; Cc: *C. caretta*).**

Parameter	Ei	Lk	Cm	Cc	References
Nesting females/yr	>1,000	5,000	4,220	n/a	8, 10, 11, 12, 13, 14, 15, 16, 17, 18, 37, 40, 41, 42, 43, 44, 45
Nests/female/yr	2.5	2	3.85	2.33	8, 10, 11, 12, 19, 37, 38, 52, 54, 57, 60
Female remigration interval	3.21	n/a	2.27	2.63	8, 19, 37, 38, 52

After almost three decades of nesting beach monitoring and conservation efforts, almost the four species present clear increasing trends. In a long term period of evaluation (20 years) the trend of the number of registered nests for hawksbill turtles is slightly down (8,9,10,11,12,13,14,15,16,17,18), it is going up for Kemp's Ridelys (36,37), up ( $\approx 19\%$ ) for green turtles (8,9,10,11,12,13,14,15,16,17,18,40,41,42,43,44,45,61,62,63,64), and also going up ( $\approx 6.7\%$ ) for loggerhead turtles (40,41,42,43,44,45,61,62,63,64,65,66).

#### **7.1.1. Marine areas.**

Derived from several satellite tracking projects for the four-dominant species in this RMU, the main feeding and migratory grounds for post-nesting individuals are well known (Figure 5.2). There is a close link between north and south Gulf of Mexico, particularly between the peninsulas of Florida and Yucatan, sharing important nesting rookeries.

There is also a reported link between the nesting beaches inside the Mexican littoral of the GoM and some feeding grounds in the Caribbean, fact that supports the need of multinational conservation efforts for restoring these populations.

As in many parts of the world, the costs of doing in-water monitoring and research are higher than those for the nesting beaches, provoking big information gaps for the marine life stages and for their habitats.

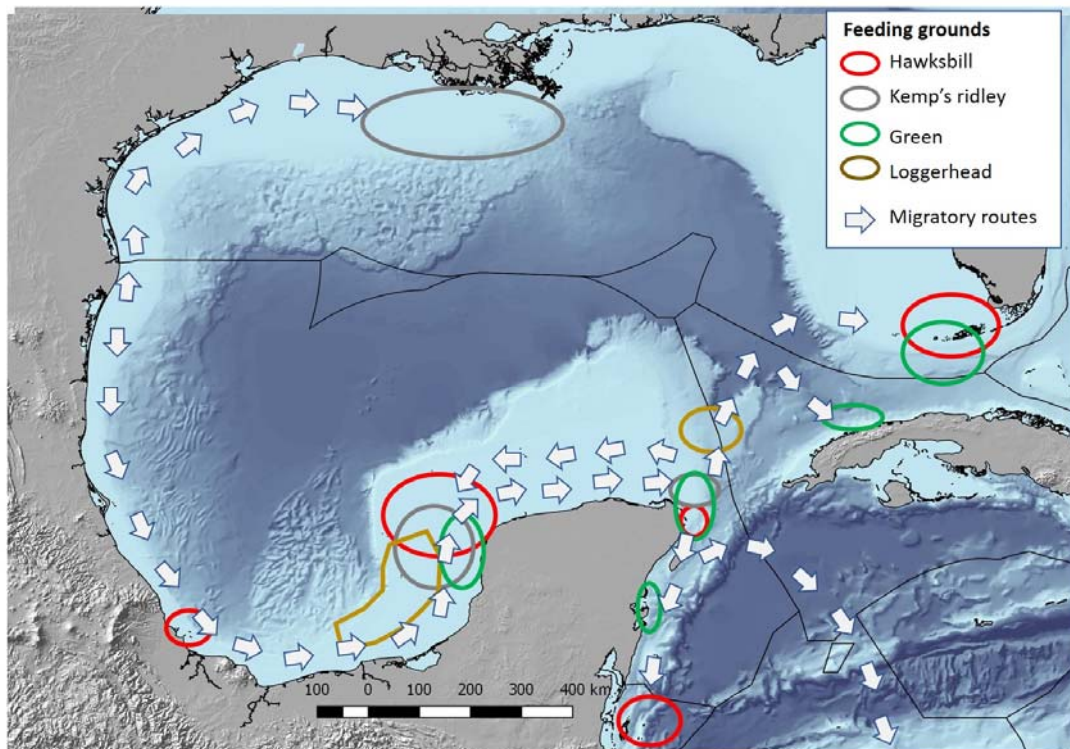


Figure 7.2. Schematic representation of the location of main feeding grounds per species and their main migratory routes from nesting beaches in the Mexican territory, and inside the Northwest Atlantic RMU.

## 7.2. Other biological data

Some key information for population recovery is the success of incubation periods, with reported values of emergence success for hawksbills close to 78% (8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18), 57% for Kemp's Ridley (36), 80% for green turtles (8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 40, 41, 42, 43, 44, 45), and 82% for loggerheads (54).

## 7.3. Threats.

### 7.3.1. Nesting sites.

### 7.3.2. Marine areas.

In land, one of the main threats to sea turtles and their habitats in Mexico is the coastal development, including all the variants and different factors associated with it. It is the result of gaps in federal laws, as well as a lack of a strategic planning for urbanization that considers the natural capital in our country. And in-water, one of the main threats is the bycatch, there are illegal fishing gears that are used close to sea turtle aggregations (feeding and reproductive) and every year cause hundreds of dead in this region.

**Table 7.3. Reported threats for nesting beaches and in-water habitats in the Mexican territory of the northwest Atlantic RMU.**

Codes for fishing gears: PLL: Pelagic Longlines; DLL: demersal longlines; SN: Set Nets; DN: Drift Nets; ST: Shrimp Trawls; MT: Multispecific bottom Trawls; PT: Pelagic Trawls; FP: Fish/Crustacean Pots/Traps; PN: Pound net) (Y: Yes, N: No).

Threat	Ei	Reference	Lk	Reference	Cm	Reference	Cc	Reference
Bycatch: presence of small scale / artisanal fisheries?	Y (PLL, DLL, SN,FP)	26	Y (SN,ST)	37	Y (PLL, DLL, SN,FP)	26	Y	54
Bycatch: presence of industrial fisheries?	Y (PLL, DLL, ST, MT, FP)	27	Y (ST)	37	Y (PLL, DLL, ST, MT, FP)	26	N	54
Bycatch: quantified?	Y	26	Y		Y	26	Y	54
Take. Intentional killing or exploitation of turtles	Y		Y		Y		Y	54
Take. Egg poaching	Y	8,9,10,11,12	Y	37	Y		Y	54
Coastal Development. Nesting habitat degradation	Y	8,9,10,11,12,28	N		Y		Y	54
Coastal Development. Photopollution	Y	29	N		Y		Y	54
Coastal Development. Boat strikes	Y		Y		Y		Y	54
Egg predation	Y	8,9,10,11,12	Y		Y		Y	54
Pollution (debris, chemical)	Y	29,30,31,32	Y	37	Y		Y	54
Pathogens	Y	33	n/a		Y		Y	54
Climate change	Y	34,35	Y	37	Y		Y	54
Foraging habitat degradation	n/a		Y		Y		n/a	54
Other	n/a		n/a		n/a		n/a	54



#### **7.4. Conservation**

The four species have shown in different moments their resilience for recovery in the long term, and there are now several indicators suggesting that the conservation efforts that have been continuously implemented to protect nesting beaches and hatchlings are the reason why populations such as the green turtles are exponentially increasing in this RMU.

Mexico has already signed different international conventions to protect the sea turtles, banning their hunting and contributing to diminish the pressures over their critical habitats through distinct strategies (Table 7.4).

Besides these conventions and legal tools, sea turtles in Mexico are protected by two laws, the Mexican Official Norms 059 and 162 by the Ministry of Environment and Natural Resources (SEMARNAT in Spanish). The first one lists all the flora and fauna species considered endangered in Mexico, and it is the key law for endangered species protection.

In the other hand, the Norm 162 specifies the technical criteria that must be complied about sea turtle beach monitoring and how guided visits to nesting beaches must be done. This is a law that was born to standardize and regulate the conservation and protection activities that are done for sea turtle recovery in Mexico.

Regarding the conservation programs, the Sea Turtle Conservation Program in Mexico has recently achieved 50 years of continuous activities. The Mexican littoral where sea turtles nest, as well as the in-water where they stay, are monitored and studied by dozens, or maybe hundreds, of projects that have contributed from different points of view to build these half century of conservation actions in this RMU.

In terms of conservation priorities, the Federal Government, through different strategies for bringing together all the stakeholders that collaborate in sea turtle conservation, built the Action Programs for Species Conservation (PACE in Spanish), equivalent to a national recovery strategy, and every sea turtle species (6) in Mexico has its own instrument.

In these documents the participants who contributed to build them identified several actions to implement in terms of knowledge, management, restoration, protection, culture, lobbying, and climate change. These documents are the nowadays reference for priorities in sea turtle restoration in Mexico.

**Table 7.4. International Conventions that Mexico has signed for sea turtle conservation and recovery.**

International Conventions	Signed	Binding	Compliance measured and reported	Species	Conservation actions
CBD: Convention on Biological Diversity (1992).	Y	Y	Y	ALL	To conserve the biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources, taking into account all rights over those resources and to technologies, and by appropriate funding.
CMS: Convention on the Conservation of Migratory Species of Wild Animals (1979). Also known as the Bonn Convention. CMS instruments can be both binding and non-binding.	Y	Y	Y	ALL	To conserve migratory species and take action to this end, paying special attention to migratory species the conservation status of which is unfavorable, and taking individually or in co-operation appropriate and necessary steps to conserve such species and their habitat.
CITES: Convention on International Trade in Endangered Species of Wild Fauna and Flora.	Y	Y	Y	ALL	An international agreement between governments, the aim of which is to ensure that international trade in specimens of wild animals and plants does not threaten their survival.
UNCLOS: The United Nations Convention on the Law of the Sea. Came into force in 1994.	Y	Y	Y	ALL	An international treaty that defines the rights and responsibilities of nations with respect to their use of the world's oceans and establishes guidelines for the management of marine natural resources (Wikipedia, 2015).
Ramsar Convention	Y	Y	Y	ALL	Is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.
Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC)	Y	Y	Y	ALL	The Convention promotes the protection, conservation and recovery of the populations of sea turtles and those habitats on which they depend, based on the best available data and taking into consideration the environmental, socioeconomic and cultural characteristics of the Parties (Article II, Text of the Convention). These actions should cover both nesting beaches and the Parties' territorial waters.

### **7.5. Research.**

The conservation projects in the Mexican territory in this RMU do big efforts to publish and make public all the knowledge regarding sea turtles and their habitat in this region. However, as most of the projects that collect the data needed for generating the information are not run by scientific entities, and the resources are scarce, the scientific research is not the main priority in the sea turtle conservation programs, and in several cases, it is not even a priority for many national and international funding agencies.

With this said, the research that is done in the Mexican territory very frequently comes from opportunities with students to attend some of the information gaps, which are a lot, using the resources implemented for conserving, managing or monitoring the sea turtle populations and their habitats.

However, with huge efforts and very productive and strong alliances with national and international partners, in this RMU we have research efforts and publications regarding growth rates (4, 46, 47, 56), genetics (21, 22, 48, 49), stocks defined by genetic markers (22, 49), remote tracking (23, 24, 50, 51), population dynamics (25), foraging ecology (), capture-mark-recapture (25, 38), among others.

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## Chapter 8: Saint Eustach

Jessica Berkel

Marine Park Manager, STENAPA, Gallows Bay z/n, Lower Town, St Eustatius, Dutch Caribbean,  
[research@statiapark.org](mailto:research@statiapark.org)

**Table 8.1. Main biology and conservation aspects of sea turtle Regional Management Units (RMU) occurring in Saint Eustach.**

	<i>Regional Management Unit</i>					
	<i>Chelonia mydas</i> Northwest Atlantic		<i>Eretmochelys imbricata</i> Northwest Atlantic		<i>Dermochelys coriacea</i> Northwest Atlantic	
	<b>CM-St Eustatius</b>	Ref #	<b>EI-St Eustatius</b>	Ref #	<b>DC-St Eustatius</b>	Ref #
<b>Occurrence</b>						
Nesting sites	Y	#1-#5	Y	#1-#5	Y	#1-#5
Pelagic foraging grounds	N	#1-#5	N	#1-#5	N	#1-#5
Benthic foraging grounds	Y	#1-#5	Y	#1-#5	N	#1-#5
<b>Key biological data</b>						
Nests/yr: recent average (range of years)	26 (2010-2014)	#1-#5	8.4 (2010-2014)	#1-#5	3 (2010-2014)	#1-#5
Nests/yr: recent order of magnitude	0-50	#1-#5	0-25	#1-#5	0-25	#1-#5
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	1	#1-#5	1	#1-#5	n/a	#1-#5
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	1	#1-#5	1	#1-#5	1	#1-#5
Nests/yr at "major" sites: recent average (range of years)	26 (2010-2014)	#1-#5	4.5 (2010-2014)	#1-#5	n/a	#1-#5
Nests/yr at "minor" sites: recent average (range of years)	5 (2010-2014)	#1-#5	5.25 (2010-2014)	#1-#5	3 (2010-2014)	#1-#5
Total length of nesting sites (km)	1.6	#1-#5	1.6	#1-#5	1.6	#1-#5
Nesting females / yr	175 (2010-2014)	#1-#5	90 (2010-2014)	#1-#5	24 (2010-2014)	#1-#5
Nests / female season (N)	n/a	#1-#5	n/a	#1-#5	n/a	#1-#5
Female remigration interval (yrs) (N)	2-3 (1)	#1-#5	n/a	#1-#5	n/a	#1-#5
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)	105.00	#1-#5	91.5	#1-#5	145	#1-#5
Age at maturity (yrs)	25-30		n/a		n/a	
Clutch size (n eggs) (N)	109.5 (104)	#1-#5	120 (42)	#1-#5	100 (15)	#1-#5

Emergence success (hatchlings/egg) (N)	0.82 (11,394)	#1-#5	0.68 (5051)	#1-#5	0.12 (1504)	#1-#5
Nesting success (Nests/ Tot emergence tracks) (N)	63% (6134)	#1-#5	68% (683)	#1-#5	17% (180)	#1-#5
<b>Trends</b>						
Recent trends (last 20 yrs) at nesting sites (range of years)	n/a		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)	7 (2002)	#1-#5	6 (2002)	#1-#5	10 (2002)	#1-#5
<b>Published studies</b>						
Growth rates	N		N		N	
Genetics	N		N		N	
Stocks defined by genetic markers	N		N		N	
Remote tracking (satellite or other)	Y		N		N	
Survival rates	N		N		N	
Population dynamics	N		N		N	
Foraging ecology (diet or isotopes)	N		N		N	
Capture-Mark-Recapture	Y		N		N	
<b>Threats</b>						
Bycatch: presence of small scale / artisanal fisheries?	Y		N		N	
Bycatch: presence of industrial fisheries?	N		N		N	
Bycatch: quantified?	N		N		N	
Take. Intentional killing or exploitation of turtles	N		N		N	
Take. Egg poaching	N		N		N	
Coastal Development. Nesting habitat degradation	Y		Y		Y	
Coastal Development. Photopollution	Y		Y		Y	
Coastal Development. Boat strikes	Y		Y		N	

Egg predation	N		N		N	
Pollution (debris, chemical)	Y		Y		Y	
Pathogens	Y		Y		Y	
Climate change	Y		Y		Y	
Foraging habitat degradation	Y		Y		N	
Other	N		N		N	
<b>Long-term projects (&gt;5yrs)</b>						
Monitoring at nesting sites (period: range of years)	Y (2002-ongoing)	#1-#5	Y (2002-ongoing)	#1-#5	Y (2002-ongoing)	#1-#5
Number of index nesting sites	1	#1-#5	1	#1-#5	1	#1-#5
Monitoring at foraging sites (period: range of years)	Y (2007-ongoing)	#1-#5	Y (2007-ongoing)	#1-#5	N	#1-#5
<b>Conservation</b>						
Protection under national law	Y	#1-#5	Y	#1-#5	Y	#1-#5
Number of protected nesting sites (habitat preservation) (% nests)	6 (100%)	#1-#5	6 (100%)	#1-#5	1 (100%)	#1-#5
Number of Marine Areas with mitigation of threats	1	#1-#5	1	#1-#5	1	#1-#5
N of long-term conservation projects (period: range of years)	>1 (2002-ongoing)	#1-#5	>1 (2002-ongoing)	#1-#5	>1 (2002-ongoing)	#1-#5
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 8.2. Sea turtle nesting beaches in the Saint Eustach.**

RMU / Nesting beach name	Index 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 #	Monitoring Level (1-2)	Monitoring Protocol (A-F)
					Long	Lat	Long	Lat	Long	Lat					
North West Atlantic	Zeelandia Beach	CM	26 (2010-2014)	52 (2010-2014)	17 30 365	062 58 835	17 30 060	062 58 255	17 30 129	062 58 388	1.4	100	#1 - #5	1	B
North West Atlantic	Zeelandia Beach	Ei	5.4 (2010-2014)	20.6 (2010-2014)	17 30 365	062 58 835	17 30 060	062 58 255	17 30 129	062 58 388	1.4	100	#1 - #5	1	B
	Oranjebay		3 (2010-2014)	14 (2010-2014)							1.5	100	#1 - #5	1	B
North West Atlantic	Zeelandia Beach	Dc	3 (2010-2014)	7.4 (2010-2014)	17 30 365	062 58 835	17 30 060	062 58 255	17 30 129	062 58 388	1.4	100	#1 - #5	1	B

**Table 8.3. International conventions protecting sea turtles and signed in Saint Eustach.**

International Conventions	Signed	Binding	Compliance measured and reported	Species	Conservation actions	Relevance to sea turtles
Inter-American Convention for the protection of sea turtles	Y	Y	Y	ALL	Protection, Monitoring and tagging	Covers Sea turtles in the Caribbean
SPAW protocol	Y	Y	Y	ALL	Protection, Monitoring and tagging	Covers Sea turtles in the Caribbean

**Table 8.4. Sea turtle conservation projects in Saint Eustach.**

#	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	CM-EUX	St Eustatius	Caribbean Netherlands	St Eustatius Sea Turtle Conservation Program	Tracking; Nesting female; Caribbean Netherlands: Zeelandia	2002	Ongoing	St Eustatius National Parks Foundation	Public	DCNA,	<a href="http://www.statiapark.org">www.statiapark.org</a>	n/a	Jessica Berkel, research@statiapark.org	Clarisse Buma manager@statiapark.org
T4.2	EI-EUX	St Eustatius	Caribbean Netherlands	St Eustatius Sea Turtle Conservation Program	Tracking; Nesting female; Caribbean Netherlands: Zeelandia	2002	Ongoing	St Eustatius National Parks Foundation	Public	DCNA,	<a href="http://www.statiapark.org">www.statiapark.org</a>	n/a	Jessica Berkel, research@statiapark.org	
T4.3	DC-EUX	St Eustatius	Caribbean Netherlands	St Eustatius Sea Turtle Conservation Program	Tracking; Nesting female; Caribbean Netherlands: Zeelandia	2002	Ongoing	St Eustatius National Parks Foundation	Public	DCNA,	<a href="http://www.statiapark.org">www.statiapark.org</a>	n/a	Jessica Berkel, research@statiapark.org	Clarisse Buma manager@statiapark.org

