

# Sea Turtles in the East Africa and the West Indian Ocean Region

MTSG Annual Regional Report 2020



© Jérôme Bourjea

## Editors:

Mayeul Dalleau<sup>1</sup>, Jérôme Bourjea<sup>2</sup>, Ronel Nel<sup>3</sup>

<sup>1</sup> Centre d'Etude et de Découverte des Tortues Marines CEDTM, Reunion, France

<sup>2</sup> MARine Biodiversity, Exploitation and Conservation MARBEC, Univ. Montpellier, CNRS, Ifremer, IRD; France

<sup>3</sup> Nelson Mandela University, South Africa

Recommended citation for this report:

Dalleau M., Bourjea J., Nel R. (Eds.) (2020). Sea Turtles in the East Africa and the West Indian Ocean Region: MTSG Annual Regional Report 2020. Report of the IUCN-SSC Marine Turtle Specialist Group, 2020.

Recommended citation for a chapter of this report:

AUTHORS (2020). CHAPTER-TITLE. In: Dalleau M., Bourjea J., Nel R. (Eds.). Sea Turtles in the East Africa and the West Indian Ocean Region: MTSG Annual Regional Report 2020. Report of the IUCN-SSC Marine Turtle Specialist Group, 2020.

# Table of Contents

REGIONAL OVERVIEW .....	4
EPARSES .....	19
CHAGOS .....	27
KENYA.....	36
REUNION.....	41
SEYCHELLES .....	49
SOUTH AFRICA .....	64
TANZANIA.....	73

# REGIONAL OVERVIEW

Mayeul Dalleau<sup>1</sup>, Jérôme Bourjea<sup>2</sup>, Ronel Nel<sup>3</sup>, Ashleigh Bandimere<sup>4</sup>

<sup>1</sup> Centre d'Etude et de Découverte des Tortues Marines CEDTM, Reunion, France

<sup>2</sup> MARine Biodiversity, Exploitation and Conservation MARBEC, Univ. Montpellier, CNRS, Ifremer, IRD; France

<sup>3</sup> Nelson Mandela University, South Africa

<sup>4</sup> Oceanic Society, USA

Seven country/territory chapters (Kenya, Tanzania, South Africa, Seychelles, France - Reunion Island, France Eparses Islands, British Indian Ocean Territories - Chagos) contribute to this MTSG regional report. Seven countries are currently not represented in this report (France-Mayotte, Somalia, Mozambique, Madagascar, Comoros and Mauritius). Additional information for RMUs in the region can be obtained from relevant publications and reports on sea turtle populations.

## **1. RMU: *Chelonia mydas*, South West Indian Ocean (CM-SWIO)**

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

#### **1.1.1 Nesting sites**

The South West Indian Ocean is one of the world most important region for the nesting of the species. The most abundant nesting sites are located in scattered islands of the Seychelles, French Eparses Islands, and British Indian Ocean Territories. But nesting also occurs to lesser extent in almost every continental country (Kenya, Tanzania, Mozambique) as well as along the coast of Madagascar.

On the one hand, the major nesting sites on scattered islands have been well-monitored for decades and most of them and exhibit either a positive or stable trend. On the other hand, trends of the minor nesting sites on coastal areas are more difficult to assess mainly because of inconsistent monitoring of nesting turtles.

#### **1.1.2 Marine areas**

The only available material on marine areas used by juveniles at early stages comes from modeling simulations. It seems that the spatial faith of early juveniles is highly influenced by the location of the nesting site relative to the main regional oceanic currents, namely the south-equatorial current, the north and east Madagascar currents and the Mozambique current. Late juvenile and adult neritic foraging grounds are located mostly along the coastal areas of East Africa (from Mozambique to Somalia) as well as on the western coast of Madagascar. Continuum of seagrass beds are spread along these areas. Islands hosting seagrass beds (e.g. Mayotte and Seychelles) are also foraging grounds. Of the final foraging grounds to which turtles were tracked, 35% were located in Marine Protected Areas.

The results of these large tracking studies highlighted hotspots of migration at the oceanic and coastal scales, with very dense coastal corridors, specifically from the north of Mozambique to south Tanzania, in Bazaruto, and all along the west Malagasy coast.

## **1.2 Other biological data**

Studies of spatial structure of nesting green turtles for the SWIO, using genetic and demographic data, demonstrate at least two main genetic stocks that could themselves be divided in two sub-stocks: A. the Southern Mozambique Channel, that could comprise two sub-stocks (a1) Europa and (a2) Juan de Nova, and B. the Northern SWIO (N-SWIO) comprising two sub-stocks (b1) the Seychelles archipelago stock—SEY; and (b2) the remaining Northern SWIO rookeries.

Recent dispersal modelling of green turtle hatchlings and genetic mixed-stock analysis of juvenile green turtle revealed that almost all nesting sites contribute to the composition of juveniles in key development habitats in this region, but there is no information available on the abundance of these life stages nor have long-term indicators been developed to follow up on their status. Addressing this lack of information about the status of the next generation of green turtles should be considered a high priority to improve any status assessments of the SWIO RMU.

## **1.3 Threats**

### **1.3.1 Nesting sites**

Major nesting sites, such as the French Eparses Island and Aldabra in the Seychelles, are inhabited and well-protected. Nevertheless, other minor continental nesting sites are more exposed to threats and female poaching occurs.

### **1.3.2 Marine areas**

Marine turtle interactions have been documented with every type of industrial fisheries occurring in the region. Interaction with fisheries remains one of the major issues for the green turtle in this region, with different order of magnitude according to fisheries, from very low globally for purse seining, medium for longline and trawling (e.g. Fennessy et al., 2008) to probably very high – but not really assessed – for artisanal fisheries.

A recent semi-quantitative Ecological Risk Assessment investigated interaction with Indian Ocean fisheries led to the same global conclusion as above but also concluded that data paucity is a great concern so there is low confidence in this result.

To assess the impact of artisanal fishery globally, a Rapid By-catch Assessment (RBA) approach was also successfully tested in the region and confirmed the importance of marine turtle mortality due to artisanal fishery.

## **1.4 Conservation**

Marine turtles are under protected status in every country of the region. Conservation efforts can only succeed if the major threats can be managed and especially at a trans-boundary level. In response, several regional instruments and structures attend to sea turtle issues. Several of those regulatory mechanisms that apply to green turtles regionally or globally apply to green turtles within the SWIO region. When assessing conservation efforts in this region, we assumed

and recommend that all conservation efforts would remain in place at their current levels. The international instruments listed below apply to sea turtles found in this area:

- Convention on Biological Diversity
- Convention Concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention)
- Convention on the Conservation of Migratory Species of Wild Animals
- Convention on International Trade in Endangered Species of Wild Fauna and Flora
- Food and Agriculture Organization Technical Consultation on sea turtle-fishery interactions
- International Convention for the Prevention of Pollution from Ships (MARPOL)
- Nairobi Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region
- Ramsar Convention on Wetlands
- United Nations Convention on the Law of the Sea
- United States Magnuson-Stevens Conservation and Management Act

In addition and more specifically, green turtles of the SWIO benefit from the Nairobi Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region as well as the Indian Ocean Southeast Asian Marine Turtle Memorandum of Understanding (IOSEA - [www.ioseaturtles.org](http://www.ioseaturtles.org)). Nine of the eleven countries of the SWIO conceived and signed the IOSEA that aims to develop and assist countries of the region in the implementation of the IOSEA regional strategy for management and conservation of sea turtles and their habitats. Accordingly, IOSEA has been successfully coordinating and closely monitoring region-wide conservation efforts in the Indian Ocean for years. This includes the development of a state-of-the-art online reporting facility, satellite tracking, genetic regional database, flipper tag inventory and a global bibliographic resource.

With a similar role but at the scale of the SWIO and under the aegis of the Nairobi Regional Seas and the IOSEA Conventions, the Western Indian Ocean -Marine Turtle Task Force (WIO-MTTF) plays an important role in providing conservation advice as a technical, non-political, working group comprised of specialists from the eleven countries, as well as representatives from intergovernmental organizations, academic, and non-governmental organizations within the region.

The Indian Ocean Tuna Commission (IOTC) is currently playing an increasingly constructive role in turtle conservation. In 2005, the IOTC adopted Resolution 05/08, superseded by Resolution 09/06 on Sea Turtles, which sets out reporting requirements on interactions with sea turtles and accordingly provides an executive summary per species for adoption at the Working Party on Ecosystem and By-catch and then subsequently at the Scientific Committee. In 2011, IOTC developed a "Sea Turtle Identification Card" to be distributed in all industrial fishing vessels operating in the Indian Ocean.

In addition to these broad-reaching international instruments, there are several country-specific conservation efforts worth noting that occur within the Southwestern Indian Ocean.

However, despite these advances, human impacts continue throughout the region. The lack of effective monitoring in fisheries operations still allows substantial direct and indirect mortality, and the uncontrolled development of coastal and marine habitats threatens to destroy the supporting ecosystems of long-lived green turtles.

## **1.5 Research**

Because it is the most abundant species in the region, the green turtle is also one of the most studied species. Monitoring programs of nesting activity first started as early as in the 1980s. Trends in major sites, nesting phenology, genetics stocks, major migratory patterns and foraging habits have been well-described.

One of the major lacks at the moment is the estimation of reproductive parameters. Since major nesting sites are remote islands, monitoring of reproductive parameters is challenging and recent estimates are lacking for most of the regional rookeries. Information on the abundance and status of juveniles is also lacking and more generally biology and ecology of this stage of life (e.g. spatial faith at young age...).

## **2. RMU: *Eretmochelys imbricata*, South West Indian Ocean (EI-SWIO)**

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

#### **2.1.1 Nesting sites**

In the South West Indian Ocean, nesting sites are mainly found in the Seychelles archipelago at the level of the Granitic and Amirantes Islands group but also in the Chagos. Smaller nesting sites are located in Kenya, Tanzania and Madagascar.

The recent trends for the most abundant population seem to the rise.

#### **2.1.2 Marine areas**

Foraging hawksbill turtles are observed almost throughout coastal areas of the South West Indian Ocean region, especially in the East Africa Coast in Madagascar but also along the coast of the region several islands and for juvenile pelagic phase along the Mozambique Channel. Small number of mark-recording studies and satellite tracking in this region has not made it possible to accurately reveal the migration routes and the location of foraging habitats according to the origin of nesting sites

### **2.2 Other biological data**

## **2.3 Threats**

### **2.3.1 Nesting sites**

Major nesting sites are in the Seychelles, a country that has implemented strong conservation initiatives benefiting hawksbill turtles in the last two decades.

### **2.3.2 Marine areas**

Marine turtle interactions have been documented in every type of industrial fisheries occurring in the region. For hawksbill turtles, interactions occur with purse-seine fisheries and entanglement in ghost fishing gear occurs.

Interaction with artisanal fisheries and intentional intake is also an important threat in East African countries and in Madagascar.

## **2.4 Conservation**

Marine turtles are under protected status in every country of the region. The same international instruments described above for the green turtle also cover the hawksbill turtle. The Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia (IOSEA Marine Turtle MOU) aims to maintain and recover marine turtle populations by promoting cooperation among Governments and other organizations that share this common objective. The associated Western Indian Ocean Task Force (WIO-MTTF) gathers experts from the region to coordinate the action plan of the IOSEA Marine Turtle MoU.

## **2.5 Research**

Several research programs have been conducted to study nesting activity since the 1980s. There is a need for a better understanding of the migratory patterns of the species in the region. No genetic studies on hawksbill turtles have been published to date, except for females breeding in the Seychelles, and research programs are underway in this area.

## **3. RMU: *Lepidochelys olivacea*, South West Indian Ocean (LO-SWIO)**

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

#### **3.1.1 Nesting sites**

For this species, a few individuals have been observed nesting in the South West Indian Ocean. These cases remain anecdotal, as no regular nesting sites have been recorded for this species in the region. The few rare cases of nesting Olive Ridley turtles that have been recorded are located on the East African coast, South Africa and Madagascar.

#### **3.1.2 Marine areas**

There is currently little information on the migratory behavior and feeding range of the species in the South West Indian Ocean. A few oceanic juveniles have been tracked but there is no clear pattern yet on their migratory behavior.

### **3.2 Other biological data**

A genetic study has been led at the scale of the Indian Ocean and showed that Olive Ridley found around Reunion Island exhibit haplotypes related with Australian populations.

## **3.3 Threats**

### **3.3.1 Nesting sites**

There are no major nesting sites for the species in the region.

### **3.3.2 Marine areas**



Marine turtle interactions have been documented in every type of industrial fisheries occurring in the region. Olive Ridley turtles are particularly exposed to entanglement in ghost nets, the threat has been documented for the North West Indian Ocean.

### **3.4 Conservation**

Marine turtles are under protected status in every country of the region. Same international instruments described above for green and hawksbill turtles also cover the Olive Ridley turtle. The Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia (IOSEA Marine Turtle MOU) aims to maintain and recover marine turtle populations by promoting cooperation among Governments and other organizations that share this common objective. The associated Western Indian Ocean Task Force (WIO-MTTF) gathers experts from the region to coordinate the action plan of the IOSEA Marine Turtle MoU.

### **3.5 Research**

The biology of Olive Ridley turtles is the least-well documented in the South West Indian Ocean but the species is also the least abundant in the region among the five occurring species.

## **4. RMU: *Caretta caretta*, South West Indian Ocean (CC-SWIO)**

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

#### **4.1.1 Nesting sites**

The centre of loggerhead nesting distribution is along the north-east coast of South Africa (in the iSimangaliso Wetland Park, KwaZulu-Natal) and southern Mozambique (south of Maputo) with incidental nesting recorded annually north and south along the east African seaboard. Loggerheads are also known to nest in south-east Madagascar, but nesting activity remains low and is currently unquantified. The centre of the rookery (Maputo to Cape Vidal) hosts around 1000 loggerhead females per annum.

#### **4.1.2 Marine areas**

Satellite tagging, strandings reports and at sea sightings confirmed that loggerheads are found mainly off the South African coast, with a large number of males seen year-round on reef systems or caught in the bather-protection nets and females followed migrating both south but mainly north up the Mozambique Channel to foraging grounds in central Mozambique (off Bazaruto Island) or off western Madagascar.

Juvenile size classes are rarely sighted in nearshore waters but satellite tagging (mostly from rehabilitated and fisheries bycaught individuals) suggest a presence of juveniles from at least the Omani or Northern WIO RMU). The oceanographic patterns off East Africa is complicated with the north and south Equatorial Currents flowing from east to west and splitting as they hit the continent just north of Madagascar. Here they reconstitute to form the Somali and Agulhas currents flowing north and southwards respectively. Sea turtles use these currents as migratory corridors, including juvenile loggerheads, moving from the islands onto the mainland or south or north to the Gulf of Oman. There is thus clear mixing of juvenile loggerheads from these RMU's around Madagascar.

## **4.2 Other biological data**

The iSimangaliso nesting population has been monitored since 1963 and it appears to have an increasing trend in the number of loggerhead nests since inception, although a recent analysis of individual sizes reported a decline in mean size of females. All other metrics (including age to maturity, hatching and emergence success) is on par with recovering populations. Particle modelling estimating dispersal trajectories for (SWIO) loggerheads from iSimangaliso MPA has indicated that the majority of hatchlings will end up in the Agulhas Retroflexion or the South East Atlantic with a small proportion in the Southern Ocean which could be lethal due to cold stunning or starvation. However, these final destinations of hatchlings after a year is highly dependent on swimming behaviour as well as hatching time and location with potentially major implications for climate change.

Mixed stock analysis of loggerhead turtles found off Reunion Island exhibit haplotypes from both the SWIO (South African) and NWIO (Oman's) populations with no mixing or sharing of haplotypes between these two RMUs. To date, all genotyping of stranded or loggerheads caught in bather-protection nets are from the SWIO RMU.

## **4.3 Threats**

### **4.3.1 Nesting sites**

The majority of nesting takes place in protected areas (iSimangaliso or Ponto Do Ouro Partial Marine Reserve) with active patrolling and are thus well protected. Incidental take does however occur but is low and is reported to be less than 5 incidents per annum (on the south African side of the RMU). The iSimangaliso Wetland Park was significantly expanded in 2019 with both a southward (~40km) and seaward (15 – 25 km) expansion to include the entire interesting movement and habitat of these individuals. Other natural threats, including predation of nests and eggs take place but is less than the heavy bird predation that is typical of tropical nesting beaches of green turtles. Climate change may have an impact on the beaches as well as on the egg incubation process although both seems to be well managed for this rookery and therefore pose only a small threat in the near future.

### **4.3.2 Marine areas**

As for other marine turtle species, loggerheads remain vulnerable to industrial fisheries occurring in the region with longlining and gill netting probably the best-known threats and shrimp trawling an unquantified effect. Mortality is low, although present, in purse seine fisheries. The largest emerging concern for loggerhead turtles is the expansion of oil and gas activities in northern Mozambique and Tanzania. All these threats may however be offset by a massive expansion of an MPA network in South Africa in late 2019, which include a 5% off the EEZ with a substantial expansion of offshore MPAs.

## **4.4 Conservation**

Marine turtles are under protected status in every country of the region. Same international instruments described above for green turtle also cover the loggerhead turtle. The Memorandum of Understanding on the Conservation and Management of Marine Turtles and

their Habitats of the Indian Ocean and South-East Asia (IOSEA Marine Turtle MOU) aims to maintain and recover marine turtle populations by promoting cooperation among Governments and other organizations that share this common objective. The associated Western Indian Ocean Task Force (WIO-MTTF) gathers experts from the region to coordinate the action plan of the IOSEA Marine Turtle MoU.

#### **4.5 Research**

Loggerhead turtles are well-researched in South Africa with several MSc and PhD projects completed on the biology and ecology of these species including the direct measurement of age to maturity/first nesting of this species (estimated at ~ 36 years). Other regional research projects, mostly initiated and funded through Reunion, allowed for a more complete understanding of the spatial dynamics of this highly migratory species.

### **5. RMU: *Dermochelys coriacea*, South West Indian Ocean (DC-SWIO)**

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

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

Leatherbacks are widely distributed off the African seaboard and in the SWIO. This species nests in a shared rookery between southern Mozambique and iSimangaliso MPA, KwaZulu-Natal South Africa. This species also nests incidentally in southern Madagascar but little information is available on these events. Nest monitoring has taken place since 1963 in South Africa and increased initially. However, despite the continued protection the species, abundance has remained critically low with less than 100 nesting females per annum.

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

Three main migratory corridors have been established for these three species through the use of satellite tagging; these include a northern migration into the Mozambique Channel, a southwestward migration into the Atlantic and a southeasterly migration into the southern Indian Ocean. More intriguing is the increased use of coastal foraging habitats (north into Mozambique or northern Madagascar, or along the southeast coast of South Africa), as opposed to the expected pelagic or oceanic migrations which is more common.

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

Despite this species' populations being depressed, the monitoring results do not indicate population growth, although the number of nests appears to be stable. Unlike the loggerheads nesting in iSimangaliso, individual sizes of leatherback turtles are stable and slightly increasing.

#### **5.3 Threats**

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

Like loggerheads, leatherback rookeries are well protected in coastal protected areas which are actively managed. Nesting distribution within these areas does not overlap and consequently predation pressure is slightly different to loggerheads. Honey badgers and water mongoose further south in iSimangaliso are more important predators than birds or ghost crabs which struggle with these large hatchlings. Overall nest success and hatching and emergence success is very high with few natural or non-natural predators.

### **5.3.2 Marine areas**

The most common interactions between fisheries and leatherbacks occur as entanglements in longlines. Macro plastic and ghost nets are also known to be an issue for this species. Leatherbacks are also particularly vulnerable to boat strikes, and several individuals that had sustained large cuts have washed ashore along the coast of South Africa and Namibia. The MPA network in South Africa expanded by nearly 5% of the EEZ in 2019 and the effect on leatherback turtles at sea remains to be evaluated.

### **5.4 Conservation**

Marine turtles are under protected status in every country of the region. The same international instruments described above for the other turtle species also cover the leatherback turtle. The Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia (IOSEA Marine Turtle MOU) aims to maintain and recover marine turtle populations by promoting cooperation among Governments and other organizations that share this common objective. The associated Western Indian Ocean Task Force (WIO-MTTF) gathers experts from the region to coordinate the action plan of the IOSEA Marine Turtle MoU.

### **5.5 Research**

Leatherback research is mainly lead in the SWIO by South African researchers, in cooperation with Mozambique. Despite several postgraduate projects, the lack of recovery of the leatherback population remains unclear.