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## Chapter 9: Saint Pierre et Miquelon

Frank Urtizbera

DTAM975, boulevard Constant Colmay BP 4217, 97500 Saint Pierre et Miquelon.

frank.urtizbera@equipement-agriculture.gouv.fr

**Table 9.1. Main biology and conservation aspects of sea turtle Regional Management Units (RMU) occurring in Saint Pierre et Miquelon.**

	<i>Caretta caretta</i> North-West atlantic		<i>Dermochelys coriacea</i> North-West atlantic	
	CC-NW ATL	Ref #	DC-NW ATL	Ref #
<b>Topic</b>				
<b>Occurrence</b>				
Nesting sites	N		N	
Pelagic foraging grounds	N/A		Y	2,3,5,6,7
Benthic foraging grounds	Y	7	Y	2,3,5,6,7
<b>Key biological data</b>				
Nests/yr: recent average (range of years)	n/a		n/a	
Nests/yr: recent order of magnitude	n/a		n/a	
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	n/a		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		n/a	
Nests/yr at "minor" sites: recent average (range of years)	n/a		n/a	
Total length of nesting sites (km)	n/a		n/a	
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)	n/a		n/a	



Age at maturity (yrs)	n/a		n/a	
Clutch size (n eggs) (N)	n/a		n/a	
Emergence success (hatchlings/egg) (N)	n/a		n/a	
Nesting success (Nests/ Tot emergence tracks) (N)	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	
Oldest documented abundance: nests/yr (range of years)			n/a	
<b>Published studies</b>				
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	N		N	
	N			
<b>Threats</b>				
Bycatch: presence of small scale / artisanal fisheries?	NA	7	N	
Bycatch: presence of industrial fisheries?	Y		N	
Bycatch: quantified?	Y		N	
Take. Intentional killing or exploitation of turtles	N		N	
Take. Egg poaching	N		N	
Coastal Development. Nesting habitat degradation	N		N	
Coastal Development. Photopollution	N		N	
Coastal Development. Boat strikes	N		Y/N	7
Egg predation	N		N	
Pollution (debris, chemical)	NA	7	NA	7
Pathogens	N		N	

Climate change	n/a		n/a	
Foraging habitat degradation	n/a		n/a	
Other	Y (see text)		N	
<b>Long-term projects (&gt;5yrs)</b>				
Monitoring at nesting sites (period: range of years)	N		N	
Number of index nesting sites	N		N	
Monitoring at foraging sites (period: range of years)	N		N	
<b>Conservation</b>				
Protection under national law	Y	7	Y	7
Number of protected nesting sites (habitat preservation) (% nests)	NA		NA	
Number of Marine Areas with mitigation of threats	N		N	
N of long-term conservation projects (period: range of years)	N		N	
In-situ nest protection (eg cages)	NA		NA	
Hatcheries	NA		NA	
Head-starting	N		N	
By-catch: fishing gear modifications (eg, TED, circle hooks)	N		N	
By-catch: onboard best practices	N		N	
By-catch: spatio-temporal closures/reduction	N		N	
Other				

**Table 9.2. Sea turtle nesting beaches in the Saint Pierre et Miquelon**

Non occurring.

**Table 9.3. International conventions protecting sea turtles and signed in Saint Pierre et Miquelon**

International Conventions	Signed	Binding	Compliance measured and reported	Species	Conservation actions	Relevance to sea turtles
CBD: Convention on Biological Diversity (1992).	Y	Y	Y	ALL	To conserve the biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources, taking into account all rights over those resources and to technologies, and by appropriate funding.	Marine turtle conservation is relevant to the agreement given the species' importance to overall biological diversity. For example, text in Article 8 states that each contracting party shall: "promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings" (CBD, 1992).
CMS: Convention on the Conservation of Migratory Species of Wild Animals (1979). Also known as the Bonn Convention. CMS instruments can be both binding and non-binding.	Y	Y	Y	ALL	To conserve migratory species and take action to this end, paying special attention to migratory species the conservation status of which is unfavourable, and taking individually or in co-operation appropriate and necessary steps to conserve such species and their habitat.	All seven species of marine turtles are listed within the convention text (CMS, 2014). A specific agreement has been developed for marine turtles under CMS. The Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia (IOSEA), for example, to which the UK and France are individual EU country signatories. CMS has a specific resolution on bycatch detailing various actions needed to reduce bycatch of migratory species that will include marine turtles ( <i>UNEP/CMS/Resolution 9.18 on Bycatch</i> ).
Convention on the Conservation of European Wildlife and Natural Habitats (1979). Also known as the Bern Convention and is binding.	Y	Y	Y	ALL	To conserve wild flora and fauna and their natural habitats, especially those species and habitats whose conservation requires the co-operation of several States, and to promote such co-operation.	Conserving European natural heritage is a key element of this convention (CoE, 2014) and this will include marine turtle populations in the Mediterranean, for example. The EU aims to fulfil its obligations under the Bern Convention through its Habitats Directive (a directive designed to ensure the

						conservation of rare, threatened, or endemic animal and plant species) .
CITES: Convention on International Trade in Endangered Species of Wild Fauna and Flora.	Y	Y	Y	ALL	An international agreement between governments, the aim of which is to ensure that international trade in specimens of wild animals and plants does not threaten their survival.	All seven species listed in Appendix I of CITES.
Convention of Carthagene (1986)	Y	Y	Y	ALL	A Caribbean agreement for the protection and enhancement of the Caribbean Sea	

**Table 9.4. Sea turtle conservation projects in Saint Pierre et Miquelon.**

#	RM U	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)
T4.1	North east atlantic	France	French fishing zones	OBSMER	At sea observer work,	2003	still going	DPMA	Public	IFREMER, MNHN, CNRS		State	DPMA

## References

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- 3 Ouellet M. & Galois P., 2009. Les tortues marines de l’archipel de Saint-Pierre et Miquelon. Rapport de mission scientifique réalisée pour SPM Frag’îles. Amphibia-Nature, Gaspé, Québec, 25 p.
- 4 Bédel S., 2011. Rapport de mission du 3 au 21 octobre 2011 sur la sensibilisation à la présence des tortues marines autour de l’archipel de St-Pierre-et Miquelon : Animations scolaires, projections-débats, enquête (rencontres individuelles et téléphoniques). SPM Frag’Iles.
- 5 Urtizbérrea F., 2011. Studies of biodiversity and ecology of marine mammals and leatherbacks near Saint-Pierre & Miquelon (France). NAMMCO (North Atlantic Marine Mammal Commission) Working Group on Abundance. From March 7 to 11, 2011, Copenhagen, Denmark.
- 6 Les tortues à Saint Pierre et Miquelon – DTAM975 GTMF Poster 2015
- 7 Urtizbérrea F. et al. 2013 Observations de Tortues Luth de l'archipel de St. Pierre et Miquelon



## **Chapter 10. St Barthelemy FWI**

Claire Saladin, DVM PhD

Widecast Coordinator for the Island of St Martin FWI

IUCN SSC Wildlife Health Specialist Group Member

IUCN World Commission on Environmental Law Ocean, Coasts and Coral Reefs Specialist Group Member

clairesaladin@hotmail.com

This report objectives are:

- ☆ To describe the Excel Charts' data including the unpublished data referenced from the Environmental Agency of Saint Barthelemy FWI and my individual observation and analysis.
- ☆ To describe actual Conservation and Research Projects concerning Sea Turtles on Saint Barthelemy FWI.
- ☆ To recommend and suggest new Conservation and Research Projects for the Endangered Species on Saint Barthelemy FWI.

**Table 10.1. Main table: Main biology and conservation aspects of Sea Turtle Regional Management Units occurring in Saint Barthelemy FWI.**

SAINT BARTHELEMY FWI										
RMU Caribbean / NorthWest Atlantic	<i>Chelonia mydas</i>	Ref #	<i>Dermochelys coriacea</i>	Ref #	<i>Eretmochelys imbricata</i>	Ref #	<i>Caretta caretta</i>	Ref #	<i>Lepidochelys olivacea</i>	Ref #
Occurrence										
Nesting sites	Y 15	1;2	Y 2	1;2	Y 17	1;2	N	2;3	N	2;3
Pelagic foraging grounds	Y Cf Fig 1	1;2;3;4	n/a	1;2;3;4	Y Cf. Fig 1	1;2;3;4	Y?	2;3	Y?	2;3
Benthic foraging grounds	Y Cf Fig 1	1;2;3;4	n/a	1;2;3;4	Y Cf Fig 1	1;2;3;4	Y?	2;3	Y?	2;3
Key biological data										
Nests/yr: recent average (range of years) : rate based on crawls observed	2.25 (1982-2018)	2	0,4 (1982-2018)	2	3,75 (1982-2018)	2	n/a		n/a	
Nests/yr: recent order of magnitude	0 - 17	2	0 - 3	2	0 - 18	2	n/a		n/a	
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	0	1;2	0	1;2	0	1;2	n/a		n/a	
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	15	2	2	2	17	2	n/a		n/a	



**Table 10.1. Main table: Main biology and conservation aspects of Sea Turtle Regional Management Units occurring in Saint Barthelemy FWI.**

SAINT BARTHELEMY FWI										
Nests/yr at "major" sites: recent average (range of years)	n/a	1;2	n/a	1;2	n/a	1;2	n/a		n/a	
Nests/yr at "minor" sites: recent average (range of years)	0.15 (1982-2018)	1;2	0.20 (1982-2018)	1;2	0.22 (1982-2018)	1;2	n/a		n/a	
Total length of nesting sites (km)	6.400	2	1,155	2	6,725	2	n/a		n/a	
Nesting females / yr	n/a	1;2	n/a	1;2	n/a	1;2	n/a		n/a	
Nests / female season	n/a	1;2	n/a	1;2	n/a	1;2	n/a		n/a	
Female remigration interval (yrs)	n/a	1;2	n/a	1;2	n/a	1;2	n/a		n/a	
Sex ratio: hatchlings (F / Tot)	n/a	1;2	n/a	1;2	n/a	1;2	n/a		n/a	
Sex ratio: juveniles (F / Tot)	n/a	1;2	n/a	1;2	n/a	1;2	n/a		n/a	
Sex ratio: Adults (F / Tot)	n/a	1;2	n/a	1;2	n/a	1;2	n/a		n/a	
Min adult size, CCL or SCL (cm)	n/a	1;2	n/a	1;2	n/a	1;2	n/a		n/a	

**Table 10.1. Main table: Main biology and conservation aspects of Sea Turtle Regional Management Units occurring in Saint Barthelemy FWI.**

SAINT BARTHELEMY FWI										
Age at maturity (yrs)	n/a	1;2	n/a	1;2	n/a	1;2	n/a		n/a	
Clutch size (n eggs)	n/a	1;2	n/a	1;2	n/a	1;2	n/a		n/a	
Emergence success (hatchlings/egg)	n/a	1;2	n/a	1;2	n/a	1;2	n/a		n/a	
Nesting success (Nests/ Tot emergence tracks)	n/a	1;2	n/a	1;2	n/a	1;2	n/a		n/a	
Trends										
Recent trends (last 20 yrs) at nesting sites (range of years): data subject to volunteers availability variable factor	n/a	1;2	n/a	1;2	n/a	1;2	n/a		n/a	
Recent trends (last 20 yrs) at foraging grounds (range of years)	n/a	1;2	n/a	1;2	n/a	1;2	n/a		n/a	
Oldest documented abundance: nests/yr (range of years)	1982	1;2	1982	1;2	1982	1;2	n/a		n/a	
Published studies	Y	1	Y	1	Y	1	n/a		n/a	
Growth rates	N	1;2	N	1;2	N	1;2	n/a		n/a	

**Table 10.1. Main table: Main biology and conservation aspects of Sea Turtle Regional Management Units occurring in Saint Barthelemy FWI.**

SAINT BARTHELEMY FWI										
Genetics	N	1;2	N	1;2	N	1;2	n/a		n/a	
Stocks defined by genetic markers	N	1;2	N	1;2	N	1;2	n/a		n/a	
Remote tracking (satellite or other): Antoinette and Leleka see Table 4	N	1;2	N	1;2	Y	1;2	n/a		n/a	
Survival rates	N	1;2	N	1;2	N	1;2	n/a		n/a	
Population dynamics	n/a	1;2	n/a	1;2	n/a	1;2	n/a		n/a	
Foraging ecology (diet or isotopes)	N	1;2	N	1;2	N	1;2	n/a		n/a	
Capture-Mark-Recapture	N	1;2	N	1;2	N	1;2	n/a		n/a	
Threats										
Bycatch: small scale / artisanal	Y	2	Y	2	Y	1;2	Y	2	Y	2
Bycatch: industrial	N	2	N	2	N	1;2	N	2	N	2
Bycatch: quantified?	N	2	N	2	N	1;2	N	2	N	2
Intentional killing or exploitation of turtles	N	2	N	2	N	1;2	N	2	N	2



**Table 10.1. Main table: Main biology and conservation aspects of Sea Turtle Regional Management Units occurring in Saint Barthelemy FWI.**

SAINT BARTHELEMY FWI										
Protection under national law	Y	1;2;4;6;11	Y	1;2;4;6;11	Y	1;2;4;6;11	Y	1;2;6;11	Y	1;2;6;11
Number of protected nesting sites (habitat preservation)	15	1;2;11	2	1;2;11	17	1;2;11	n/a	1;2	n/a	1;2
Number of Marine Areas with mitigation of threats	1	1;Fig1	1	1;Fig1	1	1;Fig1	1	1;Fig1	1	1;Fig1
Long-term conservation projects (number)	2	1;2;4;9;10	2	1;2;4;9;10	2	1;2;4;9;10	2	1;2;4;9;10	2	1;2;4;9;10
In-situ nest protection (eg cages)	N	1;2	N	1;2	N	1;2	n/a	2	n/a	2
Hatcheries	N	1;2	N	1;2	N	1;2	n/a	2	n/a	2
Head-starting	N	1;2	N	1;2	N	1;2	n/a	2	n/a	2
By-catch: fishing gear modifications (eg, TED, circle hooks)	N	1;2	N	1;2	N	1;2	n/a	2	n/a	2
By-catch: onboard best practices	N	1;2	N	1;2	N	1;2	n/a	2	n/a	2
By-catch: spatio-temporal closures/reduction	N	1;2	N	1;2	N	1;2	n/a	2	n/a	2
Other : St Barthelemy's Environmental Agency accredited and responsible for law enforcement concerning environmental matters. Nesting Beaches monitoring	Y	1;2	Y	1;2	Y	1;2	Y	2	Y	2



## **10.1. Distribution, abundance, trends.**

### **10.1.1. Presence and Nesting sites.**

Three Species of Sea Turtles nest on Saint Barthelemy FWI: *Chelonia mydas*, *Eretmochelys imbricata* and *Dermochelys coriacea*.

*Caretta caretta* is most probably present in Saint Barthelemy's waters, a healthy individual having been observed foraging in St Martin's waters in 2017. *Caretta caretta* presence in Saint Barthelemy's waters has been confirmed by fishermen in July 2019.

An individual *Lepidochelys olivacea* has been found entangled in Grands Fonds in 2015. If the species is present or infrequently present in Saint Barthelemy's waters or if the entangled individual was drifting from further foraging grounds is unknown.





Erethmochelys imbricata										
Colombier	0.03 (1982-2018)	-62,869184	17,921572	-62,868090	17,923990	-62,868420	17,922935	0,310	100	1;2
Public	0,03 (1982-2018)	-62,852872	17,904408	-62,852321	17,903015	-62,852330	17,904000	0,165	100	1;2
Shell Beach	0,05 (1982-2018)	-62,849304	17,892951	-62,847509	17,892135	-62,848260	17,892716	0,225	100	1;2
Gouverneur	0,35 (1982-2018)	-62,834078	17,884311	-62,831396	17,885270	-62,832599	17,884957	0,305	100	1;2
Saline	0,55 (1982-2018)	-62,823641	17,886835	-62,819493	17,888240	-62,821608	17,887708	0,485	100	1;2
Grand Fond	0,18 (1982-2018)	-62,809775	17,890790	-62,808052	17,892238	-62,808982	17,891680	0,280	100	1;2
Toiny	0,70 (1982-2018)	-62,799455	17,896612	-62,795530	17,897630	-62,797217	17,897440	0,450	100	1;2
Petit Cul de Sac	0,03 (1982-2018)	-62,797161	17,906498	-62,794166	17,905650	-62,795894	17,905427	0,400	100	1;2
Grand Cul de Sac	0,18 (1982-2018)	-62,803070	17,913018	-62,800876	17,908366	-62,802244	17,908770	0.360 + 0.150	100	1;2
Marechal	0,15 (1982-2018)	-62,804810	17,912734	-62,803301	17,913196	-62,803835	17,912866	0,185	100	1;2
Marigot	0,05 (1982-2018)	-62,808941	17,910341	-62,809619	17,910944	-62,809363	17,910650	0,100	100	1;2
Lorient	0,40 (1982-2018)	-62,827877	17,908257	-62,821398	17,907737	-62,823792	17,906658	0,815	100	1;2
St Jean	0,65 (1982-2018)	-62,840950	17,905595	-62,832747	17,904040	-62,837642	17,903098	0.615 + 0,300	100	1;2
Anse des Cayes	0,10 (1982-2018)	-62,845028	17,913801	-62,842863	17,909861	-62,844025	17,911653	0,545	100	1;2
Flamands	0,20 (1982-2018)	-62,860105	17,919709	-62,854218	17,919815	-62,857234	17,918955	0,670	100	1;2
Bonhomme	0,10 (1982-2018)	-62,851709	17,930811	-62,851122	17,931160	-62,851409	17,930995	0,100	100	1;2
Fregate	0,03 (1982-2018)	-62,835654	17,938585	-62,832098	17,940206	-62,834650	17,939396	0.185 + 0.080	100	1;2
Dermochelys coriacea										
Colombier	0 (1982-2018)	-62,869184	17,921572	-62,868090	17,923990	-62,868420	17,922935	0,310	100	1;2
Public	0 (1982-2018)	-62,852872	17,904408	-62,852321	17,903015	-62,852330	17,904000	0,165	100	1;2

Shell Beach	0 (1982-2018)	-62,849304	17,892951	-62,847509	17,892135	-62,848260	17,892716	0,225	100	1;2
Gouverneur	0 (1982-2018)	-62,834078	17,884311	-62,831396	17,885270	-62,832599	17,884957	0,305	100	1;2
Saline	0,25 (1982-2018)	-62,823641	17,886835	-62,819493	17,888240	-62,821608	17,887708	0,485	100	1;2
Grand Fond	0 (1982-2018)	-62,809775	17,890790	-62,808052	17,892238	-62,808982	17,891680	0,280	100	1;2
Toiny	0 (1982-2018)	-62,799455	17,896612	-62,795530	17,897630	-62,797217	17,897440	0,450	100	1;2
Petit Cul de Sac	0 (1982-2018)	-62,797161	17,906498	-62,794166	17,905650	-62,795894	17,905427	0,400	100	1;2
Grand Cul de Sac	0 (1982-2018)	-62,803070	17,913018	-62,800876	17,908366	-62,802244	17,908770	0.360 + 0.150	100	1;2
Marechal	0 (1982-2018)	-62,804810	17,912734	-62,803301	17,913196	-62,803835	17,912866	0,185	100	1;2
Marigot	0 (1982-2018)	-62,808941	17,910341	-62,809619	17,910944	-62,809363	17,910650	0,100	100	1;2
Lorient	0 (1982-2018)	-62,827877	17,908257	-62,821398	17,907737	-62,823792	17,906658	0,815	100	1;2
St Jean	0 (1982-2018)	-62,840950	17,905595	-62,832747	17,904040	-62,837642	17,903098	0.615 + 0.300	100	1;2
Anse des Cayes	0 (1982-2018)	-62,845028	17,913801	-62,842863	17,909861	-62,844025	17,911653	0,545	100	1;2
Flamands	0,15 (1982-2018)	-62,860105	17,919709	-62,854218	17,919815	-62,857234	17,918955	0,670	100	1;2
Bonhomme	0 (1982-2018)	-62,851709	17,930811	-62,851122	17,931160	-62,851409	17,930995	0,100	100	1;2
Fregate	0 (1982-2018)	-62,835654	17,938585	-62,832098	17,940206	-62,834650	17,939396	0.185 + 0.080	100	1;2

**Table 10.2.1. Saint Barthelemy's Sea Turtle crawls, nests or hatching nests observed per species per nesting beach between 1982 and 2018.**

Nesting Beach/Species	<i>Chelonia mydas</i>	<i>Eretmochelis imbricata</i>	<i>Dermochelis coriacea</i>	Indeterminate
Colombier				1
Public				1
Shell Beach		1		
Gouverneur	2	4		6
Saline	4	5	5	12
Grand Fond		2		3
Toiny	3	10		8
Petit Cul de Sac				1
Grand Cul de Sac		2		3
Marechal		2		2
Marigot		1		
Lorient		6		4
St Jean		12		2
Anse des Cayes	7	1		2
Flamands	4	3	3	2

Bonhomme		1		2
Fregate				1
total	20	50	8	50

**Table 10.3. Saint Barthelemy's Sea Turtle data per year per species between 1982 and 2018.**

Year \ Species	DC	CM	EI	Indeterminate : 50% CM 50 % EI
1982	1	-	-	-
1992	-	-	1	-
2001	-	1	3	-
2002	-	-	2	-
2003	-	2	-	-
2004	-	-	1	3
2005	-	3	1	3
2006	-	-	-	3
2007	-	-	1	1
2008	-	-	2	3
2009	3	1	4	5
2010	-	4	3	13
2011	1	-	2	6
2012	1	1	4	2
2013	-	4	4	1
2014	2	-	3	4
2015	-	-	2	2
2016	-	3	15	3
2017	-	-	2	-
2018	-	1	-	1
total	8	20	50	50
% nests/year during the 20 years	0,4	2,25	3,75	Data included by counting 50% CM and 50% EI

### **10.1.2. Marine areas.**

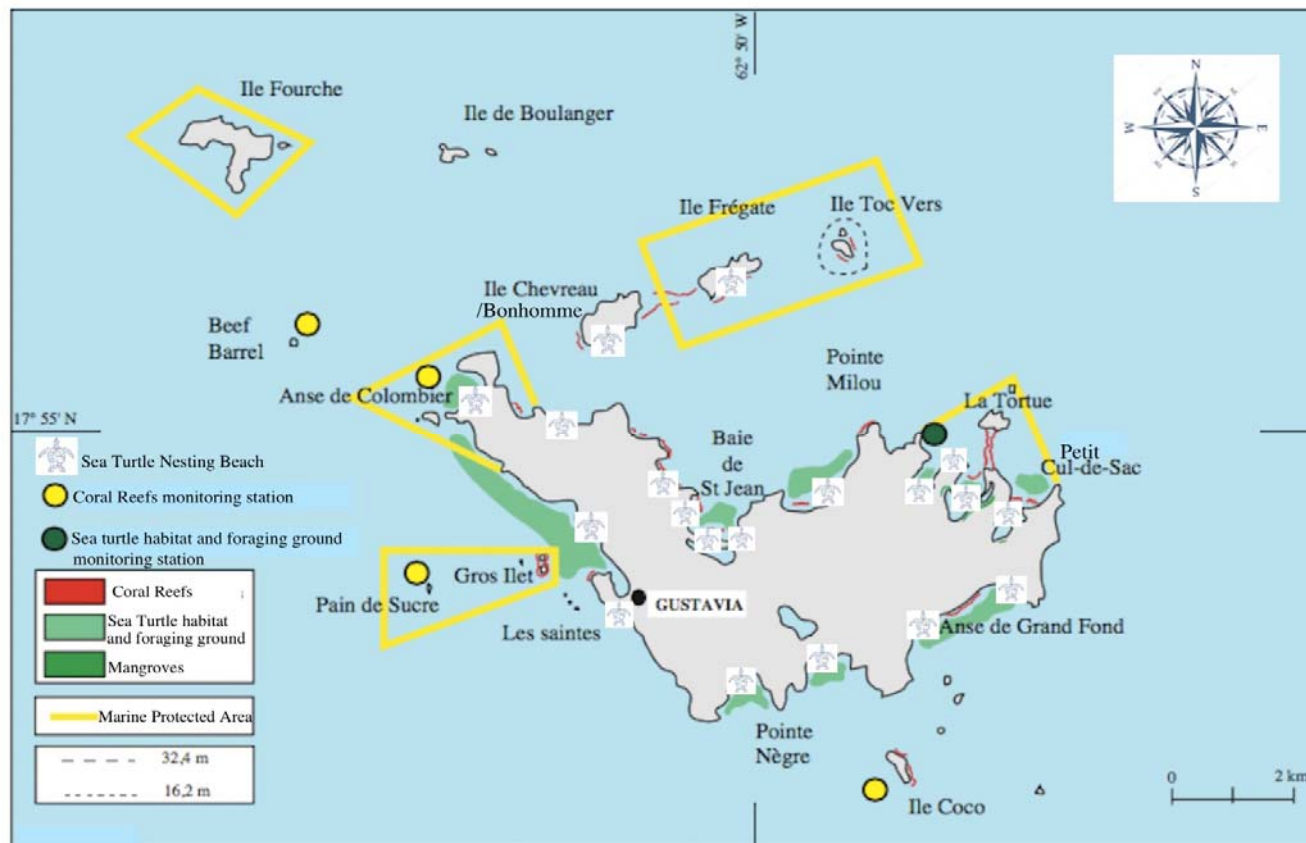
Sea Turtles and their habitat are completely protected by National Law since 1991 without exemptions in and outside of the Marine Protected Area. International Treaties signed and ratified concerning Sea Turtles have been rigorously implemented and complied to.

Saint Barthelemy's Marine Protected Area created in 1996 by Ministerial Arrete, classifies 1200 hectares of marine reserve.<sup>1</sup>

The Agence Territoriale de l'Environnement is the Non Governmental Organization managing Saint Barthelemy's Marine Protected Area. The Agency also has law enforcement accreditation and duties.

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<sup>1</sup>See [www.reserves-naturelles.org/saint-barthelemy](http://www.reserves-naturelles.org/saint-barthelemy).



St Barthelemy FWI Sea Turtle Nesting Beaches Habitat and Foraging Grounds. Based on Map 2 of Ref. 4

Figure 10.1. St Barthelemy FWI Sea Turtle nesting beaches, habitat, foraging and mating grounds.

**Table 10.3. International Treaties concerning Sea Turtles signed and ratified by France applying on Saint Barthelemy FWI.**

International Conventions	Signed	Binding	Compliance measured and reported	Species	Conservation actions	Relevance to sea turtles
CITES	Y (France, European Union)	Y	Y	all	CITES or Washington Convention 1972 governs the international trade in threatened and endangered species, which are listed in three appendices to the Convention. The Convention requires parties to prohibit trade in listed species except in accordance with the provisions of the Convention.	All species of Sea Turtles are listed in CITES Appendix I. Appendix I includes endangered species for which trade in specimens must be strictly regulated; Their trade with a commercial primary purpose is prohibited.
CMS	Y (France, European Union)	Y	Y	all. Reservation concerning <i>Chelonia mydas</i> since 07.01.1990 applicable on France and its overseas Departments and Territories	The Bonn Convention 1979, or the Convention on the Conservation of Migratory Species of Wild Animals, seeks to conserve terrestrial, aquatic, and avian migratory species throughout their range.	All species of Sea Turtles are on Appendix I of the CMS. Parties that are a Range State to a migratory species listed in Appendix I shall endeavor to strictly protect them by: prohibiting the taking of such species, with very restricted scope for exceptions; conserving and where appropriate restoring their habitats; preventing, removing or mitigating obstacles to their migration and controlling other factors that might endanger them. <i>Cheloniidae</i> C.spp and <i>Dermochelyidae</i> D.spp are also listed on Appendix II of the CMS. They are therefore protected by its provisions.
CBD	Y (France, European Union)	Y	Y	all	The Convention on Biological Diversity 1992 provides for the conservation and sustainable use of biological diversity, including with regard to access and sharing of the benefits arising out of the use of genetic resources.	CBD applies to the sustainable Management of St Barthelemys natural resources including Sea Turtles. Scientific Studies on Sea Turtles planning on the use of their genetic resources therefore require the declaration to the French Ministry of Environment.



CAR-SPAW	Y (France)	Y	Y	all	<p>The Protocol of the Carthagena Convention 1990 for Specially Protected Areas and Wildlife in the Caribbean Region calls upon its signatories to identify and protect threatened and endangered species of fauna and flora through national law, including the taking, possession, and killing of these species. In addition, parties are to adopt cooperative measures to protect species listed on one of three Annexes to the Protocol, which contain threatened or endangered plant species (Annex I); threatened or endangered animal species (Annex II); and animal and plant species that are not threatened or endangered but which require special measures to ensure their protection (Annex III). A variety of species, including mangroves and seagrass, are listed in Annex III.</p>	<p>All Sea Turtles Species present on Saint Barthelemy are listed on Annex II of the CAR SPAW Protocol (Last Revision 2016). Total protection and recovery to the species of Sea Turtles listed in Annex II are ensured by prohibiting the taking, possession or killing, the incidental taking, possession or killing or commercial trade of Sea Turtles, their eggs, parts or products; and prohibiting of the disturbance of Sea Turtles, particularly during periods of breeding, incubation, estivation or migration, as well as other periods of biological stress.</p>
Berne Convention	Y (France, European Union)	Y	Y	all. Reservation concerning the Appendix II "Strictly protected species" and concerning Chelonia mydas	<p>The Bern Convention 1979 is a European Treaty aiming at ensuring conservation of wild flora and fauna species and their habitats. Special attention is given to endangered and vulnerable species, including endangered and vulnerable migratory species specified in appendices.</p>	<p>All species of Sea Turtles are listed in Appendix II of the Berne Convention. Chapter II provides for the protection of the habitat of Wild Fauna and Flora especially the species listed in Appendix I and II. Chapter III provides for the protection of Species. Chapter III Article 6 calls for State Parties to take the appropriate administrative and legislative measures to provide complete protection to all Species of Sea Turtles and ensure the prohibition of capture keeping and killing, damage of breeding and resting sites, disturbance, possession of eggs, internal trade of animals alive or dead. Chapter IV pertaining to migratory species, specifically provides for cooperation between Parties.</p>
UNCLOS	Y (France, European Union)	Y	Y	all	<p>The Law of the Sea Convention 1982 defines the rights and responsibilities of nations with respect to their use of the world's oceans, establishing guidelines for businesses, the environment, and the management of marine natural resources. The Convention defines different areas from the baseline : internal waters, territorial waters, archipelagic waters, the contiguous zone, the exclusive economic zone, the continental shelf and the Area.</p>	<p>The Convention provides the legal framework for marine and maritime activities, establishes obligations for safeguarding the marine environment and provides freedom of scientific research on the high seas, respecting the Common Heritage of Mankind Principle. The First Intergovernmental Conference on an international legally binding instrument under the United Nations Convention on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction has been convened pursuant to General Assembly resolution 72/249. The conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction, in particular, together and as a whole, marine genetic resources, including questions on</p>

						the sharing of benefits, measures such as area-based management tools, including marine protected areas, environmental impact assessments and capacity-building and the transfer of marine technology are provided for in the ABNJ Treaty President's Aid to Negotiations UNGA A/Conf.232/2019/1 that has been prepared following the First Session of the Conference in September 2018 in NYC USA.
RAMSAR Convention	Y (France)	Y	Y	all	The Ramsar Convention 1971 provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. Parties of the RAMSAR Convention specifically call for the halt of poaching and of harvesting of Sea Turtles in Resolution XIII-24 2019.	Saint Barthelemy didn't designate its Marine Protected Area as a RAMSAR site, but still is binded to the RAMSAR Convention as an Oversea Territory of France.

## **10.2. Other biological data**

☆ 2 Hawksbills have been flipper tagged on Saint Barthelemy in 2015 during a mission of the Reseau Tortues Marines Guadeloupe : Antoinette et Leleka.

Antoinette : Hawksbill FWI 7811 Right Front Flipper FWI 7821 Left Front Flipper.

Leleka : Hawksbill FWI 17824 Right Front Flipper FWI 17825 Left Front Flipper.

☆ The population of Sea Turtles of St Barthelemy is considered healthy. One Sea Turtle affected by fibropapillomatosis has however been observed for the first time in 2018 at a diving site.

☆ Nesting beaches monitoring therefore the data collected are volunteer's training and availability dependant. Margin error concerning the number and identification of Sea Turtle tracks can be considered low due to the size of the Island and the genuine participation of the public.

## **10.3. Threats.**

### **10.3.1. Nesting sites.**

☆ Alteration of nesting sites:

Constructions are numerous, can be reducing the sand bank and be sources of pollution.

Natural erosion of Saint Barthelemy's nesting beaches is happening.

Coast line restoration projects are led by several NGOs on Saint Barthelemy on Saline Beach, Gouverneur and Petit Cul de Sac at present. Although parallel construction projects altering the back of some beaches are also ongoing: on Saline, Toiny, Grand Cul de Sac, Marigot, Lorient, St Jean, Anse des Cayes and Flamands at present.

To mitigate this threat, stabilization of the beaches is performed by adding wood posts retaining the sand, in French "ganivelles", at Saline. The local NGO "Make St Barth Green Again" in collaboration with the Environmental Agency of St Barthelemy has been restoring Saline Beach Dune, also a natural protection for St Barthelemy's inhabitants in case of hurricanes and sea level rise, particularly eroded after Hurricane Irma in September 2017. Wood posts imported from Poitou in France have been installed since 2018 and seeds of *Ipomoea pes caprae* ou "Patate de mer" have been planted. This project also includes tree planting on Saline.<sup>2</sup>

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<sup>2</sup>See the Dune of Saline Restoration Project of NGO "Make St Barth Green again" description at [www.greenstbarths.com/saline-beach-dune-restoration-1-week-of-works-in-videos-and-photos/](http://www.greenstbarths.com/saline-beach-dune-restoration-1-week-of-works-in-videos-and-photos/).

Restoration of the coastline's vegetation is also performed by the local NGO "Coral Restoration Saint Barth".<sup>3</sup>

A native species seeds bank has been created in 2017 by the Environmental Agency of St Barthelemy in partnership with local NGOs "In St Barth Experience" and "Coral Restoration St Barth", volunteers, day care children of "les Zandolis" and thanks to the donation of the town of Coutiches in the North of France. Revegetation of beaches is a long term project joyfully implemented together with primary schools of Saint Barthelemy.

☆Photo pollution: there are no data on this threat on Saint Barthelemy.

### **10.3.2. Marine areas.**

☆ Boatstrikes: Rescue Rehab and Release of injured Sea turtles is performed.<sup>4</sup>

☆ Coral Reefs Seagrass meadows and Mangroves alteration and degradation:

Those coastal habitats are critical to help mitigate the impacts of climate change, storing carbon, buffering the effects of floods and storms and reducing coastal erosion.

Mangrove forests can store three to five times more carbon in their soil than tropical rainforests. Seagrass meadows absorb about 10 percent of the total estimated organic carbon sequestered in the Oceans each year. Mangroves Coral Reefs and Seagrass meadows are also nursery grounds for many marine species including Sea Turtles.

Destruction, pollution at a watershed scale, artificialization of the soils are threats weighing on those ecosystems that are sea turtle habitats foraging and mating grounds.

Stony Coral Tissue Loss Disease that has been affecting Saint Martin and Sint Maarten's Coral Reefs has not been observed yet on St Barthelemy.

Coral Reefs, Seagrass meadows and Mangroves conservation and monitoring has been performed by the Environmental Agency of Saint Barthelemy since 1996, The University of the Antilles since 2002, and numerous local NGOs.

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<sup>3</sup>See [www.coral-restoration-stbarth.com](http://www.coral-restoration-stbarth.com).

<sup>4</sup>See Press Release in the local newspaper of Saint Barthelemy Journal de Saint Barth of Lucky's boatsrike in Grand Cul de Sac " Bateaux Ralentissez" 14th march 2019 [www.journaldesaintbarth.com/actualites/environnement/bateaux-ralentissez--201903141857.html?fbclid=IwAR0WiA6hQ-VrWjARzkB1y3Equ35zU9-Ic4dap4eJxaewQF\\_RZSsFsj1s1t0](http://www.journaldesaintbarth.com/actualites/environnement/bateaux-ralentissez--201903141857.html?fbclid=IwAR0WiA6hQ-VrWjARzkB1y3Equ35zU9-Ic4dap4eJxaewQF_RZSsFsj1s1t0). Rescue Rehab and Release of Lucky was performed by Serge Toulet from the Environmental Agency Of St Barthelemy and Veterinarians Dr Benjamin Kaiser and Dr Claire Saladin. Lucky could be released in her Lagoon 2 weeks later. Thanks to the cooperation of the Sea Turtle Rescue Centre of Guadeloupe Veterinarian Dr Evva Jolt. Reference 5 of the Excel Charts.

NGO “Reef of Life” is leading the project of renaturalisation of the St Jean’s Caille using the Biorock Technology further described herein.

NGO “Ouanalo Reef” is leading the restoration project of Pointe Milou’s coral reef St Barth Project “Arti-Reef” also using the electrolytic mineral accretion technic, and the project “Eden Reef” around the Eden Rock site.<sup>5</sup>

NGO “Coral Restoration St Barth” also supports the conservation and restoration of St Barthelemy’s coral reefs and coastlines.

The BioRock Technology consists in a mesh plate disposed on the coral reef at the shore break point where a low voltage is diffusing (6 Volts). Water hydrolysis chemical reaction creates a calcium carbonate CaCO<sub>3</sub> sediment on the metal structure. CaCO<sub>3</sub> cement is 3 times denser than concrete, strengthens the structure and provides directly the elements necessary to corals to grow.

At the site of La Caille de St Jean and Lorient for instance, coral reef coverage is now less than 5% which favors erosion of the opposite coastline and weakens protection in case of climatic events. This technique has proved within 6 months to support stony corals conservation by enhancing their growth, inducing a greater number of corals symbiotic algae zooxanthelles, occurring 3 to 5 times faster than in natural conditions, strengthening their calcification therefore their resilience to climatic events e.g. rising sea temperatures during the hottest months of the year or hurricanes, and by fighting against coral infectious agents. The device in St Jean grows of 13 cm per year on average, resisted to the two major hurricanes Gonzalo and Irma. Further research is proposed on St Jean’s Caille by NGO “Reef of Life”.<sup>6</sup>

Marigot Bay, Grand Cul de Sac, Petit Cul de Sac, St Jean and Lorient have been identified in April 2019 to be the bays necessitating priority measures due to the presence of those precious ecosystems facing numerous threats and pressures.