**Table 1.** key biological information for sea turtles RMUs in the East Pacific Ocean.

Country chapters: KE - Kenya, TZ - Tanzania, ZA - South Africa, SC - Seychelles, RE - France - Reunion Island, EI - France Eparses Islands, BIOT - British Indian Ocean Territories - Chagos

RMU	Chelonia Mydas		Eretmochelys imbricata		Lepidochelys olivacea		Caretta caretta				Dermochelys coriacea	
	CM-SWIO	Country chapters	EI-SWIO	Country chapters	LO-SWIO	Country chapters	CC-SWIO	Country chapters	CC-NWIO	Country chapters	DC-SWIO	Country chapters
<b>Occurrence</b>												
Nesting sites		SC, EI, RE, BIOT, KE, TZ		EI, BIOT, SC, TZ				ZA, KE		ZA		ZA
Pelagic foraging grounds		EI, RE				RE		EI, KE, RE, ZA		ZA		BIOT, RE, ZA
Benthic foraging grounds		EI, BIOT, RE, SC, ZA, TZ		EI, BIOT, RE, SC, ZA, TZ		TZ		BIOT, KE, SC, ZA, TZ		ZA		ZA
<b>Key biological data</b>												
Nests/yr: recent average (range of years)	20,500 (BIOT); 127 (KE); 2.26 (RE); 44,175 (SC); 336 (TZ)	BIOT, KE, RE, SC, TZ	6,300 (BIOT), 5,550 (SC), 8 (TZ)	BIOT, SC, TZ			2286 (ZA)	ZA	153 (ZA)	ZA	71 (ZA)	ZA
Nests/yr: recent order of magnitude		RE						KE, ZA		ZA		ZA
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	4 (EI), >20 (BIOT), 11 (KE), >20 (SC), 6 (TZ)	EI, BIOT, KE, SC, TZ	>20 (BIOT), >30 (SC)	BIOT, SC			1 (ZA)	KE, ZA	3 (ZA)	ZA	1 (ZA)	ZA

Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	>20 (BIOT), 13 (KE), 4 (RE), >20 (SC), 11 (TZ)	BIOT, KE, RE, SC, TZ	2 (EI), >20 (BIOT), >20 (SC), 2 (TZ)	EI, BIOT, SC, TZ								
Nests/yr at "major" sites: recent average (range of years)	5 (TZ)	TZ							153 (ZA)	ZA		
Nests/yr at "minor" sites: recent average (range of years)		RE	8 (TZ)	TZ								
Total length of nesting sites (km)		EI, BIOT, KE, RE, SC		EI, BIOT, SC				ZA		ZA		ZA
Nesting females / yr	8980-13980 (EI), 3,400 (BIOT), 42 (KE), 1 (RE), 300 (TZ)	EI, BIOT, KE, RE, TZ					658 (ZA)	ZA	31 (ZA)	ZA	54 (ZA)	ZA
Nests / female season (N)	3.01 (EI), 6 (BIOT), 4.5 (RE), 4.5 (SC)	EI, BIOT, RE, SC		SC			5 (KE), 3.7 (ZA)	KE, ZA	5 (ZA)	ZA	6.7 (ZA)	ZA
Female remigration interval (yrs) (N)	1.9-7.1	EI, RE, SC		SC			2.3 (KE), 3 (ZA)	KE, ZA	2.3 (ZA)	ZA	2.9 (ZA)	ZA
Sex ratio: Hatchlings (F / Tot) (N)		BIOT		BIOT				KE		ZA		
Sex ratio: Immatures (F / Tot) (N)				BIOT				KE		ZA		
Sex ratio: Adults (F / Tot) (N)		RE		RE				KE		ZA		

Min adult size, CCL or SCL (cm)		EI, KE, RE						KE, ZA		ZA		ZA
Age at maturity (yrs)		SC		BIOT, SC			25-30 (KE), 36 (ZA)	KE, ZA		ZA		
Clutch size (n eggs) (N)		RE					98.2 (KE), 104 (ZA)	KE, ZA		ZA	105 (ZA)	ZA
Emergence success (hatchlings/egg) (N) N:nidos		EI, KE, RE						KE, ZA		ZA		ZA
Nesting success (Nests/ Tot emergence tracks) (N)		RE						KE, ZA		ZA		ZA
<b>Trends</b>												
Recent trends (last 20 yrs) at nesting sites (range of years)	Stable (EI), Up (BIOT), Up (KE), Stable (RE), Up (SC)	EI, BIOT, KE, RE, SC	Stable (EI), Up (BIOT), Up (SC)	EI, BIOT, SC			Up (KE), Up (ZA)	KE, ZA	Up (ZA)	ZA	Stable (KE), Stable (ZA)	KE, ZA
Recent trends (last 20 yrs) at foraging grounds (range of years)	Up (RE)	RE	Up (RE)	RE								
Oldest documented abundance: nests/yr (range of years)		KE, RE, TZ	50 (TZ)	TZ			301 (ZA)	KE, ZA	500 (ZA)	ZA	33 (ZA)	ZA
<b>Published studies</b>												
Growth rates		EI, SC		BIOT, SC				KE, ZA		ZA		
Genetics		EI, BIOT, KE, RE, SC, ZA, TZ		EI, BIOT, RE, SC, ZA				EI, RE, ZA				

Stocks defined by genetic markers	EI, BIOT, RE, SC, ZA		BIOT, SC, ZA				RE, ZA				
Remote tracking (satellite or other)	EI, BIOT, RE, SC, ZA, TZ		EI, BIOT, RE, ZA				EI, KE, RE, ZA		ZA		ZA
Survival rates	EI, RE										
Population dynamics	EI, BIOT, RE		BIOT								
Foraging ecology (diet or isotopes)	EI, BIOT, RE, SC, ZA		EI, BIOT, RE, SC, ZA				EI, KE, RE, ZA		ZA		ZA
Capture-Mark-Recapture	EI, BIOT, RE, SC, TZ		EI, BIOT, RE, SC				EI, KE, ZA		ZA		ZA
<b>Threats</b>											
Bycatch: presence of small scale / artisanal fisheries?	BIOT, KE, RE, SC, TZ		BIOT, RE, SC, TZ		BIOT, RE, SC, TZ		BIOT, KE, RE, SC, TZ		ZA		BIOT, RE, SC, TZ
Bycatch: presence of industrial fisheries?	EI, KE, RE, SC, TZ		EI, RE, SC, TZ		EI, RE, SC, TZ		EI, KE, RE, SC, TZ		ZA		EI, RE, SC, TZ
Bycatch: quantified?	KE, RE, ZA, TZ		EI, RE, ZA, TZ		EI, RE, ZA		EI, KE, RE, ZA, TZ		ZA		EI, RE, ZA
Take. Intentional killing or exploitation of turtles	KE, SC, TZ		SC, TZ		SC		KE, SC		ZA		SC
Take. Egg poaching	KE, TZ		TZ								
Coastal Development. Nesting habitat degradation	EI, BIOT, KE, RE, SC, TZ		BIOT, SC, TZ				KE		ZA		
Coastal Development. Photopollution	BIOT, KE, RE, SC		BIOT, SC				KE		ZA		



Coastal Development. Boat strikes		KE, RE, SC		EI, RE, SC				KE, RE		ZA		
Egg predation		EI, BIOT, KE, SC, TZ		BIOT, SC, TZ				KE, ZA		ZA		ZA
Pollution (debris, chemical)		EI, KE, RE, TZ		EI, RE, TZ		RE		EI, RE, ZA				
Pathogens		EI, RE						RE				
Climate change		EI, BIOT, KE, RE, SC		EI, BIOT, RE, SC		RE		EI, RE				RE
Foraging habitat degradation		KE, RE, TZ		RE, TZ		RE		RE				RE
Other								KE		ZA		
<b>Long-term projects</b>												
Monitoring at nesting sites		EI, BIOT, KE, RE, SC, TZ		BIOT, SC, TZ				KE, ZA		ZA		ZA
Number of index nesting sites	4 (EI), 1 (BIOT), 15 (KE), 4 (RE), 21 (SC), 1 (TZ)	EI, BIOT, KE, RE, SC, TZ	1 (BIOT), 21 (SC), 1 (TZ)	BIOT, SC, TZ		2 (KE), 1 (ZA)		KE, ZA	2 (ZA)	ZA	1	ZA
Monitoring at foraging sites		EI, BIOT, RE, SC		EI, BIOT, RE, SC								
<b>Conservation</b>												
Protection under national law		EI, BIOT, KE, RE, SC, ZA, TZ		EI, BIOT, RE, SC, ZA, TZ		EI, BIOT, RE, SC, ZA, TZ		EI, BIOT, KE, RE, SC, ZA, TZ		ZA		EI, BIOT, KE, RE, SC, ZA, TZ
Number of protected nesting sites (habitat preservation)	4 (EI), 4 (RE), all (BIOT), all (SC), 5 (TZ)	EI, BIOT, RE, SC, TZ	all (BIOT), 21 (SC), 2 (TZ)	BIOT, SC, TZ				KE	1 (ZA)	ZA	all (ZA)	ZA

Number of Marine Areas with mitigation of threats		EI, KE, RE, SC, TZ		EI, RE, SC, TZ		SC		KE, SC, ZA				SC
Long-term conservation projects (number)	>10 (EI), 2 (KE), >10 (RE), >20 (SC), 1 (TZ)	EI, KE, RE, SC, TZ	>20 (SC), 2 (TZ)	BIOT, SC, TZ	1 (TZ)	TZ	>2 (EI), >1 (KE), >2 (RE), all (ZA), 1 (TZ)	EI, KE, RE, ZA, TZ	>1	ZA	1 (TZ)	TZ
In-situ nest protection (eg cages)		TZ		TZ				KE		ZA		
Hatcheries		RE, TZ										
Head-starting		RE										
By-catch: fishing gear modifications (eg, TED, circle hooks)		EI, KE, RE, ZA		EI, RE, ZA		EI, RE, ZA		EI, BIOT, RE, ZA				EI, ZA
By-catch: onboard best practices		EI, KE, RE, SC, ZA		EI, RE, SC, ZA		EI, BIOT, RE, SC, ZA		EI, BIOT, KE, RE, SC, ZA		ZA		EI, BIOT, RE, SC, ZA
By-catch: spatio-temporal closures/reduction		EI, BIOT, ZA		EI, BIOT, SC, ZA		EI, BIOT, SC, ZA		EI, SC, ZA				EI, BIOT, SC, ZA

# EPARSES

Claire Jean<sup>1</sup>, Stéphane Ciccione<sup>1</sup>, Jérôme Bourjea<sup>2</sup>, Mayeul Dalleau<sup>3</sup>, Alice Carpentier<sup>1</sup>

<sup>1</sup> Kélonia, L'observatoire des tortues marines de La Réunion; La Réunion, France

<sup>2</sup> MARine Biodiversity, Exploitation and Conservation MARBEC, Univ. Montpellier, CNRS, Ifremer, IRD; France

<sup>3</sup> Centre d'Etude et de Découverte des Tortues Marines CEDTM, Reunion, France

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

RMU	CM-SW IND - Eparses	Ref #	EI-SW IND - Eparses	Ref #	CC-SW IND - Eparses	Ref #	DC-SW IND - Eparses	Ref #	LO-SW IND - Eparses	Ref #
<b>Occurrence</b>										
Nesting sites	Y	1,2,3, 4,5,6	Y	5,6,12 ,14,46	N		N		N	
Pelagic foraging grounds	Y	23	n/a		Y	9	n/a		n/a	
Benthic foraging grounds	Y	13,14, 15,20, 28,29, 30,31	Y	13,14, 15,20, 28,29, 30,31	N		N		N	
<b>Key biological data</b>										
Nests/yr: recent average (range of years)	n/a		n/a		n/a		n/a		n/a	
Nests/yr: recent order of magnitude	n/a		n/a		n/a		n/a		n/a	
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	4	1,2,3, 4,5,6	n/a		n/a		n/a		n/a	
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	n/a		2	5,12,1 4	n/a		n/a		n/a	
Nests/yr at "major" sites: recent average (range of years)	0		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)	26.82	1,2,3, 4,5,6	17.13	5,12,1 4	n/a		n/a		n/a	
Nesting females / yr	8980-13980 (1983-2010)	2,3,5, 9	n/a		n/a		n/a		n/a	
Nests / female season (N)	3.01 (688)	7	n/a		n/a		n/a		n/a	
Female remigration interval (yrs) (N)	1.9-7.1	2,7,33 ,34	n/a		n/a		n/a		n/a	
Sex ratio: Hatchlings (F / Tot) (N)	n/a		n/a		n/a		n/a		n/a	
Sex ratio: Immatures (F / Tot) (N)	n/a		n/a		n/a		n/a		n/a	
Sex ratio: Adults (F / Tot) (N)	n/a		n/a		n/a		n/a		n/a	

Min adult size, CCL or SCL (cm)	98 (CCL)	44	n/a		n/a		n/a		n/a	
Age at maturity (yrs)	n/a		n/a		n/a		n/a		n/a	
Clutch size (n eggs) (N)	109 (96-à TROMELIN), 113 (57-à GLORIEUSES)	7,44	n/a		n/a		n/a		n/a	
Emergence success (hatchlings/egg) (N)	0.61 (96 à Tromelin), 0.86 (57 à Glorieuses)	7,44	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	
<b>Trends</b>										
Recent trends (last 20 yrs) at nesting sites (range of years)	Stable (2004-2018)	1,3,7	Stable (2004-2018)	1	n/a		n/a		n/a	
Recent trends (last 20 yrs) at foraging grounds (range of years)	n/a		n/a		n/a		n/a		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	Y	12,13, 15,20, 28,29	N		N		N		N	
Genetics	Y	8,32,3 6, 51	Y	51	Y	39,42	N		N	
Stocks defined by genetic markers	Y	8,36	N		n/a		N		N	
Remote tracking (satellite or other)	Y	9,21,2 8,45,4 7	Y	31	Y	9,37,4 2,45	N		N	
Survival rates	Y	9	N		N		N		N	
Population dynamics	Y	1,3,4, 5,45,4 7	N		N		N		N	
Foraging ecology (diet or isotopes)	Y	31	Y	31	Y	39,42, 45	N		N	
Capture-Mark-Recapture	Y	2,3,5, 6,7,12 ,16,18 ,23,24 ,25,26 ,27,28 ,29,31 ,32,33 ,34,35 ,36,37 ,39,44 ,47	Y	5,6,12 ,15,24 ,25,28 ,29,31	Y	42	N		N	
<b>Threats</b>										
Bycatch: presence of small scale / artisanal fisheries?	N		N		N		N		N	
Bycatch: presence of industrial fisheries?	Y	1,10,1 1,22,3	Y	1,10,1 1,22,3 8,45	Y	1,10,1 1,22,3 8,45	Y	1,10,1 1,22,3 8,45	Y	1,10,1 1,22,3 8,45

		8,45,4 8, 54								
Bycatch: quantified?	250/y (PS), 2.3 (DN), 0.004/1000 hooks (PLL)	1,11,2 2	1.6 (DN), 0.004/100 0 hooks (PLL)	1,11,2 2	1 (DN), 0.004/1000 hooks (PLL)	1,11,2 2	0.3 (DN), 0.004/1000 hooks (PLL)	1,11,2 2	0.6 (DN), 0.004/1000 hooks (PLL)	1,11,2 2
Take. Intentional killing or exploitation of turtles	N		N		N		N		N	
Take. Egg poaching	N		n/a		n/a		n/a		n/a	
Coastal Development. Nesting habitat degradation	Y	50	n/a		n/a		n/a		n/a	
Coastal Development. Photopollution	N		n/a		n/a		n/a		n/a	
Coastal Development. Boat strikes	N		Y		n/a		n/a		n/a	
Egg predation	Y	19	n/a		n/a		n/a		n/a	
Pollution (debris, chemical)	Y	1,16,4 1	Y	1.16	Y	1,16,4 0,41	n/a	1,16,4 1	n/a	1,16,4 1
Pathogens	Y	35.43	n/a		n/a		n/a		n/a	
Climate change	Y	3,4,17 , 18	Y	3,4,17 , 18	Y	41,42	n/a		n/a	
Foraging habitat degradation	N		N		N		N		N	
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 (1983- ongoing)	1,2,3, 4,5,6, 7,8	n/a		n/a		n/a		n/a	
Number of index nesting sites	4	1,2,3, 4,5,6, 7,8	n/a		n/a		n/a		n/a	
Monitoring at foraging sites (period: range of years)	Y (2003- ongoing)	12,13, 24,25, 26,27, 28,29	Y (2003- ongoing)		N		N		N	
<b>Conservation</b>										
Protection under national law	Y		Y		Y		Y		Y	
Number of protected nesting sites (habitat preservation) (% nests)	4 (100%)		0		0		0		0	
Number of Marine Areas with mitigation of threats	4		1		0		0		0	
N of long-term conservation projects (period: range of years)	>10 (2004- ongoing)	18, 50	0		>2 (2004- ongoing)	18	0		0	
In-situ nest protection (eg cages)	N		n/a		n/a		n/a		n/a	
Hatcheries	N		N		N		N		N	
Head-starting	N		N		N		N		N	
By-catch: fishing gear modifications (eg, TED, circle hooks)	circle hooks, ECOFADS		circle hooks, ECOFADS		circle hooks, ECOFADS		circle hooks, ECOFADS		circle hooks, ECOFADS	
By-catch: onboard best practices	Y	38, 22,42, 45	Y	38,22, 42,45	Y	38,22, 42,45	Y	38,22, 42,45	Y	22,42, 45

By-catch: spatio-temporal closures/reduction	Y	55	Y	55	Y	55	Y	55	Y	55
Other	n/a									

**Table 2.** Sea turtle nesting beaches in Eparses

RMU / Nesting beach name	Index site	Nests/yr: recent average (range of years)	Crawls/yr: recent average (range of years)	Central point		Length (km)	% Monitored	Ref #	Monitoring Level (1-2)	Monitoring Protocol (A-F)
				Long	Lat					
CM-SW IND - Eparses										
Europa	Y	n/a	13340 (2011-2016)	40.362802	-22.35793	7.8	46.8	1,2,3,4,5,6	1	B
Tromelin	Y	4417 (2009-2010)	8063 (2006-2016)	54.522377	-15.891126	1.89	100	1,2,3,4,5,6,7	1	B
Juan de Nova	Y	n/a	161 (2006-2016)	42.722208	-17.054821	9.3	100	1,2,3,4,5,6	1	B
Glorieuses	Y	n/a	6413 (2006-2016)	47.296616	-11.579852	7.83	100	1,2,3,4,5,6	1	B
				Long	Lat					
EI-SW IND - Eparses										
Juan de Nova	Y	n/a	50 (2006-2009)	42.722208	-17.054821	9.3	100	5.13	1	B
Glorieuses	Y	n/a	6413 (2006-2016)	47.296616	-11.579852	7.83	100	5.13	1	B

**Table 3.** International conventions protecting sea turtles and signed by Eparses.

International Conventions	Signed	Binding	Compliance measured and reported	Species	Conservation actions	Relevance to sea turtles
Convention régionale pour la gestion et la conservation des tortues marines et de leurs habitats dans l'océan Indien et le sud-est asiatique (IOSEA)	Y	Y	Y	ALL		
Convention de Nairobi	Y	N	Y	CM, EI		Protection of marine and coastal ecosystems
Convention Ramsar (OCTA, 2013)	Y	N	n/a	CM		Protection of Europa, major nesting site for green turtles.

**Table 4. Projects and databases on sea turtles in Eparses.**

#	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)	Database available	Name of Database	Beginning of the time series	End of the time series	Track information	Nest information	Flipper tagging	Tags in STTI - ACC STR ?	PIT tagging	Remote tracking	Ref #
T4.1	ALL-SWIO	France	La Réunion, Juan de Nova, Mayotte, Europa, Tromelin, Madagascar, Comores	TORSOOI - Sea turtle database for the South West Indian Ocean	Database; South western Indian Ocean	2004	on-going	Kelonia, IFREMER	Private				Claire Jean (claire.jean.kelonia@museesreunion.re)	Jérôme Bourjea (Jerome.Bourjea@ifremer.fr)	Y	TORSOOI	1983	2018	N	Y	Y	n/a	Y	N	
T4.2	ALL-SWIO	France	Europa, Juan de Nova, Glorieuse, Tromelin	DYMITILE I and II	Tracking	2012	2015	Kelonia, IFREMER	Public	TAAF,	Y	Gouvernement			N	n/a	n/a	n/a	n/a	n/a	Y	n/a	N	Y	45
T4.3	ALL-SWIO	France	Europa, Glorieuse	Next	spatial ecology, Genetic, Stress	2017	on-going	IFREMER, Kélonia,	Private	CNRS, Monaco	Not yet	Ifremer, Monaco	Jérôme Bourjea (jbourjea@ifremer.fr)	Sylvain Bonhommeau (sbonhommeau@ifremer.fr)	N	n/a	n/a	n/a	n/a	n/a	N	n/a	N	Y	
T4.4	ALL-SWIO	France	Europa	PIOT	Tracking	2018	on-going	IFREMER	public	Kélonia	Not yet	Gouvernement	sbonhommeau@ifremer.fr		N	n/a	n/a	n/a	n/a	n/a	N	n/a	N	Y	
T4.5	ALL-SWIO	France	Europa	IOT	Tracking	2018	on-going	IFREMER	public	Kélonia	Not yet	EU	sbonhommeau@ifremer.fr		N	n/a	n/a	n/a	n/a	n/a	N	n/a	N	Y	
T4.6	CM SW IND	France	Glorieuses	COPRA	Trophic Ecology	2017	2019	AFB, CEDTM	Public	Kélonia	Not yet	EU	<a href="mailto:Katia.Ballorain@cedtm-asso.org">Katia Ballorain (katiaballorain@cedtm-asso.org)</a>	Laure Montchamp (laure.montchamp@afbiodiversite.fr)	N	n/a	n/a	n/a	n/a	n/a	Y	n/a	N	N	

## References

1. TORSOOI Database
2. Le Gall, J. Y., P. Bosc, et al. (1986). "Estimation du nombre de Tortues Vertes femelles adultes *Chelonia mydas* par saison de ponte à Tromelin et Europa (océan indien) (1973–1985)." *Océanographie Tropicale* 21: 3-22.
3. Lauret-Stepler M., Bourjea J., Roos D., Pelletier D., Ryan P., Ciccione S. & Grizel H. (2007). Reproductive seasonality and trend of *Chelonia mydas* in the SW Indian Ocean: a 20 yr study based on track counts. *Endangered Species Research*, 3, 217-227.
4. Dalleau M., Ciccione S., Mortimer J.A., Garnier J., Benhamou S. & Bourjea J. (2012). Nesting Phenology of Marine Turtles: Insights from a Regional Comparative Analysis on Green Turtle (*Chelonia mydas*). *Plos One*, 7, e46920.
5. Lauret-Stepler M., Ciccione S. & Bourjea J. (2010). Monitoring of marine turtles reproductive activities in Juan de Nova, Eparses Islands, South Western Indian Ocean, based on tracks count and width. *Indian Ocean Turtle Newsletter*, 11, 18-24.
6. Ballorain et al. (2018). Sea turtles of the French Territories. SWOT Report, vol XIII, pp. 18-23
7. Derville et al. (2015). Long-Term Monitoring of Green Turtle Nesting on Tromelin Island Demonstrates Stable Reproduction and Population Parameters. *Chelonian Conservation and Biology* 14(1): 11-20
8. Bourjea et al. (2007). Phylogeography of the green turtle, *Chelonia mydas*, in the Southwest Indian Ocean. *Molecular Ecology*, Vol 16 issue 1, 175
9. Dalleau (2013). Spatial ecology of marine turtles in the South-West Indian Ocean: conservation insights from remote sensing and modeling. PhD thesis
10. Petersen S.L., Honig M.B., Ryan P.G., Nel R. & Underhill L.G. (2009). Turtle bycatch in the pelagic longline fishery off southern Africa. *African Journal of Marine Science*, 31, 87-96.
11. Miossec D. & Bourjea J. (2003). Longline fishery evolution in La Réunion. Focus on the exploitation level of swordfish (*Xiphias gladius*). In: 3rd Session of the IOTC Working Party on Billfish Perth. Australia. P.14 P.
12. Bourjea, J., Ciccione, S. and Lauret-Stepler, M. (2011). Les îles Eparses: vingt-cinq ans de recherche sur les tortues marines. *Bulletin de la Société Herpétologique de France* 139: 94-111.
13. Bourjea J., Gravier-Bonnet N., Boulet V., Ciccione S. & Rolland R. (2006) – Rapport de mission pluridisciplinaire 'EUROPA'. 22 mai au 6 juin 2006. Rapport de Mission IFREMER, Le Port, La Réunion. 19 p.
14. Frazier J.G. 1975 – Marine turtles of the Western Indian Ocean. *Oryx*, 13: 164-175.
15. Bourjea J., Ribes S. & Sauvignet H. 2007c – Rapport de mission Mada-Nova. 30 mai au 13 juin 2007. Rapport de Mission IFREMER, Le Port, La Réunion. 27 p.
16. de Bettencourt J. and Imminga-Berends H. Pays et Territoires d'Outre-Mer: Profils Environnementaux [Report]. - 2015.
17. Philippe J. S. et al. Plan national d'action en faveur des tortues marines des territoires français de l'océan Indien: La Réunion, Mayotte et îles Eparses (2015-2020) [Report]. - 2014.
18. IUCN France (2016). Profil d'écosystème océan Indien - Iles Eparses
19. PNM Glorieuses Plan de gestion 2015-2030 - Finalités de gestion et carte des vocations [Report]. - 2015.
20. Ciccione S. 2005 – Rapport de Mission scientifique dans les Éparses – Glorieuses, 9 au 16 août 2005. Rapport de Mission Kélonia, St Leu, La Réunion. 9 p.
21. Girard C. 2005 – Etude du comportement d'orientation d'espèces pélagiques tropicales vis-à-vis d'attracteurs. Thèse de Doctorat de l'Université de La Réunion, Biologie Marine. 250 p.
22. Bourjea J., Nel R., Jiddawi N.S., Koonjul M.S. & Bianchi G. 2008 – Sea turtle bycatch in the West Indian Ocean: Review, recommendations and research priorities. *Western Indian Ocean J. Mar. Sci.*, 7: 137-150.



23. Bourjea J, Dalleau M, Jean C, Ciccione S (2015). DYMATURE 2015 - Dynamique spatio-temporelle et origine des tortues vertes immatures des îles Eparses. Rapport de Mission Glorieuse & Juan de Nova, 20 mars – 12 avril 2015.
24. Ballorain K, Dalleau M, Jean C (2015) Restitution : Mission PANAMAG #1 – Volet tortues marines - Glorieuses 2015. PNMG/AAMP/TAAF/CEDTM/KELONIA
25. Ballorain K, Dedeken M (2016) Rapport de mission PANAMAG #1 – Volet Herbiers marins. PNMG/AAMP/TAAF
26. Ballorain K (2016) Restitution : Mission COPRA #1 – Glorieuses 2018. CEDTM/AFB/KELONIA
27. Ballorain K, Dalleau M, Jean C, Bourjea J, Dedeken M, Nicet JB, Montchamp L, Mortimer JA, Esteban N, Hays GC, Ciccione S (2018) Thalassodendron meadows as sea turtle habitats in the Western Indian Ocean. 38th ISTS Symposium, Kobe, Japan.
28. Bourjea J, Benhamou S (2008) Rapport de Mission scientifique dans les Éparses – Glorieuses : 4 au 17 mai 2008. Rapport de Mission IFREMER, Le Port, La Réunion.
29. Bourjea J, Benhamou S, Mouquet P, Quod P (2009) Rapport de Mission scientifique dans les Éparses – Glorieuses. 23 mai au 5 juin 2009. Rapport de Mission IFREMER, Le Port, La Réunion.
30. Bourjea J, Mouquet P, Quod JP, Ciccione S (2010). Expédition pluridisciplinaire "Iles Eparses" 2010 - Rapport de mission Juan de Nova - Europa, 14 mai - 7 juin 2010.
31. Bourjea J, Dalleau M (2011). EXPEDITION EUROPA 2011. Rapport de Mission Europa, 16 Novembre – 2 décembre 2011 - IFREMER/ KELONIA / CNRS.
32. Taquet C. 2007 – Diversité et différenciation génétiques des populations de tortues vertes (*Chelonia mydas*) dans les sites de ponte et d'alimentation du sud-ouest de l'océan Indien : Application aux stratégies de conservation de l'espèce. Thèse de Doctorat de l'Université de la Réunion, Biologie Marine, 226 p.
33. Le Gall, J.-Y., Chateau, D. & Bosc, P. 1985. Rythme de reproduction inter annuel des tortues vertes *Chelonia mydas* sur les sites de ponte Tromelin et Europa (océan Indien). C.R. Acad. Sc. Paris, tome 301, 195-200.
34. Bosc, P. & Le Gall, J. Y. 1986. Nest Site Fidelity of the Green Turtle *Chelonia-Mydas* on Tromelin-Island (Indian-Ocean). *Oceanologica Acta*, 9, 489-495.
35. Leroux et al. (2010). First report of *Chelonia mydas* affected by cutaneous fibropapillomatis on the West coast of Madagascar. *Indian Ocean Turtle Newsletter* n11, pp 13-17
36. Bourjea (2013). Structure et connectivité de la mégafaune marine à l'échelle d'une région océanique Enjeux pour la gestion durable des tortues vertes dans l'océan Indien occidental. Thèse de doctorat
37. Dalleau, M., Benhamou, S., Sudre, J., Ciccione, S., Bourjea, J., 2014. The spatial ecology of juvenile loggerhead turtles (*Caretta caretta*) in the Indian Ocean sheds light on the "lost years" mystery. *Mar. Biol.* 161, 1835–1849.
38. Clermont S., Chavance P., Delgado A., Murua H., Ruiz J., Ciccione S. & Bourjea J. (2012). Eu purse seine fishery interaction with marine turtles in the Atlantic and Indian Oceans: a 15 year analyses. In. IOTC, p. 74p.
39. Tardy (2015). Caractérisation génétique et comparaison des stratégies d'alimentation par analyses d'isotopes stables des tortues caouannes juvéniles (*Caretta caretta*) capturées par la pêche palangrière réunionnaise. Master's thesis
40. Hoarau et al. (2014). Ingestion and defecation of marine debris by loggerhead sea turtles, *Caretta caretta*, from by-catches in the South-West Indian Ocean. *Marine Pollution Bulletin* 84, pp 90-96
41. Hoarau & Dalleau (2016). Impact des plastiques sur les tortues marines du Sud-ouest de l'océan Indien (La Réunion). Rapport technique COCALOCA
42. Dalleau et al. (2016). Connectivity of Loggerhead turtle (*Caretta caretta*) in Western Indian Ocean: Implementation of local and regional management. Rapport technique final COCALOCA
43. Ballorain K., Quillard M., Ciccione S. (2011) First report of green turtle fibropapillomatosis in Comoros Archipelago. Poster: 7th Western Indian Ocean Marine Science Association (WIOMSA) Scientific Symposium, 24-29 October, Monbasa, Kenya

44. Barret M. (2008) Conditions d'incubation des nids de tortues vertes (*Chelonia mydas*) aux Glorieuses (Taaf-France), évaluation de l'état de santé de la population et application à la gestion de cette espèce classée en France), évaluation de l'état de santé de la population et application à la gestion de cette espèce classée en danger d'extinction face au changement climatique. Rapport de M2 Génie des anthroposystèmes littoraux de l'Université de la Rochelle pour *Chelonia*, 52 pp + annexes.
45. Bourjea et al. (2013). DYMITILE - Dynamique migratoire des tortues marines nidifiant dans les îles française de l'océan Indien. Rapport final phase I et II.
46. Drogou, M. & Bertrand, G. (1999). Étude des populations de Tortue verte et de Tortue imbriquée à Juan de nova. Rapport de mission de novembre 1998 à juin 1999. Sous la direction de D. Roos IFREMER & S. Ciccione Centre d'Étude et de Découverte des Tortues Marines, 1-14.
47. Pelletier, D., Roos, D., Ciccione, S. (2003). Oceanic survival and movements of wild and captive-reared immature green turtles (*Chelonia mydas*) in the Indian Ocean. *Aquat Living Resour* 16, 35–41.
48. Marsac Francis, Chassot Emmanuel, Cauquil Pascal, Chavance Pierre, Clot Thierry, Bach Pascal, Bourjea Jerome, Bodin Natalie (2015). France - Territoire. Rapport national destiné au Comité scientifique de la Commission des thons de l'océan Indien, 2011-2012 Commission des thons de l'océan Indien, 2015 . DPMA - Direction des Pêches Maritimes et de l'Aquaculture, Paris , Ref. IOTC-2015-SC18-NR07 , 18p. <https://archimer.ifremer.fr/doc/00308/41896/>
49. Chavance Pierre, Herfaut Johanna, Bourjea Jerome, Chassot Emmanuel (2014). France -Territoires - Rapport national destiné au Comité scientifique de la Commission des thons de l'océan Indien, pour sa réunion annuelle 2013-2014. Informations sur les pêcheries, les recherches et les statistiques. European Commission DCF - Data Collection Framework , Ref. Ifremer/EDERU/DOI/05 , 27p.
50. Marinesque Sophie, Glenard Zoé, Bourjea Jerome (2016). Plan national d'actions en faveur des tortues marines sur les territoires français du sud-ouest de l'océan Indien 2015-2020. Iles Eparses. Volume 4
51. Jean et al. (2016). Programme: EGETOMER - Étude Génétique des Tortues Marines qui fréquentent les Eaux Réunionnaises. Compte rendu technique. "
52. Wallace B.P., DiMatteo A.D., Hurley B.J., Finkbeiner E.M., Bolten A.B., et al. (2010) Regional Management Units for Marine Turtles: A Novel Framework for Prioritizing Conservation and Research across Multiple Scales. *PLoS ONE* 5(12): e15465.oi:10.1371/journal.pone.0015465
53. Wallace B.P., DiMatteo A.D., Bolten A.B., Chaloupka M.Y., Hutchinson B.J., et al. (2011) Global Conservation Priorities for Marine Turtles. *PLoS ONE* 6(9): e24510.doi:10.1371/journal.pone.0024510
54. Bourjea J (2015). Sea turtles; a review of status, distribution and interaction with fisheries in the Southwest Indian Ocean. In Van der Elst RP and Everett BI. 2015. (Eds). *Offshore fisheries of the Southwest Indian Ocean: their status and the impact on vulnerable species*. Oceanographic Research Institute, Special Publication, 10. 448 pp. Chap.9, pp.325-349 (Van der Elst RP and Everett BI).
55. TAAF (2016) Livret de découverte des îles Eparses, Tromelin, Glorieuses, Juan de Nova, Europa et Bassas da Indian, TAAF edition, 21p.

# CHAGOS

Jeanne A. Mortimer<sup>1,2</sup>, Nicole Esteban<sup>3</sup>, Graeme Hays<sup>4</sup>

<sup>1</sup> University of Florida, USA

<sup>2</sup> Turtle Action Group of Seychelles, Seychelles

<sup>3</sup> Swansea University, UK

<sup>4</sup> Deakin University, Australia

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

RMU	CM - BIOT	Ref #	EI - BIOT	Ref #	CC - BIOT	Ref #	DC - BIOT	Ref #	LO - BIOT	Ref #
<b>Occurrence</b>										
Nesting sites	Y	1, 17	Y	1,17	N	17	N	17	N	17
Pelagic foraging grounds	n/a		n/a		n/a		Y	17	n/a	
Benthic foraging grounds	Y	2, 3, 7, 17	Y	17, 14	Y	17	N		n/a	
<b>Key biological data</b>										
Nests/yr: recent average (range of years)	20,500 (2011-2018)	1	6,300 (2011-2018)	1	n/a		n/a		n/a	
Nests/yr: recent order of magnitude	n/a		n/a		n/a		n/a		n/a	
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	>20	1	>20	1	n/a		n/a		n/a	
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	>20		>20		n/a		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)	132	1	132	1	n/a		n/a		n/a	
Nesting females / yr	3,400	1,4	n/a		n/a		n/a		n/a	
Nests / female season (N)	mean 6 (range to >10)	4	n/a		n/a		n/a		n/a	
Female remigration interval (yrs) (N)	n/a		n/a		n/a		n/a		n/a	
Sex ratio: Hatchlings (F / Tot) (N)	53%	5	63%	5	n/a		n/a		n/a	
Sex ratio: Immatures (F / Tot) (N)	n/a		~73% Female	16	n/a		n/a		n/a	
Sex ratio: Adults (F / Tot) (N)	n/a		n/a		n/a		n/a		n/a	
Min adult size, CCL or SCL (cm)	n/a		n/a							
Age at maturity (yrs)	n/a		25-30	13	n/a		n/a		n/a	

Clutch size (n eggs) (N)	n/a		n/a		n/a		n/a		n/a	
Emergence success (hatchlings/egg) (N)	n/a		n/a		n/a		n/a		n/a	
Nesting success (Nests/Tot emergence tracks) (N)	n/a		n/a		n/a		n/a		n/a	
<b>Trends</b>										
Recent trends (last 20 yrs) at nesting sites (range of years)	Up (2000-2020)		Up (2000-2020)		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/a		Y	13, 14	n/a		n/a		n/a	
Genetics	Y	18, 15, 13,	Y	18, 15, 13,	n/a		n/a		n/a	
Stocks defined by genetic markers	Y	15	Y	18, 15	n/a		n/a		n/a	
Remote tracking (satellite or other)	Y	3, 7	See Table 4		n/a		n/a		n/a	
Survival rates	n/a		n/a		n/a		n/a		n/a	
Population dynamics	Y	1	Y	1	n/a		n/a		n/a	
Foraging ecology (diet or isotopes)	Y	13, 14	Y	13, 14	n/a		n/a		n/a	
Capture-Mark-Recapture	Y	13, 14,	Y	13, 14,	n/a		n/a		n/a	
<b>Threats</b>										
Bycatch: presence of small scale / artisanal fisheries?	Y	17	Y	17	Y		Y		Y	
Bycatch: presence of industrial fisheries?	N	24	N	24	N		N		N	
Bycatch: quantified?	n/a		n/a		N		N		N	
Take. Intentional killing or exploitation of turtles	N	24	N	24	N	24	N	24	N	24
Take. Egg poaching	N	1, 24	N	1, 24	n/a		n/a		n/a	
Coastal Development. Nesting habitat degradation	Y	1	Y	1	n/a		n/a		n/a	
Coastal Development. Photopollution	Y	1	Y	1	n/a		n/a		n/a	
Coastal Development. Boat strikes	n/a		n/a		n/a		n/a		n/a	
Egg predation	Y	1	Y	1	n/a		n/a		n/a	
Pollution (debris, chemical)	n/a		n/a		n/a		n/a		n/a	
Pathogens	n/a		n/a		n/a		n/a		n/a	
Climate change	Y	5	Y	5	n/a		n/a		n/a	
Foraging habitat degradation	n/a		n/a		n/a		n/a		n/a	
Other	n/a		n/a		n/a		n/a		n/a	

<b>Long-term projects (&gt;5yrs)</b>										
Monitoring at nesting sites (period: range of years)	Y (1996-ongoing)	1, 13,	Y (1996-ongoing)	1, 13,	n/a		n/a		n/a	
Number of index nesting sites	1	1	1	1	n/a		n/a		n/a	
Monitoring at foraging sites (period: range of years)	Y (1996-ongoing)	13, 14, 17, 14	Y (1996-ongoing)	13, 14, 17, 14	n/a		n/a		n/a	
<b>Conservation</b>										
Protection under national law	Y	1, 24	Y	1,24	Y	24	Y	24	Y	24
Number of protected nesting sites (habitat preservation) (% nests)	All	1, 24	All	1, 24	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)	See Table 4 (1996-present)	Tab 4	See Table 4 (1996-present)	Tab 4	n/a		n/a		n/a	
In-situ nest protection (eg cages)	N		N		n/a		n/a		n/a	
Hatcheries	N		N		n/a		n/a		n/a	
Head-starting	N		N		n/a		n/a		n/a	
By-catch: fishing gear modifications (eg, TED, circle hooks)	n/a		n/a		n/a		n/a		n/a	
By-catch: onboard best practices	n/a		n/a		Maybe		Maybe		Maybe	
By-catch: spatio-temporal closures/reduction	Y	24	Y	24	Y	24	Y	24	Y	24
Other	n/a		n/a		n/a		n/a		n/a	