Management of sources of direct anthropogenic pollution is a priority, including in particular the modernization of the waste water system, the improvement of the desalination waters’ system, the reduction of the use of polluting antifouling paint. Identified polluting person or companies are being fined by the Environmental Agency of St Barthelemy and asked to upgrade to standards.

Nesting beaches pollution management has been installed with the collection of wastes and plastic wastes via special bins at disposal on site. Information and sensibilisation of the public on the topic is ongoing. The use of coral reef-friendly sunscreen is promoted.

Monitoring of seabeds has been performed since 2007 by the Environmental Agency of St Barthelemy, including for instance the measure of density variation of *Thalassia testudinum* or SeaTurtle grass and *Syringodium filiforme*.

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<sup>5</sup>See NGO “Ouanalao Reef” Projects at [www.ouanalaooreef.com](http://www.ouanalaooreef.com).

<sup>6</sup>See NGO “Reef of Life” Projects at [www.reef-of-life.com/biorock](http://www.reef-of-life.com/biorock).

Monitoring of St Barthelemy's coral reefs is also ongoing via the Reef Check methods and program.

Update of the inventory of St Barthelemy's coral reefs and seabeds will allow the adjustment of the number and/or location of anchoring sites so as to enhance conservation of those ecosystems.

Sargassum strandings have been collected gradually. Sargassum stranding management is also a specific objective set to be met.

☆ Threats for the species and conservation efforts performed at a Regional scale :

At a regional perspective, overharvesting and legal gaps concerning sea turtles have been identified and are threatening the conservation efforts performed. Humber et al. 2014 describe the Wider Caribbean as the second region in the World responsible for the direct take of Sea Turtles with 16 countries allowing their harvest in their national waters, representing 34.6% of estimated takes in the World with 14 640 Turtles slaughtered per year. International cooperation is necessary at a scientific scale for the survival of the species, it is however not recommended to create further legally binding agreements providing for Sea Turtle harvest. At the regional scale, clarification on the legal basis on which rely the authorized Sea Turtle harvest is needed. Implement RAMSAR Res XIII-24 2019 encouraging the halt of poaching and of exploitation of Sea Turtles is sorely advised.

## 10.4. Conservation.

**Table 10.4. Sea Turtle Conservation Projects and databases on Saint Barthelemy FWI.**

RMU	Country	Region / Location	Project Name or descriptive title	Key words	Start date	End date	Leading organisation	Public/Private	Collaboration	Reports / Information material	Current Sponsors	Primary Contact (name and Email)	Refs
Caribbean/ NorthWest Atlantic	Saint Barthelemy FWI	Caribbean	Suivi Scientifique des pontes des Tortues de Mer a Saint Barthelemy FWI/Sea Turtle Nesting Season Monitoring on Saint Barthelemy FWI	Sea Turtles ; Females ; Nesting ; Nest ; Monitoring ; Volunteers	1982	ongoing	Agence Territoriale de l'Environnement Saint Barthelemy	Non Governmental Agency	Y Volunteers Widecast	<a href="https://agencedelenvironnement.fr/bilan-de-pontes-tortues-marines-1982-2016/">https://agencedelenvironnement.fr/bilan-de-pontes-tortues-marines-1982-2016/</a>	N	Sebastien Greaux <a href="mailto:sebastien.greaux@agence-environnement.fr">sebastien.greaux@agence-environnement.fr</a>	1
Caribbean/ NorthWest Atlantic	Saint Barthelemy FWI	Caribbean	Widecast Atlas of Sea Turtles Nesting Beaches	Sea Turtles ; Nesting ; Atlas ; Wider Caribbean	2017	ongoing	Widecast	International NGO	Y	ongoing Cf <a href="http://seama.p.env.duke.edu/widecast/">http://seama.p.env.duke.edu/widecast/</a>	N	Claire Saladin <a href="mailto:clairesaladin@hotmail.com">clairesaladin@hotmail.com</a>	ongoing
Caribbean/ NorthWest Atlantic	Saint Barthelemy France	Caribbean	CITES	sea turtles ; trade ; illegal trade ; Caribbean ; poaching	1978	ongoing	Direction de l'environnement, de l'aménagement et du logement de la Guadeloupe DEAL Guadeloupe	Governmental Agency	Y	Y	N	pb.m.deal-guadeloupe@developpement-durable.gouv.fr	n/a
Caribbean/ NorthWest Atlantic	Saint Barthelemy France	Caribbean	Suivi Scientifique des Recifs Coralliens Herbiers et Mangroves de St Barthelemy	coral reefs; seagrass; mangrove; sea turtle; St Barthelemy.	2002	ongoing	IFRECOR/Universite des Antilles/Agence Territoriale de l'Environnement	Governmental Agency/N GO	Y	Y	N	Sebastien Greaux <a href="mailto:sebastien.greaux@agence-environnement.fr">sebastien.greaux@agence-environnement.fr</a>	4;9;10
Caribbean/ NorthWest Atlantic	Saint Barthelemy France	Caribbean	Nesting Beaches stabilization and revegetation	Nesting beaches ; climate change; erosion; sea turtle ; native	2018	ongoing	Local NGOS (Make St Barth Green again, Coral Restoration St Barth, In St Barth Experience) in	Public	Y	Y	Y	Sebastien Greaux <a href="mailto:sebastien.greaux@agence-environnement.fr">sebastien.greaux@agence-environnement.fr</a>	10

**Table 10.4. Sea Turtle Conservation Projects and databases on Saint Barthelemy FWI.**

RMU	Country	Region / Location	Project Name or descriptive title	Key words	Start date	End date	Leading organisation	Public/Private	Collaboration	Reports / Information material	Current Sponsors	Primary Contact (name and Email)	Refs
				species; St Barthelemy			partnership with the Agence Territoriale de l'Environnement St Barthelemy, volunteers, primary schools and daycare.						



Conservation Projects are described herein and in Saint Barthelemy's ExcelChart. Recommendations and advises for future research projects and threats mitigation are developed throughout this report.

New Conservation Projects could include but are not limited to:

∞ As Sea Turtle souvenirs hotspots are present in the Caribbean Region and the Caribbean Region is the second largest Region responsible for Sea Turtle harvest at a global scale, an Education and Outreach Campaign about the Sea Turtle Trade in the Caribbean Region is suggested, which could be developed via an educative program in schools of St Barthelemy for the enhancement of sustainable tourism practices on Saint Barthelemy and when travelling abroad.

### **10.5. Research**

☆ Photo pollution: Evaluation and Research on the photo pollution of sea turtle nesting beaches of Saint Barthelemy is suggested. This research program could be included in a developing partnership with Hotels and residents for the enhancement of Sea Turtle monitoring and the implementation of Sea Turtle Friendly lightings.

☆ Saint Barthelemy's Leatherback Research Project: So as to increase hatching success rate for the Leatherback population of Saint Barthelemy, nest protection including nest shading with a comparison of the hatching success rate with and without shading is suggested.

**References :**

# REF	Full reference
1	Agence Territoriale de l'Environnement Saint Barthelemy, Activites de ponte et emergences des tortues marines a Saint Barthelemy de 1982 a 2016, Agence Territoriale de l'Environnement Saint Barthelemy, 2017, 10 pages.
2	Saladin Claire (2019) Analysis and Synthesis of Saint Barthelemy Sea Turtles Data 1982-2018 Unpublished Data.
3	De Massary et al (2018) Liste taxinomique de l'herpétofaune dans l'outre-mer français : II. Collectivité de Saint-Barthélemy, Bull. Soc. Herp. Fr. (2018) 166 : 59-78
4	Hily C., Duchêne J., Bouchon C., Bouchon-Navaro Y., Gigou A., Payri C., Védie F., 2010. Les herbiers de phanérogames marines de l'outre-mer français. Hily C., Gabrié C., Duncombe M. coord. IFRECOR, Conservatoire du littoral, 33-44p.
5	Journal de Saint Barth « Bateaux Ralentissez » 14th March 2019 at <a href="http://www.journaldesaintbarth.com/actualites/environnement/bateaux-ralentissez--201903141857.html?fbclid=IwAR0WiA6hQ-VrWjARzkB1y3Equ35zU9-Ic4dap4eJxaewQF_RZSsFsj1s1t0">www.journaldesaintbarth.com/actualites/environnement/bateaux-ralentissez--201903141857.html?fbclid=IwAR0WiA6hQ-VrWjARzkB1y3Equ35zU9-Ic4dap4eJxaewQF_RZSsFsj1s1t0</a> , last visited 24 <sup>th</sup> July 2019.
6	Saladin Claire (2019) International Environmental Law and Sea Turtles : Assessment of the legal framework and trade of Sea Turtles in the Lesser Antilles, Journal of International Wildlife Law and Policy 22(4).
7	Humber et al. "So excellent a fish: a global overview of legal marine turtle fisheries" Diversity Distrib., 2014, 20, 579–590.
8	Ramsar Resolution XIII-24 2019 at <a href="http://www.ramsar.org/sites/default/files/documents/library/xiii.24_sea_turtles_e.pdf">www.ramsar.org/sites/default/files/documents/library/xiii.24_sea_turtles_e.pdf</a>
9	Ifrecor Comite local IFRECOR de St Barthelemy (2019) Compte rendu et proposition d'éléments pour l'élaboration du plan local d'action IFRECOR de Saint-Barthélemy, Petites Antilles 38 pages.
10	Agence Territoriale de l'Environnement de St Barthelemy Rapport d'activités 2017 19 pages.
11	Journal Officiel de la République Française n°283 du 6 décembre 2005 page 18816 texte n° 36, Arrêté du 14 octobre 2005 fixant la liste des tortues marines protégées sur le territoire national et les modalités de leur protection, NOR: DEVN0540395A ELI: <a href="https://www.legifrance.gouv.fr/eli/arrete/2005/10/14/DEVN0540395A/jo/texte">https://www.legifrance.gouv.fr/eli/arrete/2005/10/14/DEVN0540395A/jo/texte</a> at <a href="https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000000424977">https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000000424977</a>

## **Chapter 11. St Martin FWI**

Claire Saladin, DVM PhD

Widecast Coordinator for the Island of St Martin FWI

IUCN SSC Wildlife Health Specialist Group Member

IUCN World Commission on Environmental Law Ocean Specialist Group Member

clairesaladin@hotmail.com

The objectives of this report are:

- 1.** To describe the Excel Charts' data including unpublished data originating from inhabitants and personal observations concurring with observations or informations collected by the Reserve Naturelle de Saint Martin FWI within and without the Marine Protected Area (MPA hereinafter).
- 2.** To describe actual Conservation and Research Projects concerning Sea Turtles on Saint Martin FWI.
- 3.** To recommend and suggest new Conservation and Research Projects necessary for the Species Conservation and at a larger scale for Biodiversity restoration on Saint Martin FWI.

**Table 11.1. Main Table: Main biology and conservation aspects of Sea Turtle Regional Management Units occurring in Saint Martin FWI.**

SAINT MARTIN FWI										
RMU	<i>Chelonia mydas</i>	Ref #	<i>Dermochelys coriacea</i>	Ref #	<i>Eretmochelys imbricata</i>	Ref #	<i>Caretta caretta</i>	Ref #	<i>Lepidochelys olivacea</i>	Ref #
Occurrence										
Nesting sites	Y 17	1;2;3;4; 5;6;7;8; 9;10;11; 12	Y 4	1;2;3;4; 5;6;7;8; 9;10;11 ;12	Y 17	1;2;3;4;5 ;6;7;8;9; 10;11;12	N	1;2;3;4;5; 6;7;8;9;1 0;11;12	N	1;2;3;4;5; 6;7;8;9;1 0;11;12
Pelagic foraging grounds	Y Cf Fig 1	1;2;3;4; 5;6;7;8; 9;10;11; 13	n/a	1;2;3;4; 5;6;7;8; 9;10;11 ;13	Y Cf Fig 1	1;2;3;4;5 ;6;7;8;9; 10;11;13	Y	10;11	Y?	10;11;12
Benthic foraging grounds	Y Cf Fig 1	1;2;3;4; 5;6;7;8; 9;10;11; 12;13	n/a	1;2;3;4; 5;6;7;8; 9;10;11 ;12;13	Y Cf Fig 1	1;2;3;4;5 ;6;7;8;9; 10;11;12 ;13	Y	10;11	Y?	10;11;12
Key biological data : based on crawls observed. Grand Case Sandyground and Baie Nettle Sites are not included for average data.										
Nests/yr: recent average (range of years)	128.28 (2009- 2017)	1;2;3;4; 5;6;7;8; 9;10;11	1.89 (2009- 2017)	1;2;3;4; 5;6;7;8; 9;10;11	70.27 (2009-2017)	1;2;3;4;5 ;6;7;8;9; 10;11	n/a	10;11	n/a	10;12
Nests/yr: recent order of magnitude	8 - 225 (2009- 2017)	1;2;3;4; 5;6;7;8; 9;10;11	0 - 6 (2009- 2017)	1;2;3;4; 5;6;7;8; 9;10;11	36 - 106	1;2;3;4;5 ;6;7;8;9; 10;11	n/a	10;11	n/a	10;12
Number of "major" sites (>20 nests/yr AND >10 nests/km yr) :	2 (Baie Longue, Baie aux Prunes)	1;2;3;4; 5;6;7;8; 9;10;11	0	1;2;3;4; 5;6;7;8; 9;10;11	1 (Lagon)	1;2;3;4;5 ;6;7;8;9; 10;11	n/a	10;11	n/a	10;12

**Table 11.1. Main Table: Main biology and conservation aspects of Sea Turtle Regional Management Units occurring in Saint Martin FWI.**

SAINT MARTIN FWI										
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	15	1;2;3;4; 5;6;7;8; 9;10;11	4	1;2;3;4; 5;6;7;8; 9;10;11	15	1;2;3;4;5 ;6;7;8;9; 10;11	n/a	10;11	n/a	10;12
Nests/yr at "major" sites: recent average (range of years)	52.59 (2009-2017)	1;2;3;4; 5;6;7;8; 9;10;11	n/a	1;2;3;4; 5;6;7;8; 9;10;11	21.83 (2009-2017)	1;2;3;4;5 ;6;7;8;9; 10;11	n/a	10;11	n/a	10;12
Nests/yr at "minor" sites: recent average (range of years)	1.93 (2009-2017)	1;2;3;4; 5;6;7;8; 9;10;11	0.47 (2009-2017)	1;2;3;4; 5;6;7;8; 9;10;11	4.04 (2009-2017)	1;2;3;4;5 ;6;7;8;9; 10;11	n/a	10;11	n/a	10;12
Total length of nesting sites (km)	16,16	1;2;3;4; 5;6;7;8; 9;10;11	5,475	1;2;3;4; 5;6;7;8; 9;10;11	14,1	1;2;3;4;5 ;6;7;8;9; 10;11	n/a	10;11	n/a	10;12
Nesting females / yr	n/a	1;2;3;4; 5;6;7;8; 9;10;11	n/a	1;2;3;4; 5;6;7;8; 9;10;11	n/a	1;2;3;4;5 ;6;7;8;9; 10;11	n/a	10;11	n/a	10;12
Nests / female season	n/a	1;2;3;4; 5;6;7;8; 9;10;11	n/a	1;2;3;4; 5;6;7;8; 9;10;11	n/a	1;2;3;4;5 ;6;7;8;9; 10;11	n/a	10;11	n/a	10;12
Female remigration interval (yrs)	2	1;2;3;4; 5;6;7;8; 9;10;11	n/a	1;2;3;4; 5;6;7;8; 9;10;11	n/a	1;2;3;4;5 ;6;7;8;9; 10;11	n/a	10;11	n/a	10;12
Sex ratio: hatchlings (F / Tot)	n/a	1;2;3;4; 5;6;7;8; 9;10;11	n/a	1;2;3;4; 5;6;7;8; 9;10;11	n/a	1;2;3;4;5 ;6;7;8;9; 10;11	n/a	10;11	n/a	10;12
Sex ratio: juveniles (F / Tot)	n/a	1;2;3;4; 5;6;7;8; 9;10;11	n/a	1;2;3;4; 5;6;7;8; 9;10;11	n/a	1;2;3;4;5 ;6;7;8;9; 10;11	n/a	10;11	n/a	10;12
Sex ratio: Adults (F / Tot)	n/a	1;2;3;4; 5;6;7;8; 9;10;11	n/a	1;2;3;4; 5;6;7;8; 9;10;11	n/a	1;2;3;4;5 ;6;7;8;9; 10;11	n/a	10;11	n/a	10;12



**Table 11.1. Main Table: Main biology and conservation aspects of Sea Turtle Regional Management Units occurring in Saint Martin FWI.**

SAINT MARTIN FWI										
Growth rates	N	1;2;3;4; 5;6;7;8; 9;10;11	N	1;2;3;4; 5;6;7;8; 9;10;11	N	1;2;3;4;5 ;6;7;8;9; 10;11	N	1;2;3;4;5; 6;7;8;9;1 0;11	N	1;2;3;4;5; 6;7;8;9;1 0;11
Genetics	N	1;2;3;4; 5;6;7;8; 9;10;11	N	1;2;3;4; 5;6;7;8; 9;10;11	N	1;2;3;4;5 ;6;7;8;9; 10;11	N	1;2;3;4;5; 6;7;8;9;1 0;11	N	1;2;3;4;5; 6;7;8;9;1 0;11
Stocks defined by genetic markers	N	1;2;3;4; 5;6;7;8; 9;10;11	N	1;2;3;4; 5;6;7;8; 9;10;11	N	1;2;3;4;5 ;6;7;8;9; 10;11	N	1;2;3;4;5; 6;7;8;9;1 0;11	N	1;2;3;4;5; 6;7;8;9;1 0;11
Remote tracking (satellite or other)	Y	1;2;3;4; 5;6;7;8; 9;10;14	N	1;2;3;4; 5;6;7;8; 9;10	N	1;2;3;4;5 ;6;7;8;9; 10	N	1;2;3;4;5; 6;7;8;9;1 0;11	N	1;2;3;4;5; 6;7;8;9;1 0;11
Survival rates	N	1;2;3;4; 5;6;7;8; 9;10;11	N	1;2;3;4; 5;6;7;8; 9;10;11	N	1;2;3;4;5 ;6;7;8;9; 10;11	N	1;2;3;4;5; 6;7;8;9;1 0;11	N	1;2;3;4;5; 6;7;8;9;1 0;11
Population dynamics	N	1;2;3;4; 5;6;7;8; 9;10;11	N	1;2;3;4; 5;6;7;8; 9;10;11	N	1;2;3;4;5 ;6;7;8;9; 10;11	N	1;2;3;4;5; 6;7;8;9;1 0;11	N	1;2;3;4;5; 6;7;8;9;1 0;11
Foraging ecology (diet or isotopes)	N	1;2;3;4; 5;6;7;8; 9;10;11	N	1;2;3;4; 5;6;7;8; 9;10;11	N	1;2;3;4;5 ;6;7;8;9; 10;11	N	1;2;3;4;5; 6;7;8;9;1 0;11	N	1;2;3;4;5; 6;7;8;9;1 0;11
Capture-Mark-Recapture	N	1;2;3;4; 5;6;7;8; 9;10;11	N	1;2;3;4; 5;6;7;8; 9;10;11	N	1;2;3;4;5 ;6;7;8;9; 10;11	N	1;2;3;4;5; 6;7;8;9;1 0;11	N	1;2;3;4;5; 6;7;8;9;1 0;11
Threats										
Bycatch: small scale / artisanal	Y	1;2;3;4; 5;6;7;8; 9;10;11	Y	1;2;3;4; 5;6;7;8; 9;10;11	Y	1;2;3;4;5 ;6;7;8;9; 10;11	Y	10;11	Y	10;11

**Table 11.1. Main Table: Main biology and conservation aspects of Sea Turtle Regional Management Units occurring in Saint Martin FWI.**

SAINT MARTIN FWI										
Bycatch: industrial	N	1;2;3;4; 5;6;7;8; 9;10;11	N	1;2;3;4; 5;6;7;8; 9;10;11	N	1;2;3;4;5 ;6;7;8;9; 10;11	N	10;11	N	10;11
Bycatch: quantified?	N	1;2;3;4; 5;6;7;8; 9;10;11	N	1;2;3;4; 5;6;7;8; 9;10;11	N	1;2;3;4;5 ;6;7;8;9; 10;11	N	10;11	N	10;11
Intentional killing or exploitation of turtles	Y	1;2;3;4; 5;6;7;8; 9;10;11; 15	Y	1;2;3;4; 5;6;7;8; 9;10;11 ;15	Y	1;2;3;4;5 ;6;7;8;9; 10;11;15	Y	10;11;15	Y	10;11;15
Egg poaching	N	1;2;3;4; 5;6;7;8; 9;10;11	N	1;2;3;4; 5;6;7;8; 9;10;11	N	1;2;3;4;5 ;6;7;8;9; 10;11	n/a	10;11	n/a	10;11
Egg predation	Y	1;2;3;4; 5;6;7;8; 9;10;11	Y	1;2;3;4; 5;6;7;8; 9;10;11	Y	1;2;3;4;5 ;6;7;8;9; 10;11	n/a	10;11	n/a	10;11
Photopollution	Y	1;2;3;4; 5;6;7;8; 9;10;11	Y	1;2;3;4; 5;6;7;8; 9;10;11	Y	1;2;3;4;5 ;6;7;8;9; 10;11	n/a	10;11	n/a	10;11
Boat strikes	Y	1;2;3;4; 5;6;7;8; 9;10;11; 16	Y	1;2;3;4; 5;6;7;8; 9;10;11 ;16	Y	1;2;3;4;5 ;6;7;8;9; 10;11;16	Y	10;11;16	Y	10;11;16
Nesting habitat degradation	Y	1;2;3;4; 5;6;7;8; 9;10;11	Y	1;2;3;4; 5;6;7;8; 9;10;11	Y	1;2;3;4;5 ;6;7;8;9; 10;11	n/a	10;11	n/a	10;11
Foraging habitat degradation	Y	1;2;3;4; 5;6;7;8; 9;10;11; 13;17;1 8;19	Y	1;2;3;4; 5;6;7;8; 9;10;11 ;13;17; 18;19	Y	1;2;3;4;5 ;6;7;8;9; 10;11;13 ;17;18;1 9	Y	10;11	Y	10;11





**Table 11.1. Main Table: Main biology and conservation aspects of Sea Turtle Regional Management Units occurring in Saint Martin FWI.**

SAINT MARTIN FWI										
Protection under national law	Y	1;2;3;4; 5;6;7;8; 9;10;11; 20;24	Y	1;2;3;4; 5;6;7;8; 9;10;11 ;20;24	Y	1;2;3;4;5 ;6;7;8;9; 10;11;20 ;24	Y	10;11;20; 24	Y	10;11;20; 24
Number of protected nesting sites (habitat preservation)	20+3	1;2;3;4; 5;6;7;8; 9;10;11; 24	4	1;2;3;4; 5;6;7;8; 9;10;11 ;24	19+4	1;2;3;4;5 ;6;7;8;9; 10;11;24	n/a	10;11;24	n/a	10;11;24
Number of Marine Areas with mitigation of threats	1	1;2;3;4; 5;6;7;8; 9;10	1	1;2;3;4; 5;6;7;8; 9;10	1	1;2;3;4;5 ;6;7;8;9; 10	1	10;11	1	10;11
Long-term conservation projects (number)	3	1;2;3;4; 5;6;7;8; 9;10;13; 17;18;19	3	1;2;3;4; 5;6;7;8; 9;10;13 ;17;18; 19	3	1;2;3;4;5 ;6;7;8;9; 10;13;17 ;18;19	3	10;11	3	10;11
In-situ nest protection (eg cages)	N	1;2;3;4; 5;6;7;8; 9;10	N	1;2;3;4; 5;6;7;8; 9;10	n/a	1;2;3;4;5 ;6;7;8;9; 10	n/a	10;11	n/a	10;11
Hatcheries	N	1;2;3;4; 5;6;7;8; 9;10	N	1;2;3;4; 5;6;7;8; 9;10	N	1;2;3;4;5 ;6;7;8;9; 10	N	10;11	N	10;11
Head-starting	N	1;2;3;4; 5;6;7;8; 9;10	N	1;2;3;4; 5;6;7;8; 9;10	N	1;2;3;4;5 ;6;7;8;9; 10	N	10;11	N	10;11
By-catch: fishing gear modifications (eg, TED, circle hooks)	N	1;2;3;4; 5;6;7;8; 9;10	N	1;2;3;4; 5;6;7;8; 9;10	N	1;2;3;4;5 ;6;7;8;9; 10	N	10;11	N	10;11
By-catch: onboard best practices	N	1;2;3;4; 5;6;7;8; 9;10	N	1;2;3;4; 5;6;7;8; 9;10	N	1;2;3;4;5 ;6;7;8;9; 10	N	10;11	N	10;11

**Table 11.1. Main Table: Main biology and conservation aspects of Sea Turtle Regional Management Units occurring in Saint Martin FWI.**

SAINT MARTIN FWI										
By-catch: spatio-temporal closures/reduction	N	1;2;3;4; 5;6;7;8; 9;10	N	1;2;3;4; 5;6;7;8; 9;10	N	1;2;3;4;5 ;6;7;8;9; 10	N	10;11	N	10;11
Other : enforcement officers members of the MPA team	Y	1;2;3;4; 5;6;7;8; 9;10;11	Y	1;2;3;4; 5;6;7;8; 9;10;11	Y	1;2;3;4;5 ;6;7;8;9; 10;11	Y	10;11	Y	10;11

## 11.1. Distribution, abundance, trends.

### 11.1.1. Presence and Nesting sites.

**Table 11.2. Sea Turtle nesting beaches of Saint Martin FWI.**

Nesting site	within the MPA	Index site	Crawls/yr: recent average (range of years)	Western limit		Eastern limit		Central point		Length (km)	% Monitored	Reference #
				Long	Lat	Long	Lat	Long	Lat			
Chelonia mydas												
Baie aux Prunes	N	Y	23,61 (2009-2017)	-63,153061	18,062287	-63,147230	18,070683	-63,149161	18,066291	1,210	100	1;2;3;4;5;6;7;8;9;10;11
Baie Blanche	Y	Y	4,83 (2009-2017)	-62,988232	18,114496	-62,987781	18,118025	-62,987828	18,116461	0,400	100	1;2;3;4;5;6;7;8;9;10;11
Baie Longue	N	Y	81,56 (2009-2017)	-62,988232	18,114496	-63,139136	18,055593	-63,145183	18,059644	1,810	100	1;2;3;4;5;6;7;8;9;10;11
Baie Rouge	N	Y	3,72 (2009-2017)	-63,135328	18,071323	-63,120692	18,071692	-63,129901	18,068726	1.600+0,085+0.050	100	1;2;3;4;5;6;7;8;9;10;11
Coralita	Y Waters N Private Beach	Y	1,22 (2009-2017)	-63,013745	18,060934	-63,012857	18,063400	-63,013770	18,062429	0,570	100	1;2;3;4;5;6;7;8;9;10;11
Gallion	Y	Y	1,44 (2009-2017)	-63,016818	18,068207	-63,016308	18,078486	-63,020256	18,073060	1,610	100	1;2;3;4;5;6;7;8;9;10;11
Grandes Cayes	Y	Y	1,56 (2009-2017)	-63,020083	18,112421	-63,018694	18,111041	-63,019543	18,111368	0,745	100	1;2;3;4;5;6;7;8;9;10;11
Lagon	Y	Y	7,50 (2009-2017)	-62,986702	18,114450	-62,982826	18,115724	-62,985166	18,115532	0,395	100	1;2;3;4;5;6;7;8;9;10;11

**Table 11.2. Sea Turtle nesting beaches of Saint Martin FWI.**

Nesting site	within the MPA	Index site	Crawls/yr: recent average (range of years)	Western limit		Eastern limit		Central point		Length (km)	% Monitored	Reference #
Petites Cayes	Y	Y	1,22 (2009-2017)	-63,032173	18,122530	-63,030494	18,122805	-63,031378	18,122471	0,195	100	1;2;3;4;5;6;7;8;9;10;11
Pinel western site	Y	N	-	-63,017048	18,105535	-63,015539	18,105058	-63,016253	18,105640	0,265	0-100	1;2;3;4;5;6;7;8;9;10;11
Pinel northern site	Y	N	0,50 (2009-2017) (Pinel)	-63,015604	18,107751	-63,013998	18,107378	-63,014855	18,107573	0,185	0-100	1;2;3;4;5;6;7;8;9;10;11
Pinel eastern site	Y	N	-	-63,014349	18,104920	-63,013859	18,105598	-63,014231	18,105298	0,125	0-100	1;2;3;4;5;6;7;8;9;10;11
Anse Marcel	N Private Beach	N	0,11 (2009-2017)	-63,042450	18,114003	-63,038734	18,115444	-63,040150	18,114149	0,430	0-100	1;2;3;4;5;6;7;8;9;10;11
Bell Beach disappearance of the Sand bank	N	N	0 (2009)	-63,046712	18,116255	-63,045554	18,115893	-63,046124	18,115932	0,135	0-100	1;2;3;4;5;6;7;8;9;10;11
Caye Verte	Y	N	0,67 (2009-2017)	-63,010938	18,087165	-63,009705	18,091015	-63,010692	18,089102	0,095	0-100	1;2;3;4;5;6;7;8;9;10;11
Baie Orientale	N	N	0,22 (2009-2017)	-63,024014	18,095773	-63,012685	18,081900	-63,021186	18,088747	2,060	25-50	1;2;3;4;5;6;7;8;9;10;11
Happy Baie	N	N	0,11 (2009-2017)	-63,074298	18,099267	-63,071802	18,100028	-63,072603	18,099426	0,270	0-100	1;2;3;4;5;6;7;8;9;10;11
Baie de Grand Case	N	N	n/a	-63,066325	18,099848	-63,052887	18,110439	-63,058326	18,100908	1,960	25-50	1;2;3;4;5;6;7;8;9;10;11
Sandyground	N	N	n/a	-63,108227	18,061168	-63,100659	18,059602	-63,145900	18,059705	0,950	0-25	1;2;3;4;5;6;7;8;9;10;11
Baie Netlee	N	N	n/a	-63,116531	18,067097	-63,108227	18,061168	-63,112200	18,062779	1,150	0-25	1;2;3;4;5;6;7;8;9;10;11

**Table 11.2. Sea Turtle nesting beaches of Saint Martin FWI.**

Nesting site	within the MPA	Index site	Crawls/yr: recent average (range of years)	Western limit		Eastern limit		Central point		Length (km)	% Monitored	Reference #
Friar's Bay Data insufficient	N	N	n/a	-63,075995	18,092990	-63,074240	18,094515	-63,074929	18,093738	0,255	0-25	1;2;3;4;5;6;7;8;9;10;11
Galisbay Data insufficient	N	N	n/a	-63,084166	18,072996	-63,080845	18,078775	-63,083425	18,073658	0,740	0-25	1;2;3;4;5;6;7;8;9;10;11
Belle Creole Data insufficient	N	N	n/a	-63,072364	18,072364	-63,114248	18,072516	-63,115144	18,073224	0,585	0-25	1;2;3;4;5;6;7;8;9;10;11
<i>Dermochelys coriacea</i>												
Baie aux Prunes	N	Y	0,11 (2009-2017)	-63,153061	18,062287	-63,147230	18,070683	-63,149161	18,066291	1,210	100	1;2;3;4;5;6;7;8;9;10;11
Baie Blanche	Y	Y	0 (2009-2017)	-62,988232	18,114496	-62,987781	18,118025	-62,987828	18,116461	0,400	100	1;2;3;4;5;6;7;8;9;10;11
Baie Longue	N	Y	0,67 (2009-2017)	-62,988232	18,114496	-63,139136	18,055593	-63,145183	18,059644	1,810	100	1;2;3;4;5;6;7;8;9;10;11
Baie Rouge	N	Y	0 (2009-2017)	-63,135328	18,071323	-63,120692	18,071692	-63,129901	18,068726	1.600+0,085+0.050	100	1;2;3;4;5;6;7;8;9;10;11
Coralita	Y Waters N Private Beach	Y	0 (2009-2017)	-63,013745	18,060934	-63,012857	18,063400	-63,013770	18,062429	0,570	100	1;2;3;4;5;6;7;8;9;10;11
Gallion	Y	Y	0 (2009-2017)	-63,016818	18,068207	-63,016308	18,078486	-63,020256	18,073060	1,610	100	1;2;3;4;5;6;7;8;9;10;11

**Table 11.2. Sea Turtle nesting beaches of Saint Martin FWI.**

Nesting site	within the MPA	Index site	Crawls/yr: recent average (range of years)	Western limit		Eastern limit		Central point		Length (km)	% Monitored	Reference #
Grandes Cayes	Y	Y	0 (2009-2017)	-63,020083	18,112421	-63,018694	18,111041	-63,019543	18,111368	0,745	100	1;2;3;4;5;6;7;8;9;10;11
Lagon	Y	Y	0,11 (2009-2017)	-62,986702	18,114450	-62,982826	18,115724	-62,985166	18,115532	0,395	100	1;2;3;4;5;6;7;8;9;10;11
Petites Cayes	Y	Y	0 (2009-2017)	-63,032173	18,122530	-63,030494	18,122805	-63,031378	18,122471	0,195	100	1;2;3;4;5;6;7;8;9;10;11
Pinel western site	Y	N	0 (2009-2017)	-63,017048	18,105535	-63,015539	18,105058	-63,016253	18,105640	0,265	0-100	1;2;3;4;5;6;7;8;9;10;11
Pinel northern site	Y	N	0 (2009-2017)	-63,015604	18,107751	-63,013998	18,107378	-63,014855	18,107573	0,185	0-100	1;2;3;4;5;6;7;8;9;10;11
Pinel eastern site	Y	N	0 (2009-2017)	-63,014349	18,104920	-63,013859	18,105598	-63,014231	18,105298	0,125	0-100	1;2;3;4;5;6;7;8;9;10;11
Anse Marcel	N Private Beach	N	0 (2009-2017)	-63,042450	18,114003	-63,038734	18,115444	-63,040150	18,114149	0,430	0-100	1;2;3;4;5;6;7;8;9;10;11
Bell Beach disappearance of the Sand bank	N	N	0 (2009)	-63,046712	18,116255	-63,045554	18,115893	-63,046124	18,115932	0,135	0-100	1;2;3;4;5;6;7;8;9;10;11
Caye Verte	Y	N	0 (2009-2017)	-63,010938	18,087165	-63,009705	18,091015	-63,010692	18,089102	0,095	0-100	1;2;3;4;5;6;7;8;9;10;11
Baie Orientale	N	N	1,00 (2009-2017)	-63,024014	18,095773	-63,012685	18,081900	-63,021186	18,088747	2,060	25-50	1;2;3;4;5;6;7;8;9;10;11
Happy Baie	N	N	0 (2009-2017)	-63,074298	18,099267	-63,071802	18,100028	-63,072603	18,099426	0,270	0-100	1;2;3;4;5;6;7;8;9;10;11
Baie de Grand Case	N	N	0 (2009-2017)	-63,066325	18,099848	-63,052887	18,110439	-63,058326	18,100908	1,960	25-50	1;2;3;4;5;6;7;8;9;10;11

**Table 11.2. Sea Turtle nesting beaches of Saint Martin FWI.**

Nesting site	within the MPA	Index site	Crawls/yr: recent average (range of years)	Western limit		Eastern limit		Central point		Length (km)	% Monitored	Reference #
Sandyground	N	N	0 (2009-2017)	-63,108227	18,061168	-63,100659	18,059602	-63,145900	18,059705	0,950	0-25	1;2;3;4;5;6;7;8;9;10;11
Baie Netlee	N	N	0 (2009-2017)	-63,116531	18,067097	-63,108227	18,061168	-63,112200	18,062779	1,150	0-25	1;2;3;4;5;6;7;8;9;10;11
Friar's Bay Data insufficient	N	N	0 (2009-2017)	-63,075995	18,092990	-63,074240	18,094515	-63,074929	18,093738	0,255	0-25	1;2;3;4;5;6;7;8;9;10;11
Galisbay Data insufficient	N	N	0 (2009-2017)	-63,084166	18,072996	-63,080845	18,078775	-63,083425	18,073658	0,740	0-25	1;2;3;4;5;6;7;8;9;10;11
Belle Creole Data insufficient	N	N	0 (2009-2017)	-63,072364	18,072364	-63,114248	18,072516	-63,115144	18,073224	0,585	0-25	1;2;3;4;5;6;7;8;9;10;11
Erethmochelys Coriacea												
Baie aux Prunes	N	Y	8,72 (2009-2017)	-63,153061	18,062287	-63,147230	18,070683	-63,149161	18,066291	1,210	100	1;2;3;4;5;6;7;8;9;10;11
Baie Blanche	Y	Y	13,28 (2009-2017)	-62,988232	18,114496	-62,987781	18,118025	-62,987828	18,116461	0,400	100	1;2;3;4;5;6;7;8;9;10;11
Baie Longue	N	Y	6,89 (2009-2017)	-62,988232	18,114496	-63,139136	18,055593	-63,145183	18,059644	1,810	100	1;2;3;4;5;6;7;8;9;10;11
Baie Rouge	N	Y	3,17 (2009-2017)	-63,135328	18,071323	-63,120692	18,071692	-63,129901	18,068726	1.600+0,085+0.050	100	1;2;3;4;5;6;7;8;9;10;11
Coralita	Y Waters N	Y	2,78 (2009-2017)	-63,013745	18,060934	-63,012857	18,063400	-63,013770	18,062429	0,570	100	1;2;3;4;5;6;7;8;9;10;11