**Table 2.** Sea turtle nesting beaches in Chagos.

RMU / Nesting beach name	Index site	Clutches/yr: recent average (range of years)	Crawls/yr: recent average (range of years)	Western limit		Eastern limit		Central point		Length (km) Coastline Suitable for Nesting	% Monitored	Reference #
				Long	Lat	Long	Lat	Long	Lat			
<b>CM - BIOT</b>												
Diego Garcia Atoll (4 islands)	Both	6,467 (2011-2018)	na	72.317626°	-7.269204°	72.512276°	-7.291974°	72.448756°	-7.336128°	40.5	100%	1
DG Index Beach	Yes	550 (2011-2018)	na	72.441143°	-7.437337°	72.453817°	-7.413471°	72.447201°	-7.425205°	2.85	100%	1
Peros Banhos Atoll (36 islands)	N	7,941 (2011-2018)	na	71.715843°	-5.350002°	71.987883°	-5.345166°	71.839769°	-5.345035°	41.2	75%	1
Salamon Atoll (11 islands)	N	696 (2011-2018)	na	72.192809°	-5.348727°	72.279929°	-5.332986°	72.239017°	-5.336915°	13.9	100%	1
Great Chagos Bank (8 islands)	N	3,295 (2011-2018)	na	71.177727°	-6.312085°	72.768265°	-6.080570°	72.068500°	-6.196455°	18.8	100%	1
Egmont Atoll (8 islands)	N	2,088 (2011-2018)	na	71.305381°	-6.651727°	71.400757°	-6.689849°	71.350156°	-6.661210°	17.3	88%	1
<b>EI - BIOT</b>												
Diego Garcia Atoll (4 islands)	Both	3,081 (2011-2018)	na	72.317626°	-7.269204°	72.512276°	-7.291974°	72.448756°	-7.336128°	40.5	100%	1
DG Index Beach	Yes	265 (2011-2018)	na	72.441143°	-7.437337°	72.453817°	-7.413471°	72.447201°	-7.425205°	2.85	100%	1
Peros Banhos Atoll (36 islands)	N	2,627 (2011-2018)	na	71.715843°	-5.350002°	71.987883°	-5.345166°	71.839769°	-5.345035°	41.2	75%	1
Salamon Atoll (11 islands)	N	158 (2011-2018)	na	72.192809°	-5.348727°	72.279929°	-5.332986°	72.239017°	-5.336915°	13.9	100%	1
Great Chagos Bank (8 islands)	N	126 (2011-2018)	na	71.177727°	-6.312085°	72.768265°	-6.080570°	72.068500°	-6.196455°	18.8	100%	1
Egmont Atoll (8 islands)	N	316 (2011-2018)	na	71.305381°	-6.651727°	71.400757°	-6.689849°	71.350156°	-6.661210°	17.3	88%	1

**Table 3.** International conventions protecting sea turtles and signed by Chagos.

International Conventions	Signed	Binding	Compliance measured and reported	Species	Conservation actions	Relevance to sea turtles
Bonn Convention on the Conservation of Migratory Species of Wild Animals	Y	Y	Y	ALL	Includes protection of all turtles and their nesting and foraging habitats	High
Memorandum of Understanding of CMS on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia	Y	N	Y	ALL	Includes protection of all turtles and their nesting and foraging habitats	High
Convention on International Trade in Endangered Species (CITES)	Y	Y	Y	ALL	BIOT's Trade in Endangered Species (Control) Ordinance 2007 was confirmed as meeting requirements of CITES legislation in 2011.	
Ramsar Convention on Wetlands of International Importance	Y	Y	Y	ALL	Ramsar site on Diego Garcia	Protects foraging and nesting sites

**Table 4.** Projects and databases on sea turtles in Chagos.

#	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	EI-WIO; CM-WIO	BIOT	Salomon Atoll, Great Chagos Bank, Peros Banhos Atoll, Egmont Atoll, Diego Garcia Atoll	Rapid surveys of Turtle Nesting throughout Chagos Islands	Nesting females; Nesting population estimates; Track counts	1996	ongoing	Swansea University; University of Florida; Deakin University	Private	NAV/COM Environment Office Diego Garcia; BIOT Administration	<a href="https://www.marine.science/project/sea-turtle-research/">https://www.marine.science/project/sea-turtle-research/</a>	Bertarelli Foundation	Nicole Esteban; n.esteban@swansea.ac.uk	Graeme Hays; g.hays@deakin.edu.au
T4.2	EI-WIO; CM-WIO	BIOT	Diego Garcia 2.8 km Index Beach	Semi-monthly track counts at Diego Garcia 2.8	Nesting females; Nesting population estimates; Track	2006	ongoing	Swansea University; University of Florida; Deakin University	Private	NAV/COM Environment Office Diego Garcia; BIOT Administration	<a href="https://www.marine.science/project/sea-turtle-research/">https://www.marine.science/project/sea-turtle-research/</a>	Bertarelli Foundation	Nicole Esteban; n.esteban@swansea.ac.uk	Graeme Hays; g.hays@deakin.edu.au

				km Index Beach	counts; Nesting seasonality									
T4.3	EI-WIO; CM-WIO	BIOT	Turtle Cove, Diego Garcia Atoll, Chagos	In-water mark-recapture of immature foraging hawksbill & green turtles	Foraging turtles; Flipper tagging	1996	ongoing	Swansea University; University of Florida; Deakin University	Private	NAV/COM Environment Office Diego Garcia; BIOT Administration	<a href="https://www.marine.science/project/sea-turtle-research/">https://www.marine.science/project/sea-turtle-research/</a>	Bertarelli Foundation	Nicole Esteban; n.esteban@swansea.ac.uk	Graeme Hays; g.hays@deakin.edu.au
T4.4	EI-WIO; CM-WIO	BIOT	Chagos Archipelago	Genetic Analysis of immature foraging hawksbills & green turtles	Genetic analysis	1996	ongoing	Swansea University; University of Florida; Deakin University	Private	Damien Broderick; Nancy Fitzsimmons; Michael P Jensen; Jerome Bourjea		Bertarelli Foundation	Nicole Esteban; n.esteban@swansea.ac.uk	Graeme Hays; g.hays@deakin.edu.au
T4.5	EI-WIO; CM-WIO	BIOT	Chagos Archipelago	Genetic Analysis of post-nesting female hawksbills & green turtles	Genetic analysis	1996	ongoing	Swansea University; University of Florida; Deakin University	Private	Damien Broderick; Nancy Fitzsimmons; Sarah M Vargas; Michael P Jensen; Jerome Bourjea		Bertarelli Foundation	Nicole Esteban; n.esteban@swansea.ac.uk	Graeme Hays; g.hays@deakin.edu.au
T4.6	EI-WIO; CM-WIO	BIOT	Diego Garcia 2.8 km Index Beach; Nelson Island Great Chagos Bank	Use of camera traps to assess turtle nesting activity	Nesting females; Nesting population estimates	2019	ongoing	Swansea University; University of Florida; Deakin University	Private	NAV/COM Environment Office Diego Garcia; BIOT Administration	<a href="https://www.marine.science/project/sea-turtle-research/">https://www.marine.science/project/sea-turtle-research/</a>	Bertarelli Foundation	Nicole Esteban; n.esteban@swansea.ac.uk	Graeme Hays; g.hays@deakin.edu.au
T4.7	EI-WIO; CM-WIO	BIOT	Diego Garcia 2.8 km Index Beach	Temperature Loggers to assess sex ratios of hatchling production	Sex ratio	2016	ongoing	Swansea University; University of Florida; Deakin University	Private	NAV/COM Environment Office Diego Garcia; BIOT Administration	<a href="https://www.marine.science/project/sea-turtle-research/">https://www.marine.science/project/sea-turtle-research/</a>	Bertarelli Foundation	Nicole Esteban; n.esteban@swansea.ac.uk	Graeme Hays; g.hays@deakin.edu.au
T4.8	EI-WIO; CM-WIO	BIOT	Turtle Cove, Diego Garcia Atoll, Chagos	Satellite tracking of immature hawksbill and green turtles	Foraging turtles; Immature turtles	2018	ongoing	Swansea University; University of Florida; Deakin University	Private	NAV/COM Environment Office Diego Garcia; BIOT Administration	<a href="https://www.marine.science/project/sea-turtle-research/">https://www.marine.science/project/sea-turtle-research/</a>	Bertarelli Foundation	Nicole Esteban; n.esteban@swansea.ac.uk	Graeme Hays; g.hays@deakin.edu.au



T4.9	CM-WIO	BIOT	Diego Garcia Atoll; Great Chagos Bank	Satellite tracking of post-nesting female green turtles to assess regional migrations and habitat use	Nesting turtles	2012	ongoing	Swansea University; University of Florida; Deakin University	Private	NAV/COM Environment Office Diego Garcia; BIOT Administration	<a href="https://www.marine.science/project/sea-turtle-research/">https://www.marine.science/project/sea-turtle-research/</a>	Bertarelli Foundation	Nicole Esteban; n.esteban@swansea.ac.uk	Graeme Hays; g.hays@deakin.edu.au
T4.10	Ei-WIO	BIOT	Diego Garcia Atoll	Satellite tracking of post-nesting female hawksbill turtles to assess regional migrations and habitat use	Nesting turtles	2018	ongoing	Swansea University; University of Florida; Deakin University	Private	NAV/COM Environment Office Diego Garcia; BIOT Administration	<a href="https://www.marine.science/project/sea-turtle-research/">https://www.marine.science/project/sea-turtle-research/</a>	Bertarelli Foundation	Nicole Esteban; n.esteban@swansea.ac.uk	Graeme Hays; g.hays@deakin.edu.au
T4.11	Ei-WIO; CM-WIO	BIOT	Diego Garcia Atoll	Drone surveys of aggregations of foraging turtles	Foraging turtles; nesting turtles; population estimate	2018	ongoing	Swansea University; University of Florida; Deakin University	Private	NAV/COM Environment Office Diego Garcia; BIOT Administration	<a href="#">See reference 26</a>	Bertarelli Foundation	Nicole Esteban; n.esteban@swansea.ac.uk	Graeme Hays; g.hays@deakin.edu.au
T4.12	Ei-WIO; CM-WIO	BIOT	All atolls	Impact of Plastic Pollution on Nesting Beaches	nesting turtles; pollution	2019	ongoing	Swansea University; ZSL	Private	NAV/COM Environment Office Diego Garcia; BIOT Administration		DEFRA; Bertarelli Foundation	Nicole Esteban; n.esteban@swansea.ac.uk	Graeme Hays; g.hays@deakin.edu.au

## References

1. MORTIMER JA, ESTEBAN N, GUZMAN A, HAYS G. 2020. Estimates of marine turtle nesting populations in the south-west Indian Ocean indicate the importance of the Chagos Archipelago. *Oryx* doi:10.1017/S0030605319001108
2. ESTEBAN N, UNSWORTH RKF, GOURLAY JBQ, HAYS GC. 2018. The discovery of deep-water seagrass meadows in a pristine Indian Ocean wilderness revealed by tracking green turtles. *Mar Pollut Bull* 134:99–105. <https://doi.org/10.1016/j.marpolbul.2018.08.011>
3. CHRISTIANSEN F, ESTEBAN N, MORTIMER JA, DUJON AM, HAYS GC. 2017. Diel and seasonal patterns in activity and home range size of green turtles on their foraging grounds revealed by extended Fastloc-GPS tracking. *Mar Biol* 164:10. <https://doi.org/10.1007/s00227-016-3048-7>
4. ESTEBAN N, MORTIMER JA, HAYS GC. 2017. How numbers of nesting sea turtles can be overestimated by nearly a factor of two. *Proceedings of the Royal Society B*, 280, 2016258.
5. ESTEBAN N, LALOE J-O, MORTIMER JA, GUZMAN AN, HAYS GC. 2016. Male hatchling production in sea turtles from one of the world's largest marine protected areas, the Chagos Archipelago. *Scientific Reports* 6:20339. doi:10.1038/srep20339.
6. WENBAN-SMITH, N. & CARTER, M. 2016. Chagos: a History—Exploration, Exploitation, Expulsion. Chagos Conservation Trust, Sandy, UK.
7. HAYS GC, MORTIMER JA, IERODIACONOU D, ESTEBAN N. 2014. Use of long-distance migration patterns of an endangered species to inform conservation planning for the world's largest marine protected area. *Conservation Biology*, 28, 1636-1644.
8. SHEPPARD CRC, ATEWEBERHAN M, BOWEN, BW, CARR P, CHEN CA, CLUBBE C, CRAIG MT, EBINGHAUS R, EBLE J, FITZSIMMONS N, GAITHER MR, GAN C-H, GOLLOCK M, GUZMAN N, GRAHAM NAJ, HARRIS A, JONES R, KESHAVMURTHY S, KOLDEWEY H, LUNDIN CG, MORTIMER JA, OBURA D, PFEIFFER M, PRICE ARG, PURKIS S, RAINES P, READMAN JW, RIEGL B, ROGERS A, SCHLEYER M, SEAWARD, MRD, SHEPPARD ALS, TAMELANDER J, TURNER JR, VISRAM S, VOGLER C, VOGT S, WOLSCHKE H, YANG JM-C, YANG S-Y, YESSON C. 2012. Reefs and islands of the Chagos Archipelago, Indian Ocean: why it is the world's largest no-take marine protected area. *Aquatic Conservation: Marine and Freshwater Ecosystems* 22(2):232-261.
9. WALLACE BP, DIMATTEO AD, BOLTEN AB, CHALOUPKA MY, HUTCHINSON BJ, ABREU-GROBOIS FA, MORTIMER JA, et al. 2011. Global conservation priorities for marine turtles. *PLOS ONE*, 6, e24510.
10. WALLACE BP, DIMATTEO AD, HURLEY BJ, FINKBEINER EM, BOLTEN AB, CHALOUPKA MY, HUTCHINSON BJ, ABREU-GROBOIS FA, AMOROCHO D, BJORN DAL KA, BOURJEA J, BOWEN BW, BRISENO-DUENAS R, CASALE P, CHOUDBURY BC, COSTA A, DUTTON PH, FALLABRINO A, GIRARD A, GIRONDOT M, GODFREY MH, HAMANN M, LOPEZ-MENDILAHARSU M, MARCOVALDI MA, MORTIMER JA, MUSICK JA, NEL R, PILCHER NJ, SEMINOFF JA, TROENG S, WITHERINGTON B, MAST RB. 2010. Regional Management Units for Marine Turtles: A Novel Framework for Prioritizing Conservation and Research across Multiple Scales. *PLoS ONE* 5(12): e15465. doi:10.1371/journal.pone.0015465
11. MORTIMER JA. 2009. History of turtle exploitation in Chagos. *Chagos News*, 34, 14–16. [chagos-trust.org/images/uploads/documents/Chagos\\_News\\_34.pdf](http://chagos-trust.org/images/uploads/documents/Chagos_News_34.pdf) [accessed 10 September 2018].
12. MORTIMER JA. 2007. Final report: status and conservation of nesting turtles in the Chagos islands (BIOT). Marine Turtle Conservation Fund Award 98210-6-G073. Unpublished report to Multinational Species Conservation Fund.
13. MORTIMER JA, DAY M, BRODERICK D. 2002. Sea turtle populations of the Chagos Archipelago, British Indian Ocean Territory. Pp. 47-49. In: *Proceedings of the 20th Annual Symposium on Sea Turtle Biology and Conservation*. Compilers: Mosier, A, A Foley, & B Brost. NOAA Tech. Memo. NMFS-SEFSC-477, 369 pp. Orlando, Florida.

14. MORTIMER JA. 2000. Diego Garcia Marine Turtle Conservation Assessment (British Indian Ocean Territory). Unpublished report to British Indian Ocean Territory Department, Environment Science & Energy Department, and Foreign & Commonwealth Office, London, UK.
15. MORTIMER JA, BRODERICK D. 1999. Population genetic structure and developmental migrations of sea turtles in the Chagos Archipelago and adjacent regions inferred from mtDNA sequence variation. In *Ecology of the Chagos Archipelago* (eds C.R.C. Sheppard & M.R.D. Seaward), pp. 185–194, Linnean Society Occasional Publications 2, London, UK.
16. MORTIMER JA, CRAIN DA. 1999. Chapter 13: Sex steroid concentrations in immature hawksbill turtles (*Eretmochelys imbricata*) in the Chagos Archipelago. Pp. 173-184, in Sheppard, CRC and Seaward, MRD (eds). *Ecology of the Chagos Archipelago*. Linnean Society Occasional Publications 2.
17. MORTIMER JA, DAY M. 1999. Sea turtle populations and habitats in the Chagos Archipelago, British Indian Ocean Territory. In *Ecology of the Chagos Archipelago* (eds C.R.C. Sheppard & M.R.D. Seaward), pp. 159–176. Linnean Society Occasional Publications 2, London, UK.
18. VARGAS SM, JENSEN MP, HO SYW, MOBARAKI A, BRODERICK D, MORTIMER JA, WHITING SD, MILLER J, PRINCE RIT, BELL IP, HOENNER X, LIMPUS CJ, SANTOS FR, FITZSIMMONS NN. 2016. Phylogeography, Genetic Diversity, and Management Units of hawksbill turtles in the Indo-Pacific. *Journal of Heredity* 107(3):199-213. (and supplementary data).
19. BARNETT LK, EMM C. 1997. Herpetological observations in the Chagos Archipelago, British Indian Ocean Territory. *British Herpetological Bulletin* 59:6-12.
20. FRAZIER J. 1984. Marine turtles in the Seychelles and adjacent territories. In: *Biogeography and Ecology of the Seychelles Islands*. Edited by D. R. Stoddart. Dr. W. Junk Publishers: The Hague, Netherlands. pp. 417-468.
21. DUTTON RA. 1980. The herpetology of the Chagos Archipelago. *British Journal of Herpetology*. 6:133-134.
22. FRAZIER J. 1976. Report on Sea Turtles in the Seychelles Area. 1976. *J. mar. biol. Ass. India*. 18(2):179-241.
23. FRAZIER J. 1975. Marine turtles of the Western Indian Ocean. *Oryx*, 13, 164–175.
24. KOLDEWEY HJ, CURNICK D, HARDING S, HARRISON LR, GUOLLOCK M. 2010. Potential benefits to fisheries and biodiversity of the Chagos Archipelago/British Indian Ocean Territory as a no-take marine reserve. *Marine Pollution Bulletin*, 60, 1906-1915.
25. Shimada, T., Limpus, C. J., Hamann, M., Bell, I., Esteban, N., Groom, R., Hays, G. C. (2019). Fidelity to foraging sites after long migrations. *Journal of Animal Ecology*. doi:10.1111/1365-2656.13157
26. Schofield G., Esteban N., Katselidis K.A., Hays G.C. (2019). Drones for research on sea turtles and other marine vertebrates – A review. *Biological Conservation* 238:108214. <https://doi.org/10.1016/j.biocon.2019.108214>.
27. Hays, G.C., Alcoverro, T., Christianen, M.J.A., Duarte, C.M., Hamann, M., Macreadie, P.I., Marsh, H.D., Rasheed, M.A., Thums, M., Unsworth, R.K.F., York, P.H. & Esteban, N. (2018). New tools to identify the location of seagrass meadows: marine grazers as habitat indicators. *Frontiers in Marine Science* 5. doi: 10.3389/fmars.2018.00009.
28. Dujon, A., Schofield, G., Lester, R., Esteban, N. & Hays, G.C. (2017). Fastloc-GPS reveals daytime departure and arrival during long-distance migration and the use of different resting strategies in sea turtles. *Marine Biology* 164. doi:10.1007/s00227-017-3216-8.

# KENYA

Mike Olendo<sup>1,2</sup>, Hassan Bwanamkuu<sup>3</sup>, Lillian Mulupi<sup>1</sup>

<sup>1</sup> Nature Blue, Kenya

<sup>2</sup> Conservation International, Kenya

<sup>3</sup> WWF – Kenya, Kenya

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

RMU	CC-NW IND	Ref #	CM-SW IND	Ref #	DC-SW IND	Ref #
<b>Occurrence</b>						
Nesting sites	Y	1,7	Y		n/a	31
Pelagic foraging grounds	JA	4,5,10	N		n/a	32,33
Benthic foraging grounds	Y	3	n/a		n/a	
<b>Key biological data</b>						
Nests/yr: recent average (range of years)	n/a	PS	127 (2015-2019)		n/a	
Nests/yr: recent order of magnitude	100-200	42	n/a		n/a	
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	3	PS	11		n/a	
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	n/a		13		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		26.1		n/a	
Nesting females / yr	n/a		42		n/a	
Nests / female season (N)	5 (23)		n/a		n/a	
Female remigration interval (yrs) (N)	2.3 (15)		n/a		n/a	
Sex ratio: Hatchlings (F / Tot) (N)	0.64 (465)		n/a		n/a	
Sex ratio: Immatures (F / Tot) (N)	0.52 (337)		n/a		n/a	
Sex ratio: Adults (F / Tot) (N)	0.4 (51)		n/a		n/a	
Min adult size, CCL or SCL (cm)	72 CCL		86 CCL		n/a	
Age at maturity (yrs)	25-30		n/a		n/a	
Clutch size (n eggs) (N)	98.2 (287)		n/a		n/a	
Emergence success (hatchlings/egg) (N)	0.82 (1569)		0.84		n/a	
Nesting success (Nests/ Tot emergence tracks) (N)	0.4 (228)		n/a		n/a	

<b>Trends</b>						
Recent trends (last 20 yrs) at nesting sites (range of years)	Up (2000-2010)		Up (1999-2013)	1	Stable (2001-2013)	
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)	500 (1961)		Y (1999-2013)	1	n/a	
<b>Published studies</b>						
Growth rates	Y	60	N		N	
Genetics	N		Y	3	N	
Stocks defined by genetic markers	N		N		N	
Remote tracking (satellite or other)	Y	58,59	N		N	
Survival rates	N		N		N	
Population dynamics	N		N		N	
Foraging ecology (diet or isotopes)	Y	56,57	N		N	
Capture-Mark-Recapture	Y	61	N		N	
<b>Threats</b>						
Bycatch: presence of small scale / artisanal fisheries?	Y (PLL, SN,)	62	Y	undocumented	n/a	
Bycatch: presence of industrial fisheries?	Y (PLL, SN, BT)	62	Y	undocumented	n/a	
Bycatch: quantified?	Y	62	Y	undocumented	n/a	
Take. Intentional killing or exploitation of turtles	Y		Y	undocumented	n/a	
Take. Egg poaching	N		Y	undocumented	n/a	
Coastal Development. Nesting habitat degradation	Y		Y	undocumented	n/a	
Coastal Development. Photopollution	Y		Y	undocumented	n/a	
Coastal Development. Boat strikes	Y		Y	undocumented	n/a	
Egg predation	Y		Y	undocumented	n/a	
Pollution (debris, chemical)	n/a		Y	undocumented	n/a	
Pathogens	n/a		n/a		n/a	
Climate change	n/a		Y		n/a	
Foraging habitat degradation	n/a		Y		n/a	
Other	Y (see text)		N		N	
<b>Long-term projects (&gt;5yrs)</b>						
Monitoring at nesting sites (period: range of years)	Y (1985-ongoing)		Y(1999 - ongoing)		n/a	

Number of index nesting sites	2		15		n/a	
Monitoring at foraging sites (period: range of years)	N		n/a		n/a	
<b>Conservation</b>						
Protection under national law	Y		Y		Y	
Number of protected nesting sites (habitat preservation) (% nests)	1 (12%)		0		0	
Number of Marine Areas with mitigation of threats	0		4		0	
N of long-term conservation projects (period: range of years)	>1 (1975-2011)		2		0	
In-situ nest protection (eg cages)	Y		n/a		n/a	
Hatcheries	N		n/a		n/a	
Head-starting	N		n/a		n/a	
By-catch: fishing gear modifications (eg, TED, circle hooks)	N		Y	2	n/a	
By-catch: onboard best practices	Y		Y	2	n/a	
By-catch: spatio-temporal closures/reduction	N		N		n/a	
Other	Y (see text)		N		N	

**Table 2. Sea turtle nesting beaches in Kenya.**

RMU / Nesting beach name	Index site	Nests/yr: recent average (range of years)	Crawls/yr: recent average (range of years)	Western limit		Eastern limit		Central point		Length (km)
				Long	Lat	Long	Lat	Long	Lat	
<b>CM-SW IND</b>										
Ashwei	Y	1(2015-2019)	Not recorded	41.322939°	-1.951192°	41.326715°	-1.946602°	Not recorded		690M
Chandani	Y	38(2015-2019)	Not recorded	41.285509°	-1.996996°	41.295353°	-1.984193°	Not recorded		1740M
Chole	N	1(2015-2019)	Not recorded	41.376864°	-1.896873°	41.378208°	-1.894411°	Not recorded		326M
Chunduni	Y	2(2015-2019)	Not recorded	41.413982°	-1.864174°	41.415366°	-1.862387°	Not recorded		155M
Chongo Katiti	Y	1(2015-2019)	Not recorded	41.403648°	-1.873966°	41.404098°	-1.873387°	Not recorded		92.4M
Kitanga Kikuu	Y	90(2015-2019)	Not recorded	41.304983°	-1.974645°	41.305720°	-1.973251°	Not recorded		190M
Kifuo Kipia	Y	8(2015-2019)	Not recorded	41.333243°	-1.942582°	41.333355°	-1.942340°	Not recorded		31M
Kiunga Mwini	Y	5(2015-2019)	Not recorded	41.510032°	-1.754901°	41.498549°	-1.768214°	Not recorded		500M
Kiwayu	Y	24(2015-2019)	Not recorded	41.254213°	-2.032329°	41.285509°	-1.996996°	Not recorded		5320M
Kongowale	Y	28(2015-2019)	Not recorded	41.315832°	-1.960437°	41.322517°	-1.952085°	Not recorded		1430M
KSV Beach	Y	65(2015-2019)	Not recorded	41.307102°	-1.957924°	41.314803°	-1.959987°	Not recorded		935M
KMNR (KWS/WWF)	Y	30(2015-2019)	Not recorded	41.300106°	-1.964204°	41.307062°	-1.957941°	Not recorded		1047M

Magogo	Y	25(2015-2019)	Not recorded	41.410048°	-1.867724°	41.412074°	-1.865829°	Not recorded		304M
Mdoa	Y	1(2015-2019)	Not recorded	41.386426°	-1.890666°	41.387204°	-1.891083°	Not recorded		100M
Mkokoni	Y	1(2015-2019)	Not recorded	41.294481°	-1.972009°	41.300070°	-1.964309°	Not recorded		1334M
Mongo Shariff	Y	145(2015-2019)	Not recorded	41.425412°	-1.852146°	41.423444°	-1.854966°	Not recorded		390M
Mongoni	N	28(2015-2019)	Not recorded	41.342841°	-1.932257°	41.343830°	-1.931152°	Not recorded		160M
Mtumumwe	N	6(2015-2019)	Not recorded	41.358502°	-1.916627°	41.363431°	-1.912903°	Not recorded		620M
Mvundeni	N	1(2015-2019)	Not recorded	41.340219°	-1.923539°	41.348033°	-1.918375°	Not recorded		1120M
Mwanabule	Y	47(2015-2019)	Not recorded	41.428814°	-1.850365°	41.427883°	-1.850357°	Not recorded		110M
Ngazini	N	1(2015-2019)	Not recorded	41.350703°	-1.924893°	41.353608°	-1.921667°	Not recorded		471M
Porcupine	N	33(2015-2019)	Not recorded	41.339764°	-1.935451°	41.339957°	-1.935256°	Not recorded		32.8M
Usini	Y	3(2015-2019)	Not recorded	41.314666°	-1.962024°	41.315862°	-1.960469°	Not recorded		407M
Kitangani	Y	1(2015-2019)	Not recorded	41.592333°	-1.14171°	41.16546°	-2.00561°	Not recorded		1890M

**Table 3.** International conventions protecting sea turtles and signed by Kenya.

International Conventions	Signed	Binding	Compliance measured and reported	Species
Convention on Biological Diversity	Y	Y	Y	ALL
Convention on the Conservation of Migratory Species of Wild Animals	Y	Y	Y	ALL
Convention on International Trade in Endangered Species of Wild Fauna and Flora	Y	Y	Y	ALL
Convention on Wetlands of International Importance	Y	Y	Y	ALL
Convention Concerning the Protection of the World Cultural and Natural Heritage	Y	Y	Y	ALL
International Convention for the Prevention of Pollution from Shipping	Y	Y	Y	ALL
United Nations Convention on the Law of the Sea	Y	Y	Y	ALL
Convention on the Preservation of Marine Pollution by Dumping of Wastes and other Matter	Y	Y	N	ALL
Convention on the Control of Transboundary Movement of Hazardous Wastes and their Disposal	Y	Y	N	ALL
Straddling stocks agreement	Y	Y	Y	ALL
United Nations Framework Convention on Climate Change	Y	Y	Y	ALL
Stockholm Convention on Persistent Organic Pollutants	Y	Y	Y	ALL

**Table 4. Projects and databases on sea turtles in Kenya.**

#	RM U	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)	Data base available	Name of Data base	Names of sites included (matching Table B, if appropriate)	Beginning of the time series	End of the time series	Track information	Nest information	Flipper tagging	Tags in STTI-ACCSTR?	PIT tagging	Remote tracking
T4.1	CM-WIO	France	Europa, Juande Nova, Glorieuse, Tromelin	Tracking green in the mozambique Channel	Tracking ; Fastloc GPS tag; Nesting female; western Indian Ocean	2010	2013	YY	Public	ZZ, RR,TT	<a href="http://www.xxx.com">www.xxx.com</a>	UU	qqqq, www, tttt		Y	DB-Turtle		1958	2016	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
T4.2	CM-WIO	Kenya	Lamu Seascape	Sea turtle conservation	Nesting female, tracking, Lamu seascape	1999	ongoing	WWF	Public	KWS, KMFRI		WWF - UK	Hassan Mohamed hmohamed@wfwkenya.org	Lily Mwasi ldali@wwfkenya.org	Y			1999	ongoing	Y	Y	Y	Y	N	Y
T4.3	CM-WIO	Kenya	Tiwi	Tiwi turtle conservation	Nesting female, Tiwi	2020	ongoing	Nature Blue	Private	KWS, Coconut Beach Lodge		ProWin Pronature	Mike Olendo izavamike@gmail.com	Lillian Mulupi Imulupi@gmail.com	Y			2020	ongoing	N	Y	N	N	N	N

## References

1. Olendo et al., (2016) Current status of sea turtle protection in Lamu Seascape, Kenya: Trends in nesting, nest predation and stranding levels
2. Fennessy et al., Report of a workshop on the analysis of existing data from prawn trawl nets with Turtle Excluder Device (TED) and without TED (non-TED) in the Western Indian Ocean"
3. Jensen et al., (2020) Seascape Genetics and the Spatial Ecology of Juvenile Green Turtles



# REUNION

Claire Jean<sup>1</sup>, Stéphane Ciccione<sup>1</sup>, Jérôme Bourjea<sup>2</sup>, Mayeul Dalleau<sup>3</sup>, Alice Carpentier<sup>1</sup>

<sup>1</sup> Kélonia, L'observatoire des tortues marines de La Réunion; La Réunion, France

<sup>2</sup> MARine Biodiversity, Exploitation and Conservation MARBEC, Univ. Montpellier, CNRS, Ifremer, IRD; France

<sup>3</sup> Centre d'Etude et de Découverte des Tortues Marines CEDTM, Reunion, France

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

RMU	CM-SW IND - Reunion	Ref #	EI-SW IND - Reunion	Ref #	CC-SW IND - Reunion	Ref #	DC-SW IND - Reunion	Ref #	LO-SW IND - Reunion	Ref #
<b>Occurrence</b>										
Nesting sites	Y	1,2,3,4,18	N		N		N		N	
Pelagic foraging grounds	Y	6,14,17	n/a		Y	6,14,17,22	Y	6,14,17	Y	6,14,17
Benthic foraging grounds	Y	1,2,5,8,11,12,15,16	Y	1,8,12,15,16	N		N		N	
<b>Key biological data</b>										
Nests/yr: recent average (range of years)	2.26 (2004-2018)	1	n/a		n/a		n/a		n/a	
Nests/yr: recent order of magnitude	0-6	1	n/a		n/a		n/a		n/a	
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	0	1,2,3,4	n/a		n/a		n/a		n/a	
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	4	1,2,3,4	n/a		n/a		n/a		n/a	
Nests/yr at "major" sites: recent average (range of years)	0		n/a		n/a		n/a		n/a	
Nests/yr at "minor" sites: recent average (range of years)	2.26 (2004-2018)	1	n/a		n/a		n/a		n/a	

Total length of nesting sites (km)	1.8	1,2,3,4	n/a		n/a		n/a		n/a
Nesting females / yr	1	1,2,3,4	n/a		n/a		n/a		n/a
Nests / female season (N)	4.5 (4)	1,2,3,4	n/a		n/a		n/a		n/a
Female remigration interval (yrs) (N)	4.5 (2)	1,2,3,4	n/a		n/a		n/a		n/a
Sex ratio: Hatchlings (F / Tot) (N)	n/a		n/a		n/a		n/a		n/a
Sex ratio: Immatures (F / Tot) (N)	n/a		n/a		n/a		n/a		n/a
Sex ratio: Adults (F / Tot) (N)	0.6 (58)	1	0.8 (5)	1	n/a		n/a		n/a
Min adult size, CCL or SCL (cm)	102 (CCL)	4	n/a		n/a		n/a		n/a
Age at maturity (yrs)	n/a		n/a		n/a		n/a		n/a
Clutch size (n eggs) (N)	117.4 (19)	1,10	n/a		n/a		n/a		n/a
Emergence success (hatchlings/egg) (N)	0.86 (19)	1	n/a		n/a		n/a		n/a
Nesting success (Nests/Tot emergence tracks) (N)	0.53 (32)	1	n/a		n/a		n/a		n/a
<b>Trends</b>									
Recent trends (last 20 yrs) at nesting sites (range of years)	Stable (2004-2018)	1.2	n/a		n/a		n/a		n/a
Recent trends (last 20 yrs) at foraging grounds (range of years)	Up (2004-2018)	1.5	Up (2004-2018)	1.5	n/a		n/a		n/a
Oldest documented abundance: nests/yr (range of years)	1	35	n/a		n/a		n/a		n/a
<b>Published studies</b>									
Growth rates	N		N		N		N		N
Genetics	Y	13, 26	Y	26	Y	14,20,29,30	N		N
Stocks defined by genetic markers	Y	13, 36	N		Y		N		N
Remote tracking (satellite or other)	Y	14	Y		Y	14,20,30	N		N

Survival rates	Y	14	N		N		N		N	
Population dynamics	Y	5	N		N		N		N	
Foraging ecology (diet or isotopes)	Y	8,11,26	Y	26	Y	29,30	N		N	
Capture-Mark-Recapture	Y	2,26	Y	26	N		N		N	
<b>Threats</b>										
Bycatch: presence of small scale / artisanal fisheries?	Y	6.24	Y	6.24	Y	6.24	Y	6.24	Y	6.24
Bycatch: presence of industrial fisheries?	Y	6.24	Y	6.24	Y	6.24	Y	6.24	Y	6.24
Bycatch: quantified?	0.004/1000 hooks (PLL)	6.24	0.004/1000 hooks (PLL)	6.24	0.004/1000 hooks (PLL)	6.24	0.004/1000 hooks (PLL)	6.24	0.004/1000 hooks (PLL)	6.24
Take. Intentional killing or exploitation of turtles	N		N		N		N		N	
Take. Egg poaching	N		n/a		n/a		n/a		n/a	
Coastal Development. Nesting habitat degradation	Y	2,4,23	n/a		n/a		n/a		n/a	
Coastal Development. Photopollution	Y	7	n/a		n/a		n/a		n/a	
Coastal Development. Boat strikes	Y	27,31	Y	31	Y	31	n/a		n/a	
Egg predation	N		n/a		n/a		n/a		n/a	
Pollution (debris, chemical)	Y	9,29,31	Y	29	Y	28,29,31	n/a		Y	29
Pathogens	Y	31	n/a		Y		n/a		n/a	
Climate change	Y		Y		Y		Y		Y	
Foraging habitat degradation	Y		Y		Y		Y		Y	
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 (2004-ongoing)		n/a		n/a		n/a		n/a	

Number of index nesting sites	4		n/a		n/a		n/a		n/a	
Monitoring at foraging sites (period: range of years)	Y (2003-ongoing)		Y (2003-ongoing)		N		N		N	
<b>Conservation</b>										
Protection under national law	Y		Y		Y		Y		Y	
Number of protected nesting sites (habitat preservation) (% nests)	4 (100%)		0		0		0		0	
Number of Marine Areas with mitigation of threats	1		1		0		0		0	
N of long-term conservation projects (period: range of years)	>10 (2004-ongoing)	25	0		>2 (2004-ongoing)		0		0	
In-situ nest protection (eg cages)	N		n/a		n/a		n/a		n/a	
Hatcheries	Y	10	N		N		N		N	
Head-starting	Y		N		N		N		N	
By-catch: fishing gear modifications (eg, TED, circle hooks)	Circle hooks		Circle hooks		Circle hooks		N		Circle hooks	
By-catch: onboard best practices	Y	6,17,30	Y	6,17,30	Y	6,17,30	Y	6,17,30	Y	6,17,30
By-catch: spatio-temporal closures/reduction	N		N		N		N		N	
Other										

**Table 2.** Sea turtle nesting beaches in Reunion.

RMU / Nesting beach name	Index site	Nests/yr: recent average (range of years)	Crawls/yr: recent average (range of years)	Central point		Length (km)	% Monitored	Reference #	Monitoring Level (1-2)	Monitoring Protocol (A-F)
				Long	Lat					
<b>CM-SW IND - Reunion</b>										
Cap Champagne	Y	0.9 (2004-2018)	1.9 (2004-2018)	55.22923	-21.02398	0.75	100		2	C
Pointe des Châteaux	Y	0.8 (2004-2018)	1.9 (2004-2018)	55.27868	-21.15249	0.725	100		2	C
Spot Tortue	Y	0.1 (2004-2018)	0.7 (2004-2018)	55.28266	-21.15527	0.15	100		2	C
Résidence Gabrielle	Y	0.5 (2004-2018)	0.9 (2004-2018)	55.28499	-21.15827	0.175	100		2	C

**Table 3.** International conventions protecting sea turtles and signed by Reunion.

International Conventions	Signed	Binding	Compliance measured and reported	Species	Relevance to sea turtles
Convention of Washington	Y	Y	n/a	ALL	
Convention of Bonn	Y	Y	n/a	ALL	As endangered species, all use of sea turtles are forbidden. All parties are also required to undertake measures to protect sea turtles habitats and helping sea turtles migration.
Convention of Berne	Y	Y	n/a	CM,EI	All captures of sea turtles or eggs are forbidden
Convention of Rio	Y	Y	n/a	ALL	helps the creation of marine protected areas, habitat restoration and sustainable development
Convention of Nairobi	Y	Y	n/a	ALL	
IOSEA Memorandum	Y	Y	n/a	ALL	

**Table 4. Projects and databases on sea turtles in Reunion.**

#	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)	Data base 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	Ref #
T4-1	ALL-SWIO	France	La Réunion, Juan de Nova, Mayotte, Tromelin, Madagascar, Comores	TORSOI - Sea turtle database for the South West Indian Ocean	Database; South western Indian Ocean	2004	on-going	Kelonia, IFREMER	Private		Y		Claire Jean (claire.jean.kelonia@museesreunion.fr)	Jérôme Bourjea (Jerome.Bourjea@ifremer.fr)	Y	TORSOOI	1983	2018	N	Y	Y	n/a	Y	N	
T4-2	CCSWIND, CCNWIN	France	Réunion, Oman, Mozambique, South Africa	COCA LOCA	Tracking, Juveniles, Bycatch	2014	2016	CEDTM	Public	IFREMER, Kélonia, ESO, SOcean, CTV, NMU	Y	AFD, EU - BEST	<a href="mailto:Mayeul.Dalleau@macedtm-asso.org">Mayeul Dalleau (mayeul.dalleau@cetdm-asso.org)</a>	Jérôme Bourjea (Jerome.Bourjea@ifremer.fr)	N	n/a	n/a	n/a	N	N	N	n/a	N	Y	20
T4-3	CM SWIND	France	Réunion	EGETOMER	Genetics, Juveniles	2013	2014	Kélonia, Ifremer, CEDTM	Public		Y	French state	claire Jean (claire.jean.kelonia@museesreunion.fr)	Jérôme Bourjea (Jerome.Bourjea@ifremer.fr)	N	n/a	n/a	n/a	N	N	Y	n/a	N	N	26
T4-4	CM SWIND	France	Réunion	HATOCAM	Foraging ecology, Borne Camer, 360° video	2017	2019	CEDTM, Kélonia	Public		Not yet	French state, Fondation CA	claire Jean (claire.jean.kelonia@museesreunion.fr)	Stéphane Ciccione (stephanciccione@cedtm-asso.org)	N	n/a	n/a	n/a	N	N	Y	n/a	N	Y	