**Table 11.2. Sea Turtle nesting beaches of Saint Martin FWI.**

Nesting site	within the MPA	Index site	Crawls/yr: recent average (range of years)	Western limit		Eastern limit		Central point		Length (km)	% Monitored	Reference #
	Private Beach											
Gallion	Y	Y	3,11 (2009-2017)	-63,016818	18,068207	-63,016308	18,078486	-63,020256	18,073060	1,610	100	1;2;3;4;5;6;7;8;9;10;11
Grandes Cayes	Y	Y	4,11 (2009-2017)	-63,020083	18,112421	-63,018694	18,111041	-63,019543	18,111368	0,745	100	1;2;3;4;5;6;7;8;9;10;11
Lagon	Y	Y	21,83 (2009-2017)	-62,986702	18,114450	-62,982826	18,115724	-62,985166	18,115532	0,395	100	1;2;3;4;5;6;7;8;9;10;11
Petites Cayes	Y	Y	5,11 (2009-2017)	-63,032173	18,122530	-63,030494	18,122805	-63,031378	18,122471	0,195	100	1;2;3;4;5;6;7;8;9;10;11
Pinel western site	Y	N	-	-63,017048	18,105535	-63,015539	18,105058	-63,016253	18,105640	0,265	0-100	1;2;3;4;5;6;7;8;9;10;11
Pinel northern site	Y	N	0.83 (2009-2017) (Pinel)	-63,015604	18,107751	-63,013998	18,107378	-63,014855	18,107573	0,185	0-100	1;2;3;4;5;6;7;8;9;10;11
Pinel eastern site	Y	N	-	-63,014349	18,104920	-63,013859	18,105598	-63,014231	18,105298	0,125	0-100	1;2;3;4;5;6;7;8;9;10;11
Anse Marcel	N Private Beach	N	0,11 (2009-2017)	-63,042450	18,114003	-63,038734	18,115444	-63,040150	18,114149	0,430	0-100	1;2;3;4;5;6;7;8;9;10;11
Bell Beach disappearance of the Sand bank	N	N	0 (2009)	-63,046712	18,116255	-63,045554	18,115893	-63,046124	18,115932	0,135	0-100	1;2;3;4;5;6;7;8;9;10;11
Caye Verte	Y	N	0,11 (2009-2017)	-63,010938	18,087165	-63,009705	18,091015	-63,010692	18,089102	0,095	0-100	1;2;3;4;5;6;7;8;9;10;11

**Table 11.2. Sea Turtle nesting beaches of Saint Martin FWI.**

Nesting site	within the MPA	Index site	Crawls/yr: recent average (range of years)	Western limit		Eastern limit		Central point		Length (km)	% Monitored	Reference #
Baie Orientale Data insufficient	N	N	n/a	-63,024014	18,095773	-63,012685	18,081900	-63,021186	18,088747	2,060	25-50	1;2;3;4;5;6;7;8;9;10;11
Happy Baie	N	N	0,22 (2009-2017)	-63,074298	18,099267	-63,071802	18,100028	-63,072603	18,099426	0,270	0-100	1;2;3;4;5;6;7;8;9;10;11
Baie de Grand Case	N	N	n/a	-63,066325	18,099848	-63,052887	18,110439	-63,058326	18,100908	1,960	25-50	1;2;3;4;5;6;7;8;9;10;11
Sandyground	N	N	n/a	-63,108227	18,061168	-63,100659	18,059602	-63,145900	18,059705	0,950	0-25	1;2;3;4;5;6;7;8;9;10;11
Baie Netlee	N	N	n/a	-63,116531	18,067097	-63,108227	18,061168	-63,112200	18,062779	1,150	0-25	1;2;3;4;5;6;7;8;9;10;11
Friar's Bay Data insufficient	N	N	n/a	-63,075995	18,092990	-63,074240	18,094515	-63,074929	18,093738	0,255	0-25	1;2;3;4;5;6;7;8;9;10;11
Galisbay Data insufficient	N	N	n/a	-63,084166	18,072996	-63,080845	18,078775	-63,083425	18,073658	0,740	0-25	1;2;3;4;5;6;7;8;9;10;11
Belle Creole Data insufficient	N	N	n/a	-63,072364	18,072364	-63,114248	18,072516	-63,115144	18,073224	0,585	0-25	1;2;3;4;5;6;7;8;9;10;11

Three Species of Sea Turtles nest on Saint Martin FWI : *Chelonia mydas*, *Erethmochelys imbricata* and *Dermochelys coriacea*.

2 of the 3 major nesting sites are located outside of the Marine Protected Area :

☆ Baie Longue and Baie aux Prunes are Green Turtles major nesting beaches located outside of the MPA.

☆ Lagon, the major nesting beach of the Critically Endangered *Erethmochelys imbricata* on Saint Martin FWI is located on Tintamarre Island within the MPA.

One important Leatherback nesting site is located outside of the Marine Protected Area on a beach where commercial activities are particularly developed: Orient Bay. Measurement of the hatching success and assessment of the impact of human activities of this site could be performed. The Leatherback Research Project recommended is further describe herein.

*Caretta caretta* is present and foraging in Saint Martin FWI's waters: an individual was found alive in Grand Case after it was speared while foraging in 2017. The individual *Caretta caretta* could be saved and released. Poacher was prosecuted.

An individual of *Lepidochelys olivacea*, amputated of both its front flippers most probably after being entangled, was found alive stranded on St Martin FWI in 2018. Due to the absence of long term rescue centre on St Martin and the fact that to relocate this individual to the Aquarium of Guadeloupe where it could have become a "Sea Turtle Ambassador" highlighting the urgent need of sustainable fishery practices, is considered too time and resources consuming, the individual was released back in the water by the Reserve Naturelle de St Martin.

Statistics calculated in this report are based on volunteers' data collected every year following the same protocol. Nesting season monitoring is based and dependent on volunteers training and availability. Number of crawls on Baie Longue in particular might be underestimated as nesting significantly occurs outside of the monitoring time.

#### **11.1.2. Marine areas.**

Sea Turtles and their habitat are completely protected by National Law since 1991 without exemptions in and outside of the Marine Protected Area. International Treaties signed and ratified concerning Sea Turtles have been rigorously implemented and complied to.

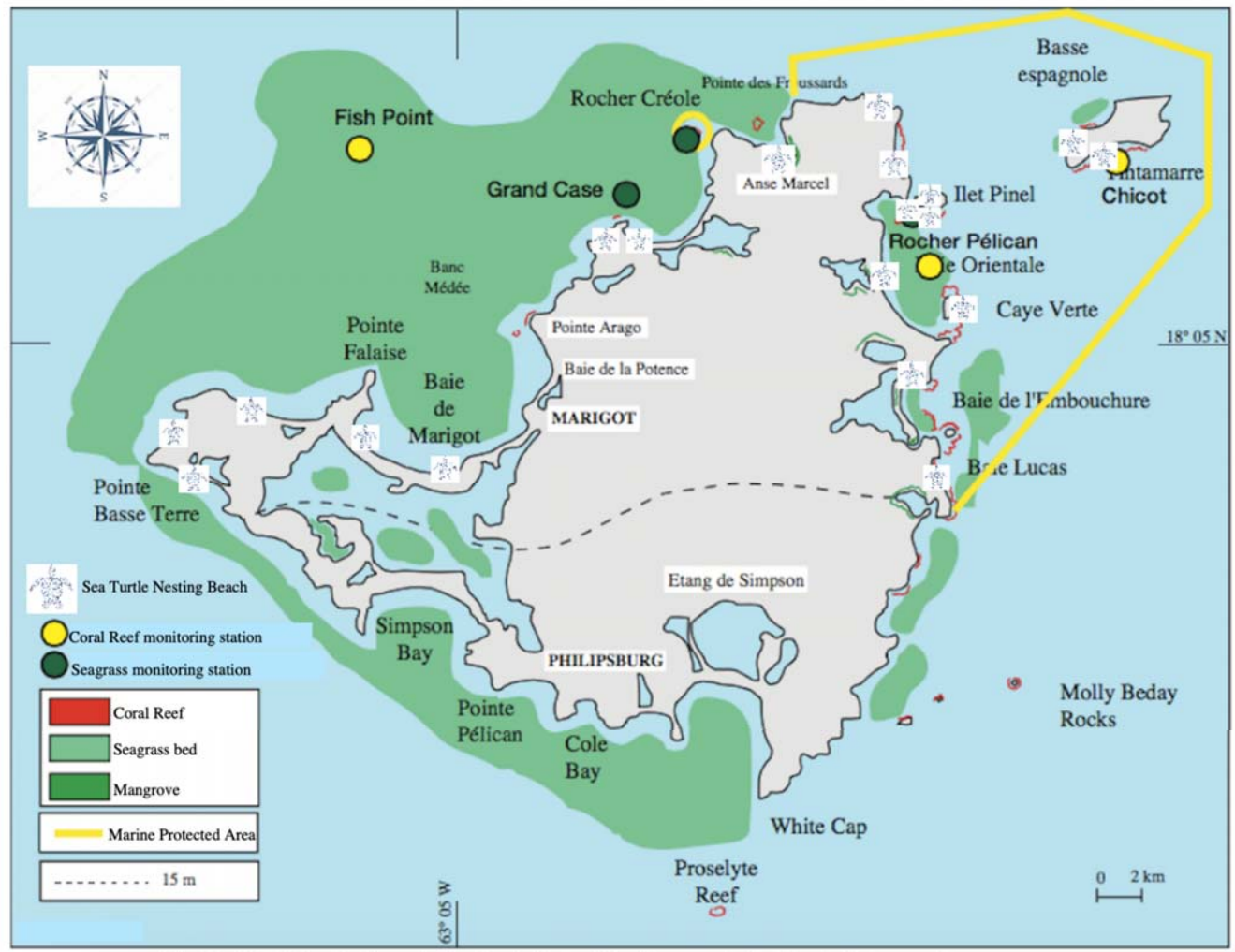
Saint Martin's Marine Protected Area created in 1998 by Ministerial Arrete classifies 3060 hectares of the Island. St Martin's MPA is composed of 2900 hectares of marine reserve, 154 hectares of coast lines and 198 hectares of wetlands. Saint Martin's Marine Protected Area is also classified as a Wetland of International importance under the

RAMSAR Convention and a Marine Protected Area listed under the CAR-SPAW Protocol.<sup>7</sup>

The MPA is managed by the Reserve Naturelle de St Martin which is a Non Governmental Organisation. The Agency is accredited and responsible of Law enforcement concerning environmental matters within the MPA.

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<sup>7</sup>See <http://www.reserves-naturelles.org/saint-martin>.



Saint Martin FWI Sea Turtle nesting beaches habitat and foraging grounds. See Map 2 of reference 13.

Figure 11.1. Saint Martin FWI Sea Turtle nesting beaches, habitat, foraging and mating grounds.

**Table 11.3. International Treaties concerning Sea Turtles signed and ratified by France applying on Saint Martin FWI.**

International Conventions	Signed	Binding	Compliance measured and reported	Species	Conservation actions	Relevance to sea turtles
CITES	Y (France, European Union)	Y	Y	all	CITES or Washington Convention 1972 governs the international trade in threatened and endangered species, which are listed in three appendices to the Convention. The Convention requires parties to prohibit trade in listed species except in accordance with the provisions of the Convention.	All species of Sea Turtles are listed in CITES Appendix I. Appendix I includes endangered species for which trade in specimens must be strictly regulated; primary purpose of commercial trade of those species is prohibited.
CMS	Y (France, European Union)	Y	Y	all. Reservation concerning Chelonia mydas since 07.01.1990 applicable on France and its overseas Departments and Territories	The Bonn Convention 1979, or the Convention on the Conservation of Migratory Species of Wild Animals, seeks to conserve terrestrial, aquatic, and avian migratory species throughout their range.	All species of Sea Turtles are on Appendix I of the CMS. Parties that are a Range State to a migratory species listed in Appendix I shall endeavor to strictly protect them by: prohibiting the taking of such species, with very restricted scope for exceptions; conserving and where appropriate restoring their habitats; preventing, removing or mitigating obstacles to their migration and controlling other factors that might endanger them. Cheloniidae C.spp and Dermochelyidae D.spp are also listed on Appendix II of the CMS. They are therefore protected by its provisions.
CBD	Y (France, European Union)	Y	Y	all	The Convention on Biological Diversity 1992 provides for the conservation and sustainable use of biological diversity, including with regard to access and sharing of the benefits arising out of the use of genetic resources.	CBD applies to the sustainable Management of St Martin's natural resources including Sea Turtles. Scientific Studies on Sea Turtles planning on the use of their genetic resources therefore require the declaration to the French Ministry of Environment.
CAR-SPAW	Y (France, European Union)	Y	Y	all	The Protocol of the Carthage Convention 1990 for Specially Protected Areas and Wildlife in the Caribbean Region calls upon its signatories to identify and protect threatened and endangered species of fauna and flora through national law, including the taking, possession, and killing of these species. In addition, parties are to adopt cooperative measures to protect species listed on one of three Annexes to the Protocol, which contain threatened or endangered plant species (Annex I); threatened or endangered animal species (Annex II); and animal and plant species that are not threatened or endangered but which require special measures to ensure their protection (Annex III). A variety of species, including mangroves and seagrass, are listed in Annex III.	St Martin Natural Reserve and St Martin Lagoon Ponds (ST Martin, France) are a SPAW listed site. (The AGOA Sanctuary - Marine Mammals sanctuary - includes St Martin and is also a SPAW listed site). All Sea Turtles Species present in the Lesser Antilles are listed on Annex II of the CAR SPAW Protocol (Last Revision 2016). Total protection and recovery to the species of Sea Turtles listed in Annex II are ensured by prohibiting the taking, possession or killing, the incidental taking, possession or killing or commercial trade of Sea Turtles, their eggs, parts or products; and prohibiting of the disturbance of Sea Turtles, particularly during periods of breeding, incubation, estivation or migration, as well as other periods of biological stress.

RAMSAR Convention	Y (France)	Y	Y	all	The Ramsar Convention 1971 provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. Parties of the RAMSAR Convention specifically call for the halt of poaching and of harvesting of Sea Turtles in Resolution XIII-24 2019.	Saint Martin's Marine Protected Area is a RAMSAR site, a wetland of international importance, since 2012, which enforces the protection of Saint Martin's Sea Turtles and their habitat and foraging grounds.
Berne Convention	Y (France, European Union)	Y	Y	all. Reservation concerning the Appendix II "Strictly protected species" and concerning Chelonia mydas	The Berne Convention 1979 is a European Treaty aiming at ensuring conservation of wild flora and fauna species and their habitats. Special attention is given to endangered and vulnerable species, including endangered and vulnerable migratory species specified in appendices.	All species of Sea Turtles are listed in Appendix II of the Berne Convention. Chapter II provides for the protection of the habitat of Wild Fauna and Flora especially the species listed in Appendix I and II. Chapter III provides for the protection of Species. Chapter III Article 6 calls for State Parties to take the appropriate administrative and legislative measures to provide complete protection to all Species of Sea Turtles and ensure the prohibition of capture keeping and killing, damage of breeding and resting sites, disturbance, possession of eggs, internal trade of animals alive or dead. Chapter IV pertaining to migratory species, specifically provides for cooperation between Parties.
UNCLOS	Y (France, European Union)	Y	Y	all	The Law of the Sea Convention 1982 defines the rights and responsibilities of nations with respect to their use of the world's oceans, establishing guidelines for businesses, the environment, and the management of marine natural resources. The Convention defines different areas from the baseline: internal waters, territorial waters, archipelagic waters, the contiguous zone, the exclusive economic zone, the continental shelf and the Area.	The convention provides the legal framework for marine and maritime activities establishes obligations for safeguarding the marine environment and provides freedom of scientific research on the high seas, respecting the Common Heritage of Mankind Principle. The First intergovernmental conference on an international legally binding instrument under the United Nations Convention on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction has been convened pursuant to General Assembly resolution 72/249. The conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction, in particular, environmental impact assessments and capacity-building and the transfer of marine technology are provided for in the ABNJ Treaty President's Aid to Negotiations UNGA A/Conf.232/2019/1 that has been prepared following the First Session of the Conference in September 2018 in NYC USA.

## **11.2. Other biological data**

Two immature Green Turtles have been equipped with satellite tags in 2015 at Tintamarre Island: Sasha and Joe have been tracked foraging Tintamarre Island seagrass for 157 and 307 days respectively.

Fibropapillomatosis is affecting Sea Turtles around the Island of St Martin. No studies have been performed yet on the Island. The disease and research recommendations are further described hereinafter.

## **11.3. Threats.**

### **11.3.1. Nesting sites.**

#### Reduction of the Sand Bank due to natural erosion and constructions:

Study of the Health of Saint Martin's nesting sites has been performed in 2015 by the Roseau Tortues Marines Guadeloupe: constructions reducing the sand bank and altering the beach vegetation have been reported. Lightings susceptible to disorientate Sea Turtles and their hatchlings have also been reported. After this mission, construction projects have been damaging nesting beaches (e.g. Happy Bay). Natural erosion is happening on St Martin.

Stabilization of the beaches sand bank and restoration of the coastline's vegetation of selected sites, in particular Hawksbill Turtles nesting sites, is advised.

Illegal constructions, illegal sand mining on nesting sites are observed and actions are taken in this regard by the appropriate authorities.

#### Photopollution:

Recommendations on the mitigation of the photo pollution threat on Saint Martin are described hereinafter.

#### Sargassum entanglement:

Sargassum entanglement of hatchlings and adult Sea Turtles is a risk with the increasing sargassum flux coming on Saint Martin. Entangled hatchlings have been described on Cul de Sac's shore. They were not reported to the Reserve Naturelle de Saint Martin so as to get rescued nor helped out of the seaweed by the public there.

### **11.3.2. Marine areas.**

#### Boat strikes:

Numerous cases of deadly boat strikes have been observed in the beginning of 2019 with 7 lethal cases happening between January and May 2019.



Development of Information/Warning Signs is suggested: via the local newspaper, via less formal informative media support, and/or formal signs to be posted at frequented sites like marinas, precisely indicating the speed limit, that can be lowered down at sensitive spots, recalling the advice to lift up the boat's engine(s) in the marina, and the procedure to follow in case of a Sea Turtle boat strike or encounter with an injured Sea Turtle. Clarification of the fact harassment of Sea Turtles is forbidden by law, and that to help an injured Sea Turtle will not be considered as the harassment of the endangered species is suggested.

#### Sea Turtles' diseases:

Fibropapillomatosis is a recurrent observation around the Island of St Martin. Is the disease on St Martin caused or worsened by pollution of the bays, by waste waters, industrial wastes, boats wastes, is yet to be determined.

The disease can be lethal in the most severe cases where the Turtle vital functions are hampered by the size of the external and/or internal tumors, and is contagious between Sea Turtles.

#### Sea Turtle habitat diseases:

Coral reefs are critical coastal habitats, buffering the effects of floods and storms and nursery to a wide range of marine Species. Stony Coral Tissue Loss Disease has been observed on Tintamarre and le Rocher Creole. Tintamarre reefs are home of the critically endangered Hawksbill Turtle, Lagon located on Tintamarre is their major nesting site on Saint Martin FWI. Le Rocher Creole in Grand Case Bay is a Sea Turtle foraging and mating ground, Grand Case beach is a nesting site.

#### Sea Turtle habitat foraging and mating ground degradation:

☆ Monitoring of coral reefs stations by the Reserve Naturelle de St Martin is ongoing following the Reef check methods and protocol.

☆ Seagrass is a critical habitat, foraging ground for Sea Turtles and also nursery ground for many fishes and other Wildlife species. Seagrass also helps lessens the impacts of severe weather, reduces erosion and mitigates the effects of climate change by absorbing about 10 percent of the total estimated organic carbon sequestered in the Oceans each year.

Anthropogenic pollution is a primary parameter reported as directly influencing the health of Saint Martin's native seagrass. The waste waters pipe system has been reported as necessitating a major renewal on Saint Martin FWI.

Sea Turtle foraging ground degradation by boats anchors is a threat for the Species and favors the development of the invasive seagrass *Halophila stipulacea*. *Halophila stipulacea* taking over 60 species of native seagrass in particular Sea Turtles' foraging

ground *Thalassia testudinum* has been studied on Saint Martin in 2014, reporting the expansion of the invasive seagrass on 5 sites around the Island.

The monitoring of seagrass beds is performed via the Reserve Naturelle de Saint Martin.

The Simpson Bay Lagoon is a Sea Turtle habitat and foraging ground. Located outside of St Martin's MPA and both on Saint Martin and Sint Maarten, boat traffic is particularly high on this site, generating all the threats for the Species due to this activity.

Anthropogenic pollution is probably also originating from the residences and businesses located around the Lagoon.

#### Sea Turtle Poaching:

Sea Turtle poaching is happening on the Island of St Martin in and outside of the MPA. It is difficult to assess the extent of the practice and if there is an organized poaching scheme including transfer of harvested Turtles to neighboring Islands or if there are opportunistic takes. Before Anguilla's moratorium on Sea Turtle Harvest, the demand on Saint Martin for Sea Turtle meat has been reported as being high.

Law is thoroughly enforced on the matter. Rescue Rehab and Release is performed.<sup>8</sup>

#### Threats for the species and conservation efforts performed at a Regional scale :

At a regional perspective, overharvesting and legal gaps concerning sea turtles have been identified and are threatening the conservation efforts performed.<sup>9</sup> Humber et al. 2014 describe the Wider Caribbean as the second region in the World responsible for the direct take of Sea Turtles with 16 countries allowing their harvest in their national waters, representing one third (34.6%) of estimated takes in the World with 14 640 Turtles slaughtered per year. International cooperation is necessary at a scientific scale for the survival of the species, it is however not recommended to create further legally binding agreements providing for Sea Turtle harvest. At the regional scale, clarification on the legal basis on which rely the authorized Sea Turtle harvest is needed. Implementation of

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<sup>8</sup>See The Rescue Rehab and Release of Gaia the Green Turtle that was speared in Orient Bay in 2013 Press Releases at [www.reservenaturelle-saint-martin.com/fr/node/472](http://www.reservenaturelle-saint-martin.com/fr/node/472), [www.tortuesmarinesguadeloupe.org/remise-a-leau-de-gaia-une-jeune-tortue-verte-rescapee/](http://www.tortuesmarinesguadeloupe.org/remise-a-leau-de-gaia-une-jeune-tortue-verte-rescapee/), [www.guadeloupe.franceantilles.fr/actualite/environnement/gaia-la-tortue-miraculee-233661.php](http://www.guadeloupe.franceantilles.fr/actualite/environnement/gaia-la-tortue-miraculee-233661.php). Gaia's Rescue Rehab and Release was performed by Julien Chalifour from the Reserve Naturelle de Saint Martin with Veterinarian Dr Claire Saladin on St Martin FWI and thanks to the supervision and coordination of Nicolas Maslach Director of the Reserve Naturelle de Saint Martin. So as to transfer Gaia to Guadeloupe for further treatment after the emergency veterinary care performed on Saint Martin collaboration was established with the Reseau Tortues Marines Guadeloupe and Veterinarian Dr Frederic Leveque. Gaia could be released 3 weeks after rescue in the Reserve Cousteau in Guadeloupe at Malendure Bay. The Direction de l'Environnement, de l'Amenagement et du Logement de Guadeloupe issued in a timely manner the CITES permit necessary for Gaia's transfer. Reference 15 of the Excel Charts.

RAMSAR Res XIII-24 2019 encouraging the halt of poaching and of exploitation of Sea Turtles is sorely advised.

#### **11.4. Conservation.**

Conservation Projects are described herein and in Saint Martin's ExcelChart. Recommendations and advises for future research projects and threats mitigation are developed throughout this report.

Direct threats for the conservation of Sea Turtles have been identified needing urgent action so as to be mitigated. Governmental support is vital for the survival of the Species on Saint Martin FWI.

**Table 11.4. Sea Turtle Conservation Projects and Databases on Saint Martin FWI.**

RMU	Country	Region / Location	Project Name or descriptive title	Key words	Start date	End date	Leading organization	Public/Private	Collaboration	Reports / Information material	Current Sponsors	Primary Contact (name and Email)	Database available	Name of Database	Ref #
NorthWestAtlantic / Caribbean	Saint Martin France	Saint Martin	Suivi des pontes de tortues marines a Saint Martin FWI/ Monitoring of Sea Turtle Nesting season on Saint Martin FWI	sea turtles ; nesting; nesting season; Saint Martin FWI ; Caribbean ; volunteer	2009	ongoing	Reserve Naturelle de Saint Martin	National NGO	Y Volunteers Widecast	Y Cf <a href="https://reserve-naturelle-saint-martin.com/fr/etudes-etudes">https://reserve-naturelle-saint-martin.com/fr/etudes-etudes</a>	-	Julien Chalifour <a href="mailto:reservenat.julien@yahoo.fr">reservenat.julien@yahoo.fr</a>	N		1;2;3; 4;5;6; 7;8;9; 10;11; 14
NorthWestAtlantic / Caribbean	Saint Martin France	Saint Martin	SWOT	sea turtles; nesting beaches; genetic ; telemetry	2006	ongoing	Oceanic Society, IUCN SSC MTSG, Duke University et al.	n/a	Y	Y Cf <a href="https://www.seaturtlestatus.org/online-map-data">https://www.seaturtlestatus.org/online-map-data</a>	-	Nicolas Maslach <a href="mailto:nicolas.maslach@rnsn.org">nicolas.maslach@rnsn.org</a>	Y	SWOT	n/a
Caribbean / NorthWest Atlantic	Saint Martin France	Wider Caribbean	Widecast Atlas of Sea Turtles Nesting Beaches	Sea Turtles ; Nesting ; Atlas : Wider Caribbean	2016	ongoing	Widecast	International NGO	Y	Ongoing Cf <a href="http://seamap.env.duke.edu/widecast/">http://seamap.env.duke.edu/widecast/</a>	-	Claire Saladin <a href="mailto:clairesaladin@hotmail.com">clairesaladin@hotmail.com</a>	Y	Widecast Atlas	ongoing
Caribbean / NorthWest Atlantic	Saint Martin France	Saint Martin	CITES	sea turtles ; trade ; illegal trade ; caribbean ; poaching	1978	ongoing	Direction de l'environnement, de l'aménagement et du logement de la Guadeloupe DEAL Guadeloupe	Governemntal Agency	Y	Y	-	pb.m.deal-guadeloupe@developpement-durable.gouv.fr	N	CITES	n/a

NorthWestAtlantic / Caribbean	Saint Martin France	Saint Martin	Suivi de l'état de sante des herbiers de la Reserve de Saint Martin FWI / Seagrass beds' Health monitoring on Saint Martin MPA FWI	foraging grounds ; sea turtles ; Saint Martin; Caribbean	2007	ongoing	Reserve Naturelle de Saint Martin	National NGO	Y	Y	-	Nicolas Maslach <a href="mailto:nicolas.maslach@rnsn.org">nicolas.maslach@rnsn.org</a>	N	n/a	13;17	
NorthWestAtlantic / Caribbean	Saint Martin France	Saint Martin	Suivi des récifs coralliens a Saint Martin FWI / Coral Reefs monitoring on Saint Martin FWI	coral reefs ; coral reefs monitoring ; Sea Turtle; Saint Martin FWI ; Caribbean	2008	ongoing	IFRECO R/Reserve Naturelle de Saint Martin	National NGO	Y	Universities, Governmental Agencies	Y	N	Nicolas Maslach <a href="mailto:nicolas.maslach@rnsn.org">nicolas.maslach@rnsn.org</a>	N	n/a	16;19

The conservation projects located within or without the MPA could include but are not limited to:

∞ Evaluation and modernisation of the management of anthropogenic pollution on Saint Martin FWI, concerning in particular the management of waste waters. At a watershed scale, precise measures of the bays pollutants origins and levels, study of the pollution originating at construction sites and at marinas including for instance the study of the chemicals used on boats could be performed. Restoration of Saint Martin seagrass meadows, coral reefs and mangroves is imperative and directly linked to the management of anthropogenic pollutions and the waste water system. Collaboration with the Collectivite de Saint Martin for this study and project is suggested.

∞ Strengthening of a Communication Program for the Conservation of Sea Turtles of Saint Martin FWI via local newspapers, via less formal media supports diffusing clear recommendations to the public, and/or via formal signs at the entry of sensitive spots e.g. the Marina Fort Louis.

∞ As Sea Turtle souvenirs hotspots are present in the Caribbean Region and the Caribbean Region is the second largest Region responsible for Sea Turtle harvest at a global scale, an Education and Outreach Campaign about the Sea Turtle Trade in the Caribbean Region is suggested, which could be developed via an educative program in schools of St Martin for the enhancement of sustainable tourism practices on Saint Martin and when travelling abroad..

∞ Stabilisation and restoration of the coastline's vegetation of Sea Turtles nesting sites including Hawksbill nesting beaches.

The Study and restoration of the coastline, in particular of the Critically Endangered Hawksbill nesting beaches is suggested. This Conservation Project could include the development of an educative program in partnership with schools of Saint Martin.

∞ Development of a partnership with businesses and hotels of nesting sites for the enhancement of Sea Turtle monitoring and conservation. How this partnership could be developed is described via the research projects suggested hereinafter.

∞ Development of a Partnership with the Indigenous Community of Fishermen of St Martin.

∞ Restoration of the Simpson Bay Lagoon Mangroves, ideal nursery grounds for groupers, snappers for example, protective ecosystems for smaller fishes, coastlines natural buffer from sea level rise, crucial for carbon sequestration. This restoration program could be developed as an educative program in partnership with schools of Saint Martin.

∞ Enhanced cooperation between Saint Martin and Sint Maarten specifically for the Simpson Bay Lagoon management.

## **11.5. Research.**

### **☆Fibropapillomatosis Research and Treatment Program:**

Fibropapillomatosis is affecting Sea Turtles around the Island of St Martin. No studies have been performed yet on the Island. Research is needed so as to understand the causes of the disease and identify the infectious agent affecting Saint Martin's Sea Turtles. The surgical treatment of affected individuals is also strongly recommended as the disease can be lethal and is contagious between Sea Turtles. Being time and resources consuming, governmental support is vital to mitigate this threat for the survival of the species.

### **☆Protocol of transfer of Unreleasable Sea Turtles to Guadeloupe:**

A protocol of transfer of unreleasable Sea Turtles to the Sea Turtle Rescue Center of Guadeloupe could be developed in cooperation with the Reserve Naturelle de Saint Martin. This protocol could describe the CITES procedure to follow for those individuals who nonetheless need to be clinically stable enough to travel by plane. The procedure is infrequent enough so as to not generate an important cost but positively significant enough for those individuals becoming "Sea Turtles Ambassadors" participating in an Educative and Outreach Program originating from a collaboration of the Reserve Naturelle de Saint Martin with the Guadeloupe Sea Turtle Rescue Center.

### **☆Saint Martin's Sea Turtle Nesting sites Photo pollution Research Program:**

To continue the study performed by the Réseau Tortues Marines Guadeloupe in 2015 reporting the need to mitigate the photopollution threat on Saint Martin, research on lightings on nesting beaches could include the measurement of the photo pollution described in 2015 and the development of a partnership with residents and hotels particularly on the major nesting sites of Baie Longue and Baie aux Prunes in the Low lands as well as a partnership with residents and businesses on the Leatherback nesting site of Orient Bay for the implementation of Sea Turtle Friendly lighting.

### **☆Saint Martin's Leatherback Research Program :**

The Leatherback Research Program of St Martin could include but is not limited to:

↻ The increase monitoring of Leatherbacks nests on Saint Martin FWI. The monitoring program could involve businesses and inhabitants of the Bay. Excavation of the nests could be performed so as to precisely measure hatching success of Saint Martin's Leatherbacks population. Nests protection and nests shading could be performed so as to increase hatching success if the primary study shows results indicating additional

methods would be beneficial and should therefore be implemented. Other threats for Saint Martin's Leatherbacks needed to be mitigated would also be identified.

∞ The study of the impact of human activities on the Leatherbacks nesting beaches in particular on Orient Bay.

∞ The implementation of a scientific partnership with the community of inhabitants and businesses of Orient Bay for the monitoring and conservation of Leatherbacks so as to enhance nests monitoring and sustainable development of the Bay including for instance the use of Sea Turtle Friendly lighting and the appropriate disposal of beach furnitures.

∞ The implementation of an Orient Bay sustainable maintenance Program with the Collectivite de Saint Martin, responsible for the daily morning beach clean up involving beach trucks.

#### ☆Research on the Fishermen Indigenous Community of St Martin FWI :

Study of the fishery practices on St Martin, including the description and valorisation of the history of the fishermen indigenous community of St Martin is advised.

#### ☆Study of the Simpson Bay Lagoon Biodiversity:

The Simpson Bay Lagoon is a sea turtle habitat and foraging ground, a special ecosystem including mangroves, also unique due its management being shared between Saint Martin and Sint Maarten. There are no publications about the Simpson Bay Lagoon. The study of its Biodiversity is necessary and will lead to its improved governance. Precise data are needed so as to effectively manage this ecosystem. Mangroves are natural soil stabilizers and filters, buffer coastlines from storm surges, tides, waves and current, as coastal habitats are accountable of 14% of the carbon sequestration by the global Ocean, are storing three to five times more carbon in their soil than tropical rainforests and are essential for the Good Health of Saint Martin's population.



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## Chapter 12: French Atlantic and Channel coasts

DELL'AMICO, Florence

AQUARIUM LA ROCHELLE - Centre d'Etudes et de Soins pour les Tortues Marines. Quai Louis Prunier BP 4 17002 LA ROCHELLE Cedex 1. tortues@aquarium-larochelle.com

**Table 12.1. Main biology and conservation aspects of sea turtle Regional Management Units (RMU) occurring in French Atlantic and Channel coasts.**

RMU	DC-NW IND	Ref #
<b>Occurrence</b>		
Nesting sites	N	
Pelagic foraging grounds	Y Both	1 to 52
Benthic foraging grounds	N	
<b>Key biological data</b>		
Nests/yr: recent average (range of years)	n/a	
Nests/yr: recent order of magnitude	n/a	
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	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	
Nests/yr at "minor" sites: recent average (range of years)	n/a	
Total length of nesting sites (km)	n/a	
Nesting females / yr	n/a	
Nests / female season	n/a	
Female remigration interval (yrs)	n/a	
Sex ratio: hatchlings (F / Tot)	n/a	
Sex ratio: juveniles (F / Tot)	n/a	
Sex ratio: Adults (F / Tot)	Y	1 to 46
Min adult size, CCL or SCL (cm)	Y	1 to 46
Age at maturity (yrs)	n/a	
Clutch size (n eggs)	n/a	
Emergence success (hatchlings/egg)	n/a	
Nesting success (Nests/ Tot emergence tracks)	n/a	
<b>Trends</b>		
Recent trends (last 20 yrs) at nesting sites (range of years)	n/a	

Recent trends (last 20 yrs) at foraging grounds (range of years)	n/a	1 to 46, 51 to 52
Oldest documented abundance: nests/yr (range of years)	n/a	
<b>Published studies</b>		
Growth rates	N	
Genetics	Y	50
Stocks defined by genetic markers	Y	50
Remote tracking (satellite or other)	N	
Survival rates	N	
Population dynamics	N	
Foraging ecology (diet or isotopes)	Y	1, 2, 16, 26, 27, 38, 41, 47 to 49, 51, 52
Capture-Mark-Recapture	N	
<b>Threats</b>		
Bycatch: small scale / artisanal	Y	49
Bycatch: industrial	Y	49
Bycatch: quantified?	Y	49
Intentional killing or exploitation of turtles	N	
Egg poaching	N	
Egg predation	N	
Photopollution	N	
Boat strikes	Y	
Nesting habitat degradation	N	
Foraging habitat degradation	Y	23, 26, 47, 48, 49, 51
Other	N	
<b>Long-term projects</b>		
Monitoring at nesting sites	N	
Number of index nesting sites	N	
Monitoring at foraging sites	Y	
<b>Conservation</b>		
Protection under national law	Y	
Number of protected nesting sites (habitat preservation)	N	
Number of Marine Areas with mitigation of threats	n/a	
Long-term conservation projects (number)	>1 (1988-ongoing)	1 to 46
In-situ nest protection (eg cages)	N	

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

**Table 12.2. Sea turtle nesting beaches in French Atlantic and Channel coasts.**

Non occurring.

**Table 12.3. International conventions protecting sea turtles and signed in French Atlantic and Channel coasts.**

International Conventions	Signed	Binding	Compliance measured and reported	Species	Conservation actions	Relevance to sea turtles
CBD: Convention on Biological Diversity (1992).	Y	Y	Y	ALL	To conserve the biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources, taking into account all rights over those resources and to technologies, and by appropriate funding.	Marine turtle conservation is relevant to the agreement given the species' importance to overall biological diversity. For example, text in Article 8 states that each contracting party shall: "promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings" (CBD, 1992).
CMS: Convention on the Conservation of Migratory Species of Wild Animals (1979). Also known as the Bonn Convention. CMS instruments can be both binding and non-binding.	Y	Y	Y	ALL	To conserve migratory species and take action to this end, paying special attention to migratory species the conservation status of which is unfavourable, and taking individually or in co-operation appropriate and necessary steps to conserve such species and their habitat.	All seven species of marine turtles are listed within the convention text (CMS, 2014). A specific agreement has been developed for marine turtles under CMS. The Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia (IOSEA), for example, to which the UK and France are individual EU country signatories. CMS has a specific resolution on bycatch detailing various actions needed to reduce bycatch of migratory species that will include marine turtles ( <i>UNEP/CMS/Resolution 9.18 on Bycatch</i> ).

Convention on the Conservation of European Wildlife and Natural Habitats (1979). Also known as the Bern Convention and is binding.	Y	Y	Y	ALL	To conserve wild flora and fauna and their natural habitats, especially those species and habitats whose conservation requires the co- operation of several States, and to promote such co-operation.	Conserving European natural heritage is a key element of this convention (CoE, 2014) and this will include marine turtle populations in the Mediterranean, for example. The EU aims to fulfil its obligations under the Bern Convention through its Habitats Directive (a directive designed to ensure the conservation of rare, threatened, or endemic animal and plant species) .
CITES: Convention on International Trade in Endangered Species of Wild Fauna and Flora (1973).	Y	Y	Y	ALL	An international agreement between governments, the aim of which is to ensure that international trade in specimens of wild animals and plants does not threaten their survival.	All seven species listed in Appendix I of CITES.
The Convention for the protection of the marine environment of the North-East Atlantic (the OSPAR Convention) (1992).	Y	y	y	Dc, Cc	To protect and conserve marine ecosystems and biological diversity of the North-East Atlantic.	These two species are considered threatened and/or declining wherever the species is present in OSPAR regions (Dc : every OSPAR Regions, Cc : OSPAR Regions IV and V)
Marine Strategy Framework Directive (2008).	Y	Y	Y	Dc, Cc	This Directive leds European member states to take the necessary measures to reduce the impact of activity in this environment in order to achieve or maintain a good environmental status by 2020.	These two species of marine turtles are considered as an indicator for MSFD descriptors: 1"Biological diversity", 8"Contaminants", and 10"Marine debris".