## References

1. TORSOOI Database
2. Ciccione S. & Bourjea J. (2006). Nesting of Green Turtles in Saint Leu, Réunion Island. *Marine Turtle Newsletter*, 112, 1-3.
3. Ballorain et al. (2018). Sea turtles of the French Territories. SWOT Report, vol XIII, pp. 18-23
4. Ciccione S. & Bourjea J. (2010). Nesting beach revegetation and its influence on green turtle (*Chelonia mydas*) conservation in Réunion Island. *Indian Ocean Turtle Newsletter*, 11, 50-52.
5. Jean et al. (2010). Ultralight aircraft surveys reveal marine turtle population increases along the west coast of Reunion Island, *Oryx*, 44(2), 223-229
6. Bourjea et al. (2008). Sea turtle bycatch in the West Indian Ocean: review, Recommendations and research priorities
7. Claro F. et Bardonnet C. (2011) Les tortues marines et la pollution lumineuse sur le territoire française. Rapport GTMF-SPN 2. MNHN-SPN, Paris, 40p.
8. Ciccione, S. (2001) Autopsie de tortues marines *Chelonia mydas* retrouvées mortes à la Réunion. *Bulletin Phaethon*, 13: 14-15.
9. Claro F., Hubert P. (2011) Impact des macrodéchets marins sur les tortues marines en France métropolitaine et d'Outre-mer. Groupe Tortues Marines France, Service du Patrimoine Naturel, Muséum National d'Histoire Naturelle.
10. Ciccione S., Lauret-Stepler M. and Bourjea J. (2008) Marine Turtle Nest Translocation Due to Hurricane Threat on Réunion Island. *Marine Turtle Newsletter* 119 : 6-8
11. Ballorain (2010) Écologie trophique de la tortue verte *Chelonia mydas* dans les herbiers marins et algues du sud-ouest de l'océan Indien. *Sciences agricoles*. Université de la Réunion, 2010. Français."
12. Jean C, Ciccione S, Talma E, Ballorain K, Bourjea J (2009) Photo-identification method for green and hawksbill turtles and first results from Reunion. *Indian Ocean Turtle Newsletter*, No11, pp 8-13
13. Bourjea et al. (2007). Phylogeography of the green turtle, *Chelonia mydas*, in the Southwest Indian Ocean. *Molecular Ecology*, Vol 16 issue 1, 175
14. Dalleau (2013). Spatial ecology of marine turtles in the South-West Indian Ocean: conservation insights from remote sensing and modeling. PhD thesis
15. Sauvignet H., Pavitrin A., Ciccione S., Roos D. (2000) Premiers résultats des campagnes de dénombrements aériens des tortues marines sur la côte ouest de La Réunion. *Bull. Phaeton*. 11, 8-18.
16. Chassagneux A., Jean C., Bourjea J & Ciccione S. (2013) Unraveling Behavioral Patterns of Foraging Hawksbill and Green Turtles Using Photo-Identification. *Marine Turtle Newsletter* No 137
17. Ciccione S. & Bourjea J. (2010b). Discovering behaviour of open sea stages of sea turtles: working flipper on hand with fishermen in Réunion. *Indian Ocean turtle newsletter*, p50-52.
18. BERTRAND, J., B. BONNET & G. LEBRUN. 1986. Nesting attempts of *Chelonia mydas* at Réunion Island (S. W. Indian Ocean). *Marine Turtle Newsletter* 39:3-4.
19. Bourjea (2013). Structure et connectivité de la mégafaune marine à l'échelle d'une région océanique Enjeux pour la gestion durable des tortues vertes dans l'océan Indien occidental. Thèse de doctorat
20. Dalleau, M., Benhamou, S., Sudre, J., Ciccione, S., Bourjea, J., 2014. The spatial ecology of juvenile loggerhead turtles (*Caretta caretta*) in the Indian Ocean sheds light on the "lost years" mystery. *Mar. Biol.* 161, 1835–1849.
21. Clermont S., Chavance P., Delgado A., Murua H., Ruiz J., Ciccione S. & Bourjea J. (2012). Eu purse seine fishery interaction with marine turtles in the Atlantic and Indian Oceans: a 15 year analyses. In. IOTC, p. 74p.
22. Tardy (2015). Caractérisation génétique et comparaison des stratégies d'alimentation par analyses d'isotopes stables des tortues caouannes juvéniles (*Caretta caretta*) capturées par la pêche palangrière réunionnaise. Master's thesis

23. DEAL La stratégie de lutte contre les espèces invasives à La Réunion : Bilan du POLI 2010-2013 et perspectives pour le POLI 2014-2017
24. Miossec D. & Bourjea J. (2003). Longline fishery evolution in La Réunion. Focus on the exploitation level of swordfish (*Xiphias gladius*). In: 3rd Session of the IOTC Working Party on Billfish Perth, Australia, p. 14 p.
25. Plan national d'actions en faveur des tortues marines des territoires français de l'océan Indien PARTIE COMMUNE Version 7, mai 2014
26. Jean et al. (2016). Programme: EGETOMER - Étude Génétique des Tortues Marines qui fréquentent les Eaux Réunionnaises. Compte rendu technique.
27. Ciccione et al. (2015). Cause and healing of a sea turtle injury revealed by photo-identification. Indian Ocean Turtle Newsletter No 21
28. Hoarau et al. (2014). Ingestion and defecation of marine debris by loggerhead sea turtles, *Caretta caretta*, from by-catches in the South-West Indian Ocean. Marine Pollution Bulletin 84, pp 90-96
29. Hoarau & Dalleau (2016). Impact des plastiques sur les tortues marines du Sud-ouest de l'océan Indien (La Réunion). Rapport technique COCALOCA
30. Dalleau et al. (2016). Connectivity of Loggerhead turtle (*Caretta caretta*) in Western Indian Ocean: Implementation of local and regional management. Rapport technique final COCALOCA
31. Carpentier (2016). Description et avancées du groupe "Pathologies et soins" du Groupe Tortues Marines France en 2016. Rapport GTMF
32. Bourjea et al. (2013). DYMITILE - Dynamique migratoire des tortues marines nidifiant dans les îles française de l'océan Indien. Rapport final phase I et II.
33. Taquet C (2007) Diversité et différenciation génétiques des populations de tortues vertes, *Chelonia mydas*, dans les sites de ponte et d'alimentation du Sud-Ouest de l'océan Indien: application aux stratégies de conservation de l'espèce. PHD Thesis, 150p
34. Ciccione S and Bourjea J (2006) Nesting of Green Turtles in Saint Leu, Réunion Island. Marine Turtle Newsletter, 112, 3-5



# SEYCHELLES

Jeanne A. Mortimer<sup>1</sup>, Ashley Dias<sup>2</sup>

<sup>1</sup> Turtle Action Group Seychelles (TAGS), Seychelles

<sup>2</sup> Ministry of Environmental Energy & Climate Change, Seychelles

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

RMU	CM - SEY	Ref #	EI - SEY	Ref #	CC - SEY	Ref #	DC - SEY	Ref #	LO - SEY	Ref #
<b>Occurrence</b>										
Nesting sites	Y	1, 2, 3	Y	1, 2, 3	N	1, 2, 3	N	1, 2, 3	N	1, 2, 3
Pelagic foraging grounds	n/a		n/a		n/a		n/a		n/a	
Benthic foraging grounds	Y	38, 39, 35	Y	34, 36, 37, 39, 40	Y	2, 3	N		N	
<b>Key biological data</b>										
Nests/yr: recent average (range of years)	44,175 (1998-2017)	1	5,550 (1998-2017)	1	n/a		n/a		n/a	
Nests/yr: recent order of magnitude	n/a		n/a		n/a		n/a		n/a	
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	>20	1	>30	1	n/a		n/a		n/a	
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	>20		>20		n/a		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)	193.3	1	193.3	1	n/a		n/a		n/a	
Nesting females / yr	n/a		n/a		n/a		n/a		n/a	
Nests / female season (N)	3-6 mean	9	3-4 mean	54	n/a		n/a		n/a	
Female remigration interval (yrs) (N)	3-6?	9	2-4	54	n/a		n/a		n/a	
Sex ratio: Hatchlings (F / Tot) (N)	n/a		n/a		n/a		n/a		n/a	
Sex ratio: Immatures (F / Tot) (N)	n/a		n/a		n/a		n/a		n/a	
Sex ratio: Adults (F / Tot) (N)	n/a		n/a		n/a		n/a		n/a	
Min adult size, CCL or SCL (cm)	n/a		n/a	15						
Age at maturity (yrs)	25-30	61	25-30		n/a		n/a		n/a	
Clutch size (n eggs) (N)	n/a		n/a		n/a		n/a		n/a	
Emergence success (hatchlings/egg) (N)	n/a		n/a		n/a		n/a		n/a	
Nesting success (Nests/ Tot emergence tracks) (N)	n/a		n/a		n/a		n/a		n/a	

<b>Trends</b>									
Recent trends (last 20 yrs) at nesting sites (range of years)	Up (2000-2020)		Up (2000-2020)		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	Y			48, 61	n/a		n/a		n/a
Genetics	Y	41, 42, 43,	Y	44, 45, 46	n/a		n/a		n/a
Stocks defined by genetic markers	Y	41, 42	Y	46	n/a		n/a		n/a
Remote tracking (satellite or other)	Y				n/a		n/a		n/a
Survival rates	N				n/a		n/a		n/a
Population dynamics	N				n/a		n/a		n/a
Foraging ecology (diet or isotopes)	Y	35	36		n/a		n/a		n/a
Capture-Mark-Recapture	Y	61		48	n/a		n/a		n/a
<b>Threats</b>									
Bycatch: presence of small scale / artisanal fisheries?	Y		Y		Y		Y		Y
Bycatch: presence of industrial fisheries?	Y		Y		Y		Y		Y
Bycatch: quantified?	N		N		N		N		N
Take. Intentional killing or exploitation of turtles	Y		Y		Y		Y		Y
Take. Egg poaching	N		N		n/a		n/a		n/a
Coastal Development. Nesting habitat degradation	Y		Y		n/a		n/a		n/a
Coastal Development. Photopollution	Y		Y		n/a		n/a		n/a
Coastal Development. Boat strikes	Y		Y		n/a		n/a		n/a
Egg predation	Y		Y		n/a		n/a		n/a
Pollution (debris, chemical)	n/a		n/a		n/a		n/a		n/a
Pathogens	n/a		n/a		n/a		n/a		n/a
Climate change	Y		Y		n/a		n/a		n/a
Foraging habitat degradation	n/a		n/a		n/a		n/a		n/a
Other	n/a		n/a		n/a		n/a		n/a
<b>Long-term projects (&gt;5yrs)</b>									
Monitoring at nesting sites (period: range of years)	Y (1981-ongoing)		Y (1981-ongoing)		n/a		n/a		n/a
Number of index nesting sites	21		21		n/a		n/a		n/a
Monitoring at foraging sites (period: range of years)	Y (1986-ongoing)		Y (1986-ongoing)		n/a		n/a		n/a

<b>Conservation</b>									
Protection under national law	Y		Y		Y		Y		Y
Number of protected nesting sites (habitat preservation) (% nests)	All		All		n/a		n/a		n/a
Number of Marine Areas with mitigation of threats	Many		Many		Many		Many		Many
N of long-term conservation projects (period: range of years)	>20 (1981-ongoing)		>20 (1981-ongoing)		n/a		n/a		n/a
In-situ nest protection (eg cages)	N		N		n/a		n/a		n/a
Hatcheries	N		N		n/a		n/a		n/a
Head-starting	N		N		n/a		n/a		n/a
By-catch: fishing gear modifications (eg, TED, circle hooks)	N		N		n/a		n/a		n/a
By-catch: onboard best practices	Maybe		Maybe		Maybe		Maybe		Maybe
By-catch: spatio-temporal closures/reduction	Y		Y		Y		Y		Y
Other	n/a		n/a		n/a		n/a		n/a

**Table 2.** Sea turtle nesting beaches in Seychelles.

RMU / Nesting beach name	Index site	Clutches/yr: recent average (range of years)	Crawls/yr: recent average (range of years)	Western limit		Eastern limit		Central point		Length (km)	% Monitored	Reference #
				Long	Lat	Long	Lat	Long	Lat			
<b>CM - SEYCHELLES</b>				Long	Lat	Long	Lat	Long	Lat			
<b>Inner Islands (All Islands)</b>	<b>Mixed</b>	<b>180 (2010-2018)</b>	<b>na</b>	<b>55.155442°</b>	<b>-4.469469°</b>	<b>55.993902°</b>	<b>-4.607453°</b>	<b>55.596875°</b>	<b>-4.298264°</b>	<b>56.2</b>		<b>1, 2</b>
<b>Inner Islands (non-Index sites)</b>	no									<b>27.73</b>	Occasional Rapid Surveys	
<b>Inner Islands (13 index sites)</b>	<b>13 index sites</b>									<b>28.47</b>		
1 Bird Island	yes							55.206110°	-3.719694°	4.80	100%	
2 Denis Island	yes							55.667783°	-3.805603°	4.80	100%	
3 Ile du Nord	yes							55.243854°	-4.394055°	2.29	100%	
4 Silhouette Island	yes							55.231866°	-4.487337°	0.90	100%	
5 Ile Aride	yes							55.669519°	-4.214923°	0.90	100%	
6 Curieuse Island	yes							55.729973°	-4.286015°	2.06	100%	
7 Cousin Island	yes							55.663426°	-4.331257°	1.79	100%	
8 Cousine Island	yes							55.647902°	-4.349028°	1.00	100%	
9 Lemuria Hotel (Praslin)	yes							55.678771°	-4.298418°	1.11	100%	
10 Felicite Island	yes							55.866674°	-4.322785°	0.56	100%	
11 Ste Anne Island	yes							55.509223°	-4.603691°	2.72	100%	
12 Mahé Island (S beaches)	yes							55.525931°	-4.800812°	3.98	100%	
13 Fregate Island	yes							55.941231°	-4.586358°	1.56	100%	

<b>Platte &amp; Coetivy (Total)</b>	no	70 (1998-2006)	na	55.343501°	-5.841807°	56.346450°	-7.158010°	55.685281°	-6.557599°	23.7	Occasional Rapid Surveys	1, 2
<b>Amirantes Group (All Islands)</b>	Mixed	1425 (2004-2017)	na	52.663972°	-7.182290°	53.694486°	-5.660945°	53.065408°	-5.879895°	45.9		1, 2
<b>Amirantes Group (non-Index sites)</b>	no									12.72	Occasional Rapid Surveys	
<b>Amirantes Group (6 index sites)</b>	6 index sites									33.18		
1 Desroches Island	yes							53.671352°	-5.688794°	13.00	100%	
2 D'Arros Island	yes							53.297936°	-5.415865°	5.00	100%	
3 St Joseph Island	yes							53.341397°	-5.426715°	7.44	100%	
4 Alphonse Island	yes							52.726717°	-7.005377°	5.00	100%	
5 St Francois Island	yes							52.737592°	-7.158553°	2.18	100%	
6 Bijoutier Island	yes							52.734544°	-7.067369°	0.56	100%	
<b>Providence/Farquhar</b>	Mixed	2500 (2014-2017)	na	50.913266°	-9.508191°	51.198477°	-10.182934°	50.995233°	-9.770900°	31.3		1, 2
<b>Providence</b>	no									12.78	Occasional Rapid Surveys	
<b>Farquhar (1 index site)</b>	1 index site									18.52		
1 Farquhar Atoll	yes							51.113601°	-10.177604°	18.52	100%	
<b>Cosmoledo/Astove</b>	no	15,000 (2014-2015)	na	47.448460°	-9.740231°	47.798683°	-10.105560°	47.620856°	-9.927960°	23.2	Occasional Rapid Surveys	1, 2

Aldabra/Assomption	Mixed	25,000 (2008-2015)	na	46.125729°	-9.454214°	46.592256°	-9.381940°	46.402140°	-9.647278°	13.0		1, 2
Assomption	no									7.8	Occasional Rapid Surveys	
Aldabra (1 index site)	1 index site									5.20		
1 Aldabra Atoll	yes							46.336512°	-9.422785°	5.20	100%	
EI - SEYCHELLES												
				Long	Lat	Long	Lat	Long	Lat			
Inner Islands (All Islands)	Mixed	180 (2010-2018)	na	55.155442°	-4.469469°	55.993902°	-4.607453°	55.596875°	-4.298264°	56.2		1, 2
Inner Islands (non-Index sites)	no									27.73	Occasional Rapid Surveys	
Inner Islands (13 index sites)	13 index sites									28.47		
1 Bird Island	yes							55.206110°	-3.719694°	4.80	100%	
2 Denis Island	yes							55.667783°	-3.805603°	4.80	100%	
3 Ile du Nord	yes							55.243854°	-4.394055°	2.29	100%	
4 Silhouette Island	yes							55.231866°	-4.487337°	0.90	100%	
5 Ile Aride	yes							55.669519°	-4.214923°	0.90	100%	
6 Curieuse Island	yes							55.729973°	-4.286015°	2.06	100%	
7 Cousin Island	yes							55.663426°	-4.331257°	1.79	100%	
8 Cousine Island	yes							55.647902°	-4.349028°	1.00	100%	
9 Lemuria Hotel (Praslin)	yes							55.678771°	-4.298418°	1.11	100%	

10 Felicite Island	yes							55.866674°	-4.322785°	0.56	100%	
11 Ste Anne Island	yes							55.509223°	-4.603691°	2.72	100%	
12 Mahé Island (S beaches)	yes							55.525931°	-4.800812°	3.98	100%	
13 Fregate Island	yes							55.941231°	-4.586358°	1.56	100%	
<b>Platte &amp; Coetivy (Total)</b>	<b>no</b>	<b>70 (1998-2006)</b>	<b>na</b>	<b>55.343501°</b>	<b>-5.841807°</b>	<b>56.346450°</b>	<b>-7.158010°</b>	<b>55.685281°</b>	<b>-6.557599°</b>	<b>23.7</b>	Occasional Rapid Surveys	<b>1, 2</b>
<b>Amirantes Group (All Islands)</b>	<b>Mixed</b>	<b>1425 (2004-2017)</b>	<b>na</b>	<b>52.663972°</b>	<b>-7.182290°</b>	<b>53.694486°</b>	<b>-5.660945°</b>	<b>53.065408°</b>	<b>-5.879895°</b>	<b>45.9</b>		<b>1, 2</b>
<b>Amirantes Group (non-Index sites)</b>	<b>no</b>									<b>12.72</b>	Occasional Rapid Surveys	
<b>Amirantes Group (6 index sites)</b>	<b>6 index sites</b>									<b>33.18</b>		
1 Desroches Island	yes							53.671352°	-5.688794°	13.00	100%	
2 D'Arros Island	yes							53.297936°	-5.415865°	5.00	100%	
3 St Joseph Island	yes							53.341397°	-5.426715°	7.44	100%	
4 Alphonse Island	yes							52.726717°	-7.005377°	5.00	100%	
5 St Francois Island	yes							52.737592°	-7.158553°	2.18	100%	
6 Bijoutier Island	yes							52.734544°	-7.067369°	0.56	100%	
<b>Providence/Farquhar</b>	<b>Mixed</b>	<b>200 (2014-2017)</b>	<b>na</b>	<b>50.913266°</b>	<b>-9.508191°</b>	<b>51.198477°</b>	<b>-10.182934°</b>	<b>50.995233°</b>	<b>-9.770900°</b>	<b>31.3</b>		<b>1, 2</b>
<b>Providence</b>	<b>no</b>									<b>12.78</b>	Occasional Rapid Surveys	

Farquhar (1 index site)	1 index site									18.52		
1 Farquhar Atoll	yes							51.113601°	-10.177604°	18.52	100%	
Cosmoledo/Astove	no	50 (2014-2015)	na	47.448460°	-9.740231°	47.798683°	-10.105560°	47.620856°	-9.927960°	23.2	Occasional Rapid Surveys	1, 2
Aldabra/Assomption	Mixed	50 (2008-2015)	na	46.125729°	-9.454214°	46.592256°	-9.381940°	46.402140°	-9.647278°	13.0		1, 2
Assomption	no									7.8	Occasional Rapid Surveys	
Aldabra/Assomption (1 index site)	1 index site									5.20		
1 Aldabra Atoll	yes							46.336512°	-9.422785°	5.20	100%	

**Table 3.** International conventions protecting sea turtles and signed by Seychelles.

International Conventions	Signed	Binding	Compliance measured and reported	Species	Conservation Actions	Relevance to sea turtles
Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES)	Y	Y	Y	ALL	Sea turtles are protected in Seychelles under the Wild Animals and Birds protection Act; wild animals (Turtles) protection regulation, enacted in 1994 and has since banned the trade of sea turtles and or turtle products	This has allowed better protection of sea turtles. Illegal trade no longer an issue but rather poaching of the species at National level.
					Collaborations and partnerships between agents responsible for control transactions across our borders; this includes customs, Import/Export permit Section ( Ministry of Finance) and environmental authorities which includes the CITES management and scientific authorities within the Department of Environment.	Increased monitoring, enforcement and surveillance has deterred many illegal actions/trade.
					Currently, there is no legal "traditional harvest" as all turtle harvest is illegal	
					Seychelles currently has a draft CITES Legislation ( To be finalized in 2020)	Provision made for all CITES species found in Seychelles/ increased protection provided to sea turtles in the eventuality of illegal trade.
					Seychelles was represented at CITES CoP18- Supported proposals/statements etc for increased protection of marine species	



Convention on the Conservation of Migratory Species of Wild Animals	Y	N	Y	ALL	New IOSEA focal point nominated in 2018- IOSEA National report 2019 submitted	Progress report and way forward/current issues and challenges identified as well as needs of the country in terms of sea turtle protection/conservation
					Wild Animals and Birds Protection Act will be reviewed this year through extensive stakeholder consultation - Stricter measures for protection of all sea turtles found within our waters	Current legislation contains many gaps, therefore the updated legislation is much needed in order to ensure that sea turtles and their habitats are provided maximum protection. For eg. Stricter penalties, effective enforcement etc
					Seychelles has developed a Marine Spatial Plan for its entire EEZ- The country has increased marine protection from 0.04 to 30% in March 2020	Further protection provided to sea turtles and their habitats- Both within inner and outer island groups. Magement Plans for sustainable Use zones also in progress
						Seychelles seeks to eliminate/mitigate factors impeding the migration of sea turtles
Convention on Biological Diversity	Y	N	Y	ALL	Marine Ecosystem Diagnostic Analysis ( MEDA) being updated and includes a chapter on sea turtles	Builds up on 2012 MEDA. Chapter on sea turtles highlights conservation suceses as well as current challenges and gaps. Although a lot of work has been done to stop poaching, the country needs to invest in additional resources to be able to monitor its beaches, especially due to lack of human resources and technological capacities
					6th National report to the CBD being finalized	Marine species conservation update - population trends, education, monitoring and enforcement highlighted for sea turtle
					Access and Benefit Sharing Policy 2018 completed - Adresses issues on research on genetic resources - Processes involved etc	MEECC is currently the Competent National Authority on access to genetic resources. The Ministry issues a permit for access to genetic resources and mutually agreed terms between providers of genetic resources and associated traditional knowledge and users .This includes any research conducted on sea turtles, sea turtle eggs etc.
					The establishment of protected areas, rehabilitation and restoration of degraded ecosystems have been and are being undertaken to ensure the long term conservation of these species.	
UN Convention on the Law of the Sea (UNCLOS)	Y	Y	Y	All	Seychelles has participated in the negotiations of the third IGC-BBNJ session. Also together with Mauritius Seychelles is fighting for recognition of adjacent states as key players in the ABNJ particularly as	

					it relates to our extended continental shelf and the Joint Management Area.	
Convention on Wetlands of International Importance	Y	N	Y	ALL	IOSEA Marine Turtles MoU of CMS have adopted resolutions the application of which can help improve the conservation of marine turtles;	Sea turtles nesting recorded at Aldabra and Port Launay.
					There are currently 3 RAMSAR sites in Seychelles. Data analysis of 20 years of turtle monitoring on Aldabra is helping Seychelles Islands Foundation (SIF) understand the movement patterns of sea turtles and understand threats they may face at different stages of their life.	
					In-water tagging and monitoring of both the hawksbill and green turtles on Aldabra were initiated in 1986 by Jeanne Mortimer after which the project was handed over to SIF.	
					The Port Launay Wetland on Mahe is one of the best mangrove wetlands on the island of Mahé, supporting all seven species of mangroves in Seychelles. The area was designated as a RAMSAR site in 2004.	

**Table 4. Projects and databases on sea turtles in Seychelles.**

#	RMU	Country	Region / Location	Project Name or descriptive title	Key words	Start date	End date	Leading organisation	Public/ Private	Collaboration with
T4.1	Ei-WIO; Cm-WIO	Seychelles	Cousin Island Nature Reserve	Track counts and flipper tagging	Nesting females; Flipper tagging; Track Counts; Cousin Island	1970	ongoing	Nature Seychelles	Private	
T4.2	Ei-WIO; Cm-WIO	Seychelles	Aride Island Nature Reserve	Track counts and flipper tagging	Nesting females; Flipper tagging; Track Counts; Aride Island	1975	ongoing	Island Conservation Society (ICS)	Private	
T4.3	Ei-WIO; Cm-WIO	Seychelles	Curieuse National Park	Track counts and flipper tagging	Nesting females; Flipper tagging; Track Counts; Curieuse Island	1980	ongoing	Seychelles National Parks Authority	Private	Global Vision International (GVI)
T4.4	Cm-WIO; Ei-WIO	Seychelles	Aldabra Atoll	Track counts and flipper tagging	Nesting females; Flipper tagging; Track Counts; Aldabra Atoll	1981	ongoing	Seychelles Islands Foundation (SIF)	Private	

T4.5	Ei-WIO; Cm-WIO	Seychelles	Ste Anne Marine Park	Track counts and flipper tagging	Nesting females; Flipper tagging; Track Counts; Ste Anne Island	1981	ongoing	Seychelles National Parks Authority	Private	UniSey
T4.6	Ei-WIO; Cm-WIO	Seychelles	Cousine Island	Track counts and flipper tagging	Nesting females; Flipper tagging; Track Counts; Cousine Island	1992	ongoing	Cousine Island Company	Private	
T4.7	Ei-WIO; Cm-WIO	Seychelles	Bird Island (Ile aux Vache)	Track counts and flipper tagging	Nesting females; Flipper tagging; Track Counts; Bird Island	1995	ongoing	Bird Island Lodge	Private	
T4.8	Ei-WIO; Cm-WIO	Seychelles	Mahé Island (Southern beaches)	Track counts and flipper tagging	Nesting females; Flipper tagging; Track Counts; Mahé Island	1995	ongoing	Ministry of Environment Energy and Climate Change (MEECC); Marine Conservation Society Seychelles (MCSS)	Private	Banyon Tree Resort
T4.9	Ei-WIO; Cm-WIO	Seychelles	Ile du Nord (North Island)	Track counts and flipper tagging	Nesting females; Flipper tagging; Track Counts; Ile du Nord (North Island)	1998	ongoing	North Island Resort	Private	Green Island Foundation (GIF)
T4.10	Ei-WIO; Cm-WIO	Seychelles	Praslin: A. Kerlan, A. Georgette	Track counts and flipper tagging	Nesting females; Flipper tagging; Track Counts; Praslin Island: Lemuria Resort	1998	ongoing	Lemuria Resort	Private	
T4.11	Ei-WIO; Cm-WIO	Seychelles	Plate island	Track counts and flipper tagging	Nesting females; Flipper tagging; Track Counts; Plate Island	1998	1999	Island Conservation Society (ICS)	Private	
T4.12	Ei-WIO; Cm-WIO	Seychelles	Fregate Island	Track counts and flipper tagging	Nesting females; Flipper tagging; Track Counts; Fregate Island	2003	ongoing	Fregate Island Private	Private	
T4.13	Ei-WIO; Cm-WIO	Seychelles	D'Arros Island/St Joseph Atoll	Track counts and flipper tagging	Nesting females; Flipper tagging; Track Counts; D'Arros Research Centre/Save Our Seas Foundation	2004	ongoing	D'Arros Research Centre/Save Our Seas Foundation	Private	
T4.14	Ei-WIO; Cm-WIO	Seychelles	Silhouette Island	Track counts and flipper tagging	Nesting females; Flipper tagging; Track Counts; Silhouette Island	2005	ongoing	Island Conservation Society (ICS)	Private	Silhouette Foundation; Global Vision International (GVI); Nature Protection Trust of Seychelles (NPTS)
T4.15	Ei-WIO; Cm-WIO	Seychelles	Alphonse Island / St Francois Atoll	Track counts and flipper tagging	Nesting females; Flipper tagging; Track Counts; Alphonse; Bijoutier, St Francois	2006	ongoing	Island Conservation Society (ICS)	Private	Alphonse Foundation

T4.16	Ei-WIO; Cm-WIO	Seychelles	Desroches Island	Track counts and flipper tagging	Nesting females; Flipper tagging; Track Counts; Desroches Island	2009	ongoing	Island Conservation Society (ICS)	Private	Desroches Foundation
T4.17	Ei-WIO; Cm-WIO	Seychelles	Denis Island	Track counts and flipper tagging	Nesting females; Flipper tagging; Track Counts; Denis Island	2010	ongoing	Green Island Foundation (GIF)	Private	Denis Private Island Seychelles
T4.18	Cm-WIO; Ei-WIO	Seychelles	Farquhar Atoll	Track counts and flipper tagging	Nesting females; Flipper tagging; Track Counts; Farquhar Atoll	2014	ongoing	Island Conservation Society (ICS)	Private	Farquhar Foundation
T4.19	Ei-WIO; Cm-WIO	Seychelles	Félicité Island	Track counts and flipper tagging	Nesting females; Flipper tagging; Track Counts; Farquhar Atoll	2017	ongoing	Seychelles National Parks Authority	Private	Zil Pasyon Six Senses Hotel
T4.20	Ei-WIO; Cm-WIO	Seychelles	Aldabra Atoll	In Water mark recapture; Growth rates	Foraging turtles; Flipper tagging; Aldabra	1986	ongoing	Seychelles Islands Foundation (SIF)	Private	
T4.21	Ei-WIO; Cm-WIO	Seychelles	Ile Coco, Gran Soeur, Félicité Island	In Water mark recapture; Growth rates	Foraging turtles; Flipper tagging; Aldabra	2002	ongoing	Seychelles National Parks Authority	Private	
T4.22	Ei-WIO; Cm-WIO	Seychelles	D'Arros Island/St Joseph Atoll	In Water mark recapture; Growth rates	Foraging turtles; Flipper tagging; Aldabra	2004	ongoing	D'Arros Research Centre/Save Our Seas Foundation	Private	
T4.23	Ei-WIO	Seychelles	Cousin Island/ Cousine Island	Satellite tracking post-nesting females	Post-nesting migrations; Satellite tracking; Cousin Island	1998	1999	Seychelles Ministry of Environment; Cousine Island Company	Private	
T4.24	Cm-WIO	Seychelles	St Joseph Atoll	Satellite tracking post-nesting females	Post-nesting migrations; Satellite tracking; St Joseph Island	2012	2012	D'Arros Research Centre/Save Our Seas Foundation	Private	Institut Français de Recherche pour l'Exploitation de la Mer, Ifremer, Délégation de La Réunion
T4.25	Ei-WIO	Seychelles	D'Arros Island	Satellite tracking post-nesting females	Post-nesting migrations; Satellite tracking; D'Arros Island	2014	2014	D'Arros Research Centre/Save Our Seas Foundation	Private	
T4.26	Ei-WIO; Cm-WIO	Seychelles	Alphonse Island; St François Atoll	Satellite tracking post-nesting females (3 Ei; 7 Cm)	Post-nesting migrations; Satellite tracking; Alphonse Group	2017	Present	Alphonse Foundation; Island Conservation Society	Private	Luth Association, France ; Private Donors

## References

1. Mortimer JA, Esteban N, Guzman A, Hays G. 2020. Estimates of marine turtle nesting populations in the south-west Indian Ocean indicate the importance of the Chagos Archipelago. *Oryx* doi:10.1017/S0030605319001108
2. Frazier, J. 1984. Marine turtles in the Seychelles and adjacent territories. In: *Biogeography and Ecology of the Seychelles Islands*. Edited by D. R. Stoddart. Dr. W. Junk Publishers: The Hague, Netherlands. pp. 417-468.
3. Mortimer JA. 1984. *Marine Turtles in the Republic of Seychelles: Status and Management*. Publication of IUCN Conservation Library: Gland, Switzerland. 80 pp.+ 4pl.
4. Parsons, J.J. 1962. *The Green Turtle and Man*. University of Florida Press. Gainesville, viii +126 pp.
5. Frazier, J. 1971. Observations on the sea turtles at Aldabra Atoll. *Phil. Trans. R. Soc. ser. B.* 260:373-410.
6. Gibson, T. S. H. 1979. Green turtle (*Chelonia mydas* (L.)) nesting activity at Aldabra Atoll. *Phil. Trans. R. Soc. Lond. B.* 286, 255-263.
7. Hirth, H. and Carr, A. 1970. The green turtle in the Gulf of Aden and the Seychelles Islands. *Verh. K. ned. Akad. Wet.* 58 :1-44.
8. Honegger, R. E. 1967. The green turtle (*Chelonia mydas japonica*) Thunberg in the Seychelles Islands. *Brit. J. Herpetol.* 4(1):8-11.
9. Mortimer JA, von Brandis RG, Liljevik A, Chapman R, Collie J. 2011. Fall and rise of nesting green turtles (*Chelonia mydas*) at Aldabra Atoll, Seychelles: Positive response to four decades of protection (1968-2008). *Chelonian Conservation & Biology* 10(2):165-176
10. Mortimer JA, von Brandis RG. 2013. Mortality of Adult Green Turtles (*Chelonia mydas*) at the Nesting Beaches of Aldabra Atoll, Seychelles. *Chelonian Conservation & Biology* 12(1):151-157.
11. Mortimer JA. 1985. Recovery of green turtles on Aldabra. *Oryx* 19(3):146-150.
12. Mortimer JA. 1988. Green turtle nesting at Aldabra Atoll--population estimates and trends. *Biol. Soc. Wash. Bull.* 8:116-128.
13. Seabrook, W. 1989. The seasonal pattern and distribution of green turtle (*Chelonia mydas*) nesting activity on Aldabra Atoll, Indian Ocean. *J. Zool. Lond.* 219:71-81.
14. Seabrook, W. 1991. How many green turtles nest on Aldabra? *Oryx* 25:96-98.
15. Hitchins, P.M., Bourquin, O., Hitchins, S., & Piper, S.E. 2004. Biometric data on hawksbill turtles (*Eretmochelys imbricata*) nesting at Cousine Island, Seychelles. *J. Zool., Lond.* 264 :371-381.
16. Esteban N, Mortimer JA, Hays GC. 2017. How numbers of nesting sea turtles can be overestimated by nearly a factor of two. *Proc. R. Soc. B* 284: 20162581. <http://dx.doi.org/10.1098/rspb.2016.2581>
17. Frazier, J. 1974. Sea turtles in Seychelles. *Biol. Conserv.* 6(1):71-73.
18. Frazier, J. 1975. Marine turtles in the western Indian Ocean. *Oryx.* 13(2):162-175.
19. Ministry of Foreign Affairs, Planning and Environment. 1994. Seychelles moves to stop turtle-shell trade. *Oryx* 28(4):229.
20. Mortimer JA. 1995. Teaching Critical Concepts for the Conservation of Sea Turtles. *Marine Turtle Newsletter.* 71:1-4.
21. Mortimer JA. 1999. World's first turtle shell stockpile to go up in flames as Miss World 1998 contestants look on. *Chelonian Conservation and Biology* 3(2): 376-377.
22. Mortimer JA. 2000. Conservation of hawksbill turtles (*Eretmochelys imbricata*) in the Republic of Seychelles. Pp. 176-185. In: Pilcher N. & Ismail, G. (Eds.). *Sea Turtles of the Indo-Pacific: Research Management and Conservation*. Proceedings of the 2nd ASEAN Symposium and Workshop on Sea Turtle Biology and Conservation. ASEAN Academic Press Ltd.: London. 361 pp.
23. Salm, R. V. 1976. Marine turtle management in Seychelles and Pakistan. *Environ. Conserv.*, 3(4):267-268.
24. Salm, R.V. & Humphrey, S. 1996. Brighter horizon for sea turtles in the western Indian Ocean. *Marine Turtle Newsletter* 73:13-17.
25. Allen, Z.C., Shah, N.J., Grant, A., Derand, G-D., Bell, D. 2010. Hawksbill turtle monitoring in Cousin Island Special Reserve, Seychelles: an eight-fold increase in annual nesting numbers. *Endangered Species Research* 11:195-200.

26. Brooke, M. de L. and Garnett, M.C. 1983. Survival and reproductive performance of hawksbill turtles, *Eretmochelys imbricata* L., on Cousin Island, Seychelles. *Biol. Conserv.* 25(1983):161-170.
27. Diamond, A. W. 1976. Breeding biology and conservation of hawksbill turtles, *Eretmochelys imbricata* L. on Cousin Island, Seychelles. *Biol. Conserv.* 9(1976):199-215.
28. Wood, V.E. 1986. Breeding success of hawksbill turtles (*Eretmochelys imbricata*) at Cousin Island, Seychelles and the implications for their conservation. *Biol. Conserv.* 37(4):321-332
29. Hitchins, P.M., Bourquin, O, & Hitchins, S. 2004. Nesting success of hawksbill turtles (*Eretmochelys imbricata*) on Cousine Island, Seychelles. *J. Zool., Lond.* 264 :383-389.
30. Burt AJ, Dunn N, Mason-Parker C, Antha S, Mortimer JA. 2015. Curieuse National Park, Seychelles: Critical Management Needs for Protection of an Important Nesting Habitat. *Marine Turtle Newsletter* 147:6-11.
31. Mortimer JA, Camille J-C, Boniface N. 2011. Seasonality and status of nesting hawksbill (*Eretmochelys imbricata*) and green turtles (*Chelonia mydas*) at D'Arros Island, Amirantes Group, Seychelles. *Chelonian Conservation & Biology* 10(1): 26-33.
32. Miller JD, Mortimer JA, Limpus CJ. 2017. A Field Key to the Development Stages of Marine Turtles (Cheloniidae) with notes on the development of Dermochelys. *Chelonian Biology and Conservation* 16(2): 111-122.
33. Frazier, J. 1980. Exploitation of marine turtles in the Indian Ocean. *Human Ecology* 8(4):329-270.
34. Houghton JDR, Cedras A, Myers AE, Liebsch N, Metcalfe JD, Mortimer JA, Hays GC. 2008. Measuring the state of consciousness in a free-living diving sea turtle. *J. Exp. Mar. Biol. Ecol.* 356:115-120.
35. Stokes HJ, Mortimer JA, Hays GC, Unsworth RKF, Laloe J-O, Esteban N. 2019. Green turtle diet is dominated by seagrass in the Western Indian Ocean except amongst gravid females. *Marine Biology* 166:135.
36. von Brandis RG, Mortimer JA, Reilly BK, van Soest RWM, Branch GM. 2014. Diet Composition of Hawksbill Turtles (*Eretmochelys imbricata*) in the Republic of Seychelles. *Western Indian Ocean J. Mar. Sci.* 13(1):81-91.
37. von Brandis RG, Mortimer JA, Reilly BK. 2010. In-Water Observations of the Diving Behaviour of Immature Hawksbill Turtles, *Eretmochelys imbricata*, on a Coral Reef at D'Arros Island, Republic of Seychelles. *Chelonian Conservation & Biology* 9(1):26-32.
38. Christiansen F, Esteban N, Mortimer JA, Dujon AM, Hays GC. 2017. Diel and seasonal patterns in activity and home range size of green turtles on their foraging grounds revealed by extended Fastloc-GPS tracking. *Marine Biology* 164:10. DOI 10.1007/s00227-016-3048-
39. Houghton, J.D.R., Callow, M.J., & Hays, G.C. 2003. Habitat utilization by juvenile hawksbill turtles (*Eretmochelys imbricata*, Linnaeus, 1766) around a shallow water coral reef. *Journal of Natural History* 37:1269-1280.
40. Houghton, J.D.R., Cedras, A., Myers, A.E., Liebsch, N., Metcalfe, J.D., Mortimer, J.A., & Hays, G.C. 2008. Measuring the state of consciousness in a free-living diving sea turtle. *J. Exp. Mar. Biol. Ecol.* 356:115-120.
41. Bourjea J, La Pègue S, Gagnevin L, Broderick D, Mortimer JA, Ciccione S, Roos D, Taquet C, Grizel H. 2007. Phylogeography of the green turtle, *Chelonia mydas*, in the Southwest Indian Ocean. *Molecular Ecology* 2007(16):175-186.
42. Bourjea J, Mortimer JA, Garnier J, Okemwa G, Godley BJ, Hughes G, Dalleau M, Jean C, Ciccione S, Muths D. 2015. Population structure enhances perspectives on regional management of the western Indian Ocean green turtle. *Conserv Genet* 16(5):1069-1083. (and supplementary data).
43. Jensen MP, Dalleau M, Gaspar P, Lalire M, Jean C, Ciccione S, Mortimer JA, Quillard M, Taquet C, Wamukota A, Leroux G, Bourjea J. 2020. Seascape genetics and the spatial ecology of juvenile green turtles. *Genes* 11: 278.
44. Phillips KP, Mortimer JA, Jolliffe KG, Jorgensen TH, Richardson DS. 2014. Molecular techniques reveal cryptic life history and demographic processes of a critically endangered marine turtle. *Journal of Experimental Marine Biology & Ecology* 455:29-37.
45. Phillips KP, Mortimer JA, Jolliffe KG, Jolliffe S-M, Hodgkiss RD, McClelland JHR, Liljevik A. 2017. Season-long sperm storage and no multiple paternity in green turtles (*Chelonia mydas*) nesting on Cousine Island, Seychelles. *Marine Turtle Newsletter* 154:6-11.
46. Vargas SM, Jensen MP, Ho SYW, Mobaraki A, Broderick D, Mortimer JA, Whiting SD, Miller J, Prince RIT, Bell IP, Hoenner X, Limpus CJ, Santos FR, FitzSimmons NN. Phylogeography, Genetic Diversity, and