**Table 12.4. Sea turtle conservation projects in French Atlantic and Channel coasts.**

RMU	Country	Region / Location	Project Name or descriptive title	Key words	Start date	End date	Leading organisation	Public/Private	Collaboration	Reports / Information material	Current Sponsors	Primary Contact (name and Email)
Atlantic Northwest	France	French Atlantic and Channel coasts and its EEZ and marine subregions according to MSFD : Channel – North Sea, Celtic Seas and Bay of Biscay.	Strandings, accidental bycatch and sea sightings database	Database, sea turtles, strandings, sea sightings, accidental bycatch	1988	ongoing	Aquarium La Rochelle / CESTM	Private	French Environmental Ministry, MNHN and French Biodiversity Agency		Aquarium La Rochelle and French Biodiversity Agency	Florence DELL'AMICO, tortues@aquarium-larochelle.com
Atlantic Northwest	France	Atlantic Northeast	Sea turtle conservation program	Satellite tracking, <i>Caretta caretta</i> , <i>Chelonia mydas</i> , <i>Lepidochelys kempii</i>	2008	ongoing	Aquarium La Rochelle / CESTM	Private			Aquarium la Rochelle. In 2009 with French Biodiversity Agency. Since 2009, with National Centre for Space Studies	Florence DELL'AMICO, tortues@aquarium-larochelle.com
Atlantic Northwest	France	French metropolitan waters	OBSMER	At sea observer	2003	ongoing	DPMA	Public	IFREMER, CNPMM		DPMA and European Union	DPMA
Atlantic Northwest	France	French metropolitan waters	Suivi Aérien de la Mégafaune Marine (SAMM)	Aerial survey, marine megafauna	2011	winter 2011 - summer 2012 ; 2019 - 2021	Observatoire Pelagis (La Rochelle Université-CNRS)	Public	APECS, Eco Océan Institut, LPO, LPO Haute-Normandie		MEDDE, AAMP, La Rochelle Université, EDF Nouvelles Energies	Observatoire Pelagis (La Rochelle Université – CNRS)

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## Chapter 13: Venezuela

Héctor Barrios-Garrido<sup>1,2</sup>; Marco García-Cruz<sup>3,4</sup>

1. La Universidad del Zulia, Centro de Modelado Científico (CMC), Departamento de Biología. 4002. Maracaibo-Venezuela. [hbarriosg@gmail.com](mailto:hbarriosg@gmail.com)
2. Grupo de Trabajo en Tortugas Marinas del Golfo de Venezuela (GTTM-GV). 4005. Maracaibo, Venezuela. [hbarriosg@gmail.com](mailto:hbarriosg@gmail.com)
3. Centro de Ecología, Instituto Venezolano de Investigaciones Científicas (IVIC), Apdo. 20632. Caracas 1020-A, Venezuela. [marcogarciacruz@gmail.com](mailto:marcogarciacruz@gmail.com)
4. Archie Carr Center for Sea Turtle Research and Department of Biology, University of Florida, PO Box 118525, Gainesville, FL 32611, USA. [marcogarcia@ufl.edu](mailto:marcogarcia@ufl.edu)

*Note from the authors:* Due to multiple constrains, the data included on this report cover only nesting beach information from green turtles at Aves Island which is considered by several authors as an Index Nesting Beach (INB) in the region (1,2,3,4,5). Moreover, the data regarding marine areas as identified foraging grounds, mating areas, and migratory corridors, only covers information from the Gulf of Venezuela which is located at northwester part of the country, and it is a key feeding habitat for all the species of marine turtle registered in the country (6,7,8,10,11,). We aim to include additional key nesting beaches and feeding areas in future reports (e.g. Paria Peninsula; Margarita Island, La Tortuga Island, Los Testigos Archipelago, Los Roques National Park, Central Coast of Venezuela, Paraguana Peninsula, Henry Pittier National Park, Morrocoy National Park, among others).

**Table 13.1. Main biology and conservation aspects of sea turtle Regional Management Units (RMU) occurring in Venezuela**

TOPIC	REGIONAL MANAGEMENT UNIT											
	AVES ISLAND		GULF OF VENEZUELA									
	<i>Chelonia mydas</i> Aves Island (rmu50)	Ref #	<i>Chelonia mydas</i> rmu47	Ref #	<i>Eretmochelys imbricata</i> rmu10	Ref #	<i>Caretta caretta</i> rmu25	Ref #	<i>Dermochelys coriacea</i> rmu51	Ref #	<i>Lepidochelys olivacea</i> rmu02	Ref #
<b>Occurrence</b>												
Nesting sites	Y	1,2,3,4	N		Y	10	Y	10	Y	10	N	
Pelagic foraging grounds	Y	2, 11	Y	11	Y	6	Y	6	Y	8	?	
Benthic foraging grounds	Y	2	Y (both)	6,11,12	Y (both)	6,15	Y (both)	6,12,14	Y (both)	6,12,14	Y (A)	13
<b>Key biological data</b>												
Nests/yr: recent average (range of years)	up to 3000 (1979-2009)	1,2,3	?		Up to 10 (2010-2012)	10	Up to 10 (2010-2012)	10	Up to 10 (2010-2012)	10	N/A	
Nests/yr: recent order of magnitude	up to 3000	1,2,3	?		10's		10's		10's		N/A	
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	n/a		0		0		0		0		N/A	

Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	n/a		?		1	10	1	10	1	10	N/A	
Nests/yr at "major" sites: recent average (range of years)	n/a			N/A	N/A	N/A	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	N/A	N/A	N/A	N/A	
Total length of nesting sites (km)	0.53 Km	1,2,3	?		2.3km	10	2.3km	10	2.3km	10		
Nesting females / yr	800-1200	1,2,3										
Nests / female season (N)	1200 (26)	1,2,3										
Female remigration interval (yrs) (N)	2.37 (7689)	1,2										
Sex ratio: Hatchlings (F / Tot) (N)	n/a											
Sex ratio: Immatures (F / Tot) (N)	n/a											
Sex ratio: Adults (F / Tot) (N)	n/a											
Min adult size, CCL or SCL (cm)	72 CCL	1,2	?		?		?		?			
Age at maturity (yrs)	n/a											
Clutch size (n eggs) (N)	122,9 (range 93-178)(445)	1,2	?		?		?		?			



Emergence success (hatchlings/egg) (N)	n/a											
Nesting success (Nests/ Tot emergence tracks) (N)	n/a											
<b>Trends</b>												
Recent trends (last 20 yrs) at nesting sites (range of years)	Up (1979-2009)	1,2	?		?		?		?			
Recent trends (last 20 yrs) at foraging grounds (range of years)	n/a											
Oldest documented abundance: nests/yr (range of years)	200 (1979)	1,2,3	?		10/y (2010-2012)	10	10/y (2010-2012)	10	10/y (2010-2012)	10		
<b>Published studies</b>												
Growth rates	N		N		N		N		N		N	
Genetics	Y	2	Y	11	N		N		N		N	
Stocks defined by genetic markers	Y	2	Y	11	N		N		N		N	
Remote tracking (satellite or other)	Y	2	N		N		N		N		N	
Survival rates	Y	1,2,19	N		N		N		N		N	
Population dynamics	Y	1,2,3	N		N		N		N		N	

Foraging ecology (diet or isotopes)	Y	5	N		N		N		N		N	
Capture-Mark-Recapture	Y	1,2	Y	6	Y	6	Y	6	Y	6	N	
<b>Threats</b>												
Bycatch: presence of small scale / artisanal fisheries?	N	1,2	Y (DLL; SN; DN; Turtle Nets)	11, 12, 14	Y (DLL; SN; DN; Turtle Nets)	11, 12, 14	Y (DLL; SN; DN; Turtle Nets)	11, 12, 14	Y (DLL; SN; DN; Turtle Nets)	8, 11, 12, 14	Y (DLL; SN; DN; Turtle Nets)	13, 11, 12, 14
Bycatch: presence of industrial fisheries?	Y	1,2,3	?		?		?		?		?	
Bycatch: quantified?	N											
Take. Intentional killing or exploitation of turtles	Y	6	Y		Y		Y		Y		Y	
Take. Egg poaching	N		N		?		?		?		N	
Coastal Development. Nesting habitat degradation	N		N		N		N		N		N	
Coastal Development. Photopollution	N		N		N		N		N		N	
Coastal Development. Boat strikes	N		Y		?		Y		Y		?	
Egg predation	N		?		?		?		?		?	
Pollution (debris, chemical)	N		Y		Y		Y		Y		Y	
Pathogens	Y	5, 16	Y	5, 16	Y	5	?		?		?	

Climate change	Y	2	?		?		?		?		?	
Foraging habitat degradation	Y		Y	6	Y	6	Y	6	Y	6	Y	6
Other	N											
<b>Long-term projects (&gt;5yrs)</b>												
Monitoring at nesting sites (period: range of years)	Y (1979-ongoing)	1,2,3	N/A		N/A		N/A		N/A		N/A	
Number of index nesting sites	1		N/A		N/A		N/A		N/A		N/A	
Monitoring at foraging sites (period: range of years)	N		Y(2000-ongoing)	6	Y(2000-ongoing)	6	Y(2000-ongoing)	6	Y(2000-ongoing)	6	Y(2000-ongoing)	6
<b>Conservation</b>												
Protection under national law	Y		Y		Y		Y		Y		Y	
Number of protected nesting sites (habitat preservation) (% nests)	1 (100%)	1,2,3,4	0		1		1		1		N/A	
Number of Marine Areas with mitigation of threats	0		1		1		1		1		N/A	
N of long-term conservation projects (period: range of years)	>1 (1975-ongoing)	1,2,3	1(20y)		1(20y)		1(20y)		1(20y)		1(20y)	
In-situ nest protection (eg cages)	N		N/A		N/A		N/A		N/A		N/A	
Hatcheries	N		N/A		N/A		N/A		N/A		N/A	

Head-starting	N		N/A		N/A		N/A		N/A		N/A	
By-catch: fishing gear modifications (eg, TED, circle hooks)	N		No		No		No		No		No	
By-catch: onboard best practices	Y		No		No		No		No		No	
By-catch: spatio-temporal closures/reduction	N		No		No		No		No		No	
<b>Other</b>												

**Table 13.2. Sea turtle nesting beaches in Venezuela**

Nesting beach name	Index site	Central point		Length (km)	% Monitored	Reference #
		Long	Lat			
<b>CM-NW ATL</b>		Long	Lat			
Aves Island	Y	63.617968	15.668403	0.53	100	1,2
(Playa Norte) Ensenada Malimansipa	N	71°08'; 71°28' W	11°32'; 12°00	1.23	100	10
(Playa Sur) Ensenada de Malimasipa	N	71°08'; 71°28' W	11°32'; 12°00	0.86	100	10

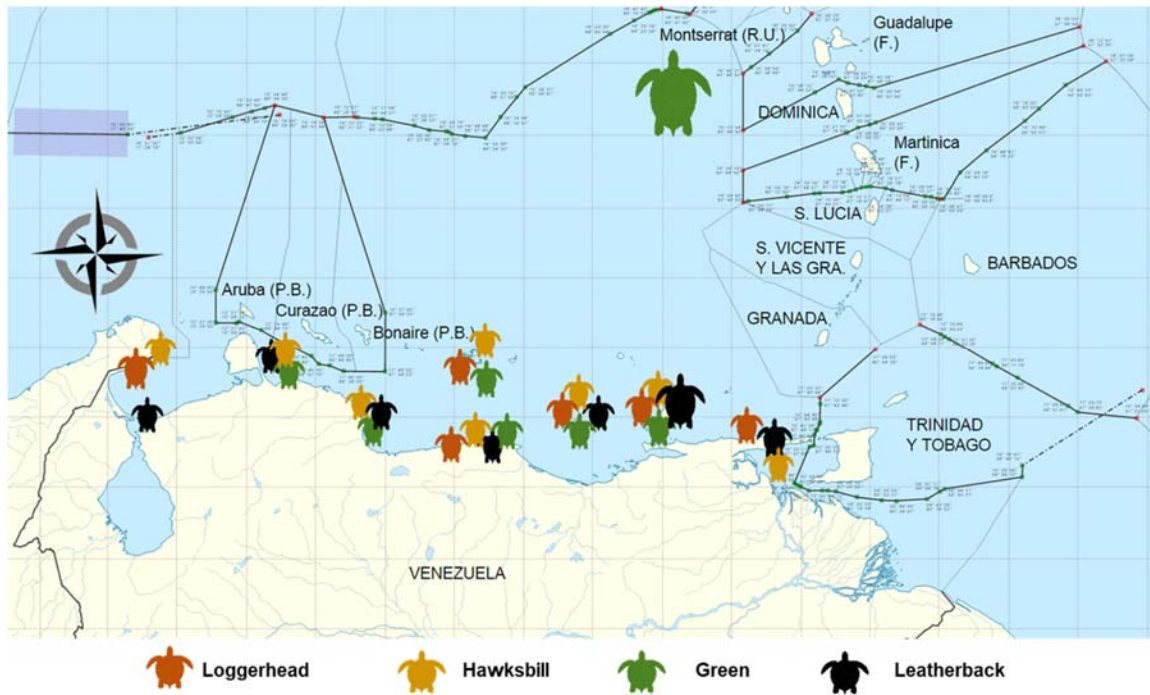


Figure 13.1. Sea turtle nesting beaches for four species in the Venezuelan coast. The size of turtles is proportional to the estimated number of nesting females.

**Table 13.3. International conventions protecting sea turtles and signed in Venezuela.**

<b>International Conventions</b>	<b>Signed</b>	<b>Binding</b>	<b>Compliance measured and reported</b>	<b>Species</b>	<b>Conservation actions</b>
CBD: Convention on Biological Diversity (1992).	Y	Y	Y	ALL	To conserve the biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources, taking into account all rights over those resources and to technologies, and by appropriate funding.
CMS: Convention on the Conservation of Migratory Species of Wild Animals (1979). Also known as the Bonn Convention. CMS instruments can be both binding and non-binding.	N	N/A	N/A	N/A	
CITES: Convention on International Trade in Endangered Species of Wild Fauna and Flora.	Y	Y	?	ALL	An international agreement between governments, the aim of which is to ensure that international trade in specimens of wild animals and plants does not threaten their survival.
UNCLOS: The United Nations Convention on the Law of the Sea. Came into force in 1994.	N	N/A	N/A	N/A	
Ramsar convention	Y	Y	?	ALL	It is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.

Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC)	Y	Y	?	ALL	The Convention promotes the protection, conservation and recovery of the populations of sea turtles and those habitats on which they depend, on the basis of the best available data and taking into consideration the environmental, socioeconomic and cultural characteristics of the Parties (Article II, Text of the Convention). These actions should cover both nesting beaches and the Parties' territorial waters.
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**Table 13.4. Sea turtle conservation projects in Venezuela.**

#	RMU	Country	Region / Location	Project Name or descriptive title	Key words	Start date	End date	Leading organisation	Public/Private	Collaboration with	Current Sponsors	Primary Contact (name and Email)	Other Contacts (name and Email)
T4.1	CM-Aves Island (RMU50)	Venezuela	Northwestern Atlantic	Monitoring and Conservation Chelonia mydas Project	Tracking; Fastloc GPS tag; Nesting female; male tagging	1979	Ongoing	Ministry of Ecosocialism and water	Public	Venezuelan Institute for Scientific Research, Direccion de Hidrografia y Navegacion	Ministry of Ecosocialism and water, Venezuelan Institute for Scientific Research, Direccion de Hidrografia y Navegacion	Edis Solorzano edissolorzano@hotmail.com and essolorzano@mimnamb.gob.ve	Marco Garcia Cruz Marcogarcia cruz@gmail.com / marcogarcua@ufl.edu
T4.2	RMU 47	Venezuela	Southeastern Caribbean	Proyecto Shawa	Tagging, rescue, rehabilitation, release.	1997	Ongoing	GTTM-GV	Private	University of Zulia	N/A	Hector Barrios-Garrido; hbarriosg@fec.luz.edu.ve; hbarriosg@gmail.com	

T4.3	RMU 10	Venezuela	Western Atlantic	Proyecto Shawa	Tagging , rescue, rehabilitation, release.	1997	Ongoing	GTTM-GV	Private	University of Zulia	N/A	Hector Barrios-Garrido; hbarriosg@fec.luz.edu.ve; hbarriosg@gmail.com
T4.4	RMU 25	Venezuela	North Atlantic	Proyecto Shawa	Tagging , rescue, rehabilitation, release.	1997	Ongoing	GTTM-GV	Private	University of Zulia	N/A	Hector Barrios-Garrido; hbarriosg@fec.luz.edu.ve; hbarriosg@gmail.com
T4.5	RMU 51	Venezuela	North Atlantic	Proyecto Shawa	Tagging , rescue, rehabilitation, release.	1997	Ongoing	GTTM-GV	Private	University of Zulia	N/A	Hector Barrios-Garrido; hbarriosg@fec.luz.edu.ve; hbarriosg@gmail.com
T4.6	RMU 02	Venezuela	Western Atlantic	Proyecto Shawa	Tagging , rescue, rehabilitation, release.	1997	Ongoing	GTTM-GV	Private	University of Zulia	N/A	Hector Barrios-Garrido; hbarriosg@fec.luz.edu.ve; hbarriosg@gmail.com

Following...

Database available	Name of Database	Beginning of the time series	End of the time series	Track information	Nest information	Flipper tagging	Tags in STTI-ACCSTR?	PIT tagging	Remote tracking
Y	Aves Island	1979	2019	Y/N	Y	Y	Y	N	N

**Table 13.5. Reported threats for nesting beach (Aves Island) and in-water habitats (Gulf of Venezuela) in the Venezuelan territory.**

Codes for fishing gears: PLL: Pelagic Longlines; DLL: demersal longlines; SN: Set Nets; DN: Drift Nets; ST: Shrimp Trawls; MT: Multi-specific bottom Trawls; PT: Pelagic Trawls; FP: Fish/Crustacean Pots/Traps; PN: Pound net.

Threats	CM Aves Island (rmu50)	Ref #	CM rmu47	Ref #	Ei rmu10	Ref #	Cc rmu25	Ref #	Dc rmu51	Ref #	Lo rmu02	Ref #
	<b>Aves Island</b>		<b>Gulf of Venezuela</b>									
Bycatch: presence of small scale / artisanal fisheries?	N	1,2	Y (DLL; SN; DN; Turtle Nets)	11, 12, 14	Y (DLL; SN; DN; Turtle Nets)	11, 12, 14	Y (DLL; SN; DN; Turtle Nets)	11, 12, 14	Y (DLL; SN; DN; Turtle Nets)	8, 11, 12, 14	Y (DLL; SN; DN; Turtle Nets)	13, 11, 12, 14
Bycatch: presence of industrial fisheries?	Y	1,2,3	?		?		?		?		?	
Bycatch: quantified?	N											

Take. Intentional killing or exploitation of turtles	Y	6	Y		Y		Y		Y		Y	
Take. Egg poaching	N		N		?		?		?		N	
Coastal Development. Nesting habitat degradation	N		N		N		N		N		N	
Coastal Development. Photopollution	N		N		N		N		N		N	
Coastal Development. Boat strikes	N		Y		?		Y		Y		?	
Egg predation	N		?		?		?		?		?	
Pollution (debris, chemical)	N		Y		Y		Y		Y		Y	
Pathogens	Y	5, 16	Y	5, 16	Y	5	?		?		?	
Climate change	Y	2	?		?		?		?		?	
Foraging habitat degradation	Y		Y	6	Y	6	Y	6	Y	6	Y	6
Other	N											

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