- Management Units of hawksbill turtles in the Indo-Pacific. *Journal of Heredity* 107(3):199-213. (and supplementary data).
47. Hays GC, Mortimer JA, Ierodiaconou D, Esteban N. 2014. The World's largest marine protected area, conservation planning and long distance migration of endangered species. *Conservation Biology* 28(6):1636-1644.
  48. Mortimer JA, Gerlach J, Summerton P. 2011. Long distance migrations of hawksbills tagged as juveniles at Aldabra Atoll: Confirmation from Digital Photography. *Marine Turtle Newsletter* 129: 11-13.
  49. Mortimer JA, von Brandis R, Balazs GH, Daly R, Sousa LL, Hitchins P. 2017. Satellite Tracking the Migrations of Post-Nesting Hawksbill Turtles (*Eretmochelys imbricata*) in Seychelles. Poster presented at the Thirty-Seventh Annual Symposium on Sea Turtle Biology and Conservation, Las Vegas, April 2017.
  50. von Brandis RG, Mortimer JA, van de Geer C, Lea JS. 2017. A long migratory record for a small post-pelagic hawksbill. *Marine Turtle Newsletter* 152: 13-15.
  51. Mortimer JA. 1990. Influence of sand characteristics on the nesting behavior and hatching success of the green turtle (*Chelonia mydas*). *Copeia* 1990(3):798-813.
  52. Dalleau M, Ciccione S, Mortimer JA, Garnier J, Benhamou S, Bourjea J. 2012. Nesting phenology of marine turtles: insights from a regional comparative analysis on green turtle (*Chelonia mydas*). *PLoS one* 7(10):e46920.
  53. Mortimer J.A. 2012. Seasonality of Green Turtle (*Chelonia mydas*) Reproduction at Aldabra Atoll, Seychelles (1980-2011) I the Regional Context of the Western Indian Ocean. *Chelonian Conservation and Biology* 11(2):170-181.
  54. Mortimer JA, Bresson R. 1999. Temporal distribution and periodicity in hawksbill turtles (*Eretmochelys imbricata*) nesting at Cousin Island, Republic of Seychelles, 1971-1997. *Chelonian Conservation & Biology* 3(2): 292-298.
  55. Remie S, Mortimer JA. 2007. First records of olive ridley turtles (*Lepidochelys olivacea*) in Seychelles. *Marine Turtle Newsletter* 117:9.
  56. Frith, C.B. 1975. Predation upon hatchlings and eggs of the green turtle, *Chelonia mydas*, on Aldabra Atoll, Indian Ocean. *Atoll Res. Bull.* No. 185:11-12.
  57. Seabrook, W. 1989. Feral cats (*Felis catus*) as predators of hatchling green turtles (*Chelonia mydas*). *J. Zool. Lond.* 219:83-89.
  58. Wallace BP, DiMatteo AD, Bolten AB, Chaloupka MY, Hutchinson BJ, Abreu-Grobois FA, Mortimer JA, Seminoff JA, Amorocho D, Bjorndal KA, Bourjea J, Bowen BW, Briseno Duenas R, Casale P, Choudbury BC, Costa A, Dutton PH, Fallabrino A, Finkbeiner EM, Girard A, Girondot M, Hamann M, Hurley BJ, Lopez-Mendilaharsu M, Marcovaldi MA, Musick JA, Nel R, Pilcher NJ, Troeng S, Witherington B, Mast RB. 2011. Global Conservation Priorities for Marine Turtles. *PLoS ONE* 6(9): e24510. doi:10.1371/journal.pone.0024510
  59. Wallace BP, DiMatteo AD, Hurley BJ, Finkbeiner EM, Bolten AB, Chaloupka MY, Hutchinson BJ, Abreu-Grobois FA, Amorocho D, Bjorndal KA, Bourjea J, Bowen BW, Briseno-Duenas R, Casale P, Choudbury BC, Costa A, Dutton PH, Fallabrino A, Girard A, Girondot M, Godfrey MH, Hamann M, Lopez-Mendilaharsu M, Marcovaldi MA, Mortimer JA, Musick JA, Nel R, Pilcher NJ, Seminoff JA, Troeng S, Witherington B, Mast RB. 2010. Regional Management Units for Marine Turtles: A Novel Framework for Prioritizing Conservation and Research across Multiple Scales. *PLoS ONE* 5(12): e15465. doi:10.1371/journal.pone.0015465
  60. Mortimer JA, Balazs GH. 2000. Post-nesting migrations of hawksbill turtles in the granitic Seychelles and implications for conservation. In: Kalb H. (compilers). *Proceedings of the 19th Annual Sea Turtle Symposium*. South Padre Island, Texas.
  61. Mortimer JA, Collie J, Jupiter T, Chapman R, Liljevik A, Betsy B. 2003. Growth rates of immature hawksbills (*Eretmochelys imbricata*) at Aldabra Atoll, Seychelles (Western Indian Ocean). Pp. 247-248. *Proceedings of the 22nd Annual Symposium on Sea Turtle Biology and Conservation, held 4 - 7 April 2002, Miami, Florida USA*.

# SOUTH AFRICA

Ronel Nel<sup>1</sup>

<sup>1</sup> Nelson Mandela University, South Africa

**Table 1.** Biological and conservation information about sea turtle Regional Management Units in South Africa.

RMU	CC-NW IND	Ref #	CC-SW IND	Ref #	DC-SW IND	Ref #	Cm-SWIO	Ref #	Ei-SWIO	Ref #	Lo-SWIO	Ref #
<b>Occurrence</b>												
Nesting sites	Y	1,7	Y		Y		N		N		N	
Pelagic foraging grounds	JA	4,5,10	JA		J(?),A		?		?		?	
Benthic foraging grounds	Y	3	Y		Y	Pers Obs	Y		Y	Pers Obs	?	
<b>Key biological data</b>												
Nests/yr: recent average (range of years)	153 (2010-2014)	PS	2286 (2013-2017)	16	71 (2013-2017)	16	NA		NA		NA	
Nests/yr: recent order of magnitude	100-200	42	As above		As above							
Number of "major" sites (>20 nests/yr AND >10 nests/km yr)	3	PS	1		1							
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	n/a		NA		NA							
Nests/yr at "major" sites: recent average (range of years)	153 (2010-2014)		As above		As above							
Nests/yr at "minor" sites: recent average (range of years)	n/a		As above		As above							
Total length of nesting sites (km)	2.6		180		180		n/a		n/a		n/a	
Nesting females / yr	31		658 (whole monitoring area0	13	54 (whole monitoring area0	13						
Nests / female season (N)	5 (23)		3.7	1	6.7	1						
Female remigration interval (yrs) (N)	2.3 (15)		3	1	2.9	1						



Sex ratio: Hatchlings (F / Tot) (N)	0.64 (465)		?		?						
Sex ratio: Immatures (F / Tot) (N)	0.52 (337)		?		?						
Sex ratio: Adults (F / Tot) (N)	0.4 (51)		?		?						
Min adult size, CCL or SCL (cm)	72 CCL		72 SCL	10.00	140 CCL	17.00					
Age at maturity (yrs)	25-30		36	10	?						
Clutch size (n eggs) (N)	98.2 (287)		104	1	105	1					
Emergence success (hatchlings/egg) (N)	0.82 (1569)		78%	1	69%	1					
Nesting success (Nests/ Tot emergence tracks) (N)	0.4 (228)		55%	1	91%	1					
<b>Trends</b>											
Recent trends (last 20 yrs) at nesting sites (range of years)	Up (2000-2010)		UP (2000 - 2014); stable (2014 - 2017)	1, 9, 12, 13	Stable (2000 - 2017)	1, 9, 12, 13	NA		NA		NA
Recent trends (last 20 yrs) at foraging grounds (range of years)	n/a		NA		NA		?		?		?
Oldest documented abundance: nests/yr (range of years)	500 (1961)		1963 (fixed effort, 1965) 301 in index area		1963 (fixed effort, 1965) 33 in index area		NA		NA		NA
<b>Published studies</b>											
Growth rates	Y	60	Y	10							
Genetics	N		Y	5, 14			Y	14	Y	14	
Stocks defined by genetic markers	N		Y	5, 14			Y	14	Y	14	
Remote tracking (satellite or other)	Y	58,59	Y	3, 4, 7	Y	3, 4, 7	Y	15	Y	15	
Survival rates	N		N		N		N		N		
Population dynamics	N										
Foraging ecology (diet or isotopes)	Y	56,57	Y	4, 15	Y	4	Y	15	Y	15	
Capture-Mark-Recapture	Y	61	Y	9	Y	9					

<b>Threats</b>												
Bycatch: presence of small scale / artisanal fisheries?	Y (PLL, SN,)	62	N		N		N		N		N	
Bycatch: presence of industrial fisheries?	Y (PLL, SN, BT)	62	N		N		N		N		N	
Bycatch: quantified?	Y	62	Y (bather protection)	6, 12, 13	Y (bather protection)	6, 12, 13	Y (bather protection)	6, 12, 13	Y (bather protection)	6, 12, 13	Y (bather protection)	6, 12, 13
Take. Intentional killing or exploitation of turtles	Y		N		N		N		N		N	
Take. Egg poaching	N		N - incidental		N - incidental		NA		NA		NA	
Coastal Development. Nesting habitat degradation	Y		N		N		N		N		N	
Coastal Development. Photopollution	Y		N		N		N		N		N	
Coastal Development. Boat strikes	Y		N - incidental		N - incidental		N - incidental		N - incidental		NA	
Egg predation	Y		Y		Y		NA		NA		NA	
Pollution (debris, chemical)	n/a		Y	8	?		?		?		?	
Pathogens	n/a		N		N		N		N		N	
Climate change	n/a		N		N		N		N		N	
Foraging habitat degradation	n/a		?		?		?		?		?	
Other	Y (see text)		N		N		N		N		N	
<b>Long-term projects (&gt;5yrs)</b>												
Monitoring at nesting sites (period: range of years)	Y (1985-ongoing)		Y (1963 - ongoing)		Y (1963 - ongoing)		NA		NA		NA	
Number of index nesting sites	2		1		1		NA		NA		NA	
Monitoring at foraging sites (period: range of years)	N		N		N		NA		NA		NA	
<b>Conservation</b>												
Protection under national law	Y		Y		Y		Y		Y		Y	
Number of protected nesting sites (habitat preservation) (% nests)	1 (12%)		100%		100%		NA		NA		NA	

Number of Marine Areas with mitigation of threats	0		Don't understand the question		Don't understand the question		NA		NA		NA	
N of long-term conservation projects (period: range of years)	>1 (1975-2011)		Question vague: 1963 is when active protection started of nesting habitat and nearshore reef		Question vague: 1963 is when active protection started of nesting habitat and nearshore reef		NA		NA		NA	
In-situ nest protection (eg cages)	Y		NA		NA		NA		NA		NA	
Hatcheries	N		No		No		NA		NA		NA	
Head-starting	N		No		No		NA		NA		NA	
By-catch: fishing gear modifications (eg, TED, circle hooks)	N		TEDs		TEDs		TEDs		TEDs		TEDs	
By-catch: onboard best practices	Y		limited		limited		limited		limited		limited	
By-catch: spatio-temporal closures/reduction	N		No - MPAs		No - MPAs		No - MPAs		No - MPAs		No - MPAs	
Other	Y (see text)											

**Table 2.** Sea turtle nesting beaches in South Africa.

RMU / Nesting beach name	Index site	Nests/yr: recent average (range of years)	Crawls/yr: recent average (range of years)	Northern limit		Southern limit		Central point		Length (km)	% Monitored	Reference #	Monitoring Level (1-2)	Monitoring Protocol (A-F)
				Long	Lat	Long	Lat	Long	Lat					
<b>CC-SW IND</b>														
iSimangaliso - Index	Y	2135.5 (2007 - 2016)	3475.7 (2007 - 2016)	32.881135	-26.895113	32.86627	-27.012282	n/a	n/a	8	8km/180km but is the high density area thus capture 65% of the nests	Ezemvelo Unpublished data	1	B
iSimangaliso - monitoring	N	3235.7 (2007-2016)		32.881135	-26.895113	32.74719	-27.341975			56	58km/180km	Ezemvelo Unpublished data	1	B
<b>DC-SW IND</b>														
iSimangaliso - Index	Y	68.1 (2007-2016)	72.1 (2007-2016)	32.881135	-26.895113	32.86627	-27.012282	n/a	n/a	8	8km/180km but is the high density area thus capture 65% of the nests	Ezemvelo Unpublished data	1	B
iSimangaliso - monitoring	N	288.3 (2007-2016)		32.881135	-26.895113	32.74719	-27.341975			56	58km/180km	Ezemvelo Unpublished data	1	B
<b>CM-SW IND</b>														

iSimangalis o	N	1	1	32.881135	-26.895113	32.74719	-27.341975			56	58km/180k m	Ezemvelo Unpublish ed data	1	B
<b>EI-SW IND</b>														
n/a														
<b>LO-W IND</b>														
n/a														

**Table 3.** International conventions protecting sea turtles and signed by South Africa.

<b>International Conventions</b>	<b>Signed</b>	<b>Species</b>	<b>Relevance to sea turtles</b>
· Convention on International Trade in Endangered Species of Wild Fauna and Flora (1975) (CITES);	Y	ALL	Protect Trade
· The Convention on the Conservation of Migratory Species of Wild Animals (1979);	Y	ALL	
o Indian Ocean South East Asia sea turtle MoU	Y	ALL	
o Africa Atlantic MoU	Y	ALL	
· World Heritage Convention;	Y	ALL	Habitat Protection
· Convention on Biological Diversity (CBD) (1992);	Y	ALL	Habitat Protection
· The Convention on the Prevention of Marine Pollution by dumping of Wastes and Other Matter (The London Convention);	Y	ALL	Habitat Protection
· The World Heritage Convention Concerning the Protection of the World Cultural and Natural Heritage (1972);	Y	ALL	
· The Convention on the Conservation and Management of Fishery Resources in the South-East Atlantic Ocean (1982);	Y	ALL	
· The Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat (1972)	Y	ALL	Habitat Protection
· The United Nations Law of the Sea Convention (1982) (UNCLOS);	Y	ALL	
· The Code of Conduct for Responsible Fisheries (1995);	Y	ALL	

· The Convention on the Prevention of Marine Pollution by dumping of Wastes and Other Matter (1972) (The London Convention) and the 1996 Protocol;	Y	ALL	
· Secretariat of the Climate Change Convention and the Kyoto Protocol (Bonn);	Y	ALL	Habitat Protection
Regional Multilateral Environmental Agreements - Nairobi Convention	Y	ALL	Habitat Protection
Regional Multilateral Environmental Agreements - Abidjan Convention	Y	ALL	Habitat Protection

**Table 4. Projects and databases on sea turtles in South Africa.**

#	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	CC-SWIO	South Africa	iSimangaliso	Conservation Monitoring of Sea Turtles	Flipper tagging & Nest Protection	1963	Ongoing (2016/17)	Ezemvelo KZN Wildlife	RROV. GOVT			n/a	Santosh Bachoo <Santosh.Bachoo@kznwildlife.com>
T4.2	DC-SWIO	South Africa	iSimangaliso	Conservation Monitoring of Sea Turtles	Flipper tagging & Nest Protection	1963	Ongoing (2016/17)	Ezemvelo KZN Wildlife	RROV. GOVT			n/a	Santosh Bachoo <Santosh.Bachoo@kznwildlife.com>
T4.3	CC-SWIO	South Africa	iSimangaliso	Satellite tagging - Cc	SPOT 5; Nesting Females	2010	2011	Dept of Environmental Affairs	Nat. Govt	NMU & Ezemvelo	Ref#2	n/a	<a href="mailto:Ronel.Nel@Mandela.ac.za">Ronel.Nel@Mandela.ac.za</a>
T4.4	DC-SWIO	South Africa	iSimangaliso	Satellite tagging - Dc	SPOT 5 & Kiwisat; Nesting Females	2006	2016	Dept of Environmental Affairs	Nat. Govt	NMU & Ezemvelo	Ref#2	n/a	<a href="mailto:Ronel.Nel@Mandela.ac.za">Ronel.Nel@Mandela.ac.za</a>
T4.5	ALL-SWIO	South Africa	KwaZulu-Natal	KZN Bather Protection Net Monitoring	Gill net and longline; bather protection	1983	Ongoing (2016/17)	KZN Sharks Board	Private	NMU & Ezemvelo	Ref#6	n/a	Jeremy Cliff <cliff@shark.co.za>

					n; all species									
--	--	--	--	--	-------------------	--	--	--	--	--	--	--	--	--

## References

1. Nel R., Punt A.E. & Hughes G.R. (2013). Are Coastal Protected Areas Always Effective in Achieving Population Recovery for Nesting Sea Turtles? PLoS ONE, 8, e63525.
2. Harris L.R., Nel R., Oosthuizen H., Meÿer M., Kotze D., Anders D., McCue S. & Bachoo S. (2015). Paper-efficient multi-species conservation and management are not always field-effective: The status and future of Western Indian Ocean leatherbacks. *Biological Conservation*, 191, 383-390.
3. Robinson N.J., Morreale S.J., Nel R. & Paladino F.V. (2017). Movements and diving behaviour of inter-nesting leatherback turtles in an oceanographically dynamic habitat in South Africa. *Marine Ecology Progress Series*, 571, 221-232.
4. Robinson N.J., Morreale S.J., Nel R. & Paladino F.V. (2016). Coastal leatherback turtles reveal conservation hotspot. *Scientific Reports*, 6, 37851.
5. Shamblin B.M., Bolten A.B., Alberto Abreu-Grobois F., Bjørndal K.A., Cardona L., Carreras C., Clusa M., Monzon-Argueello C., Nairn C.J., Nielsen J.T., Nel R., Soares L.S., Stewart K.R., Vilaca S.T., Turkozian O., Yilmaz C. & Dutton P.H. (2014). Geographic Patterns of Genetic Variation in a Broadly Distributed Marine Vertebrate: New Insights into Loggerhead Turtle Stock Structure from Expanded Mitochondrial DNA Sequences. *PLoS ONE*, 9.
6. Brazier W., Nel R., Cliff G. & Dudley S. (2012). Impact of protective shark nets on sea turtles in KwaZulu-Natal, South Africa, 1981–2008. *African Journal of Marine Science*, 34, 249-257.
7. Harris L.R., Nel R., Oosthuizen H., Meÿer M., Kotze D., Anders D., McCue S. & Bachoo S. (in Press). Harris L.R., Nel R., Oosthuizen H., Meyer M., Kotze D., Anders D., McCue S. & Bachoo S. Managing conflicts between economic activities and threatened migratory marine species toward creating a multiobjective blue economy. *Conservation Biology*, n/a-n/a.
8. Ryan P.G., Cole G., Spiby K., Nel R., Osborne A. & Perold V. (2016). Impacts of plastic ingestion on post-hatchling loggerhead turtles off South Africa. *Marine Pollution Bulletin*, 107, 155-160.
9. Thorson J.T., Punt A.E. & Nel R. (2012). Evaluating population recovery for sea turtles under nesting beach protection while accounting for nesting behaviours and changes in availability. *Journal of Applied Ecology*, 49, 601-610.
10. Tucek J., Nel R., Girondot M. & Hughes G. (2014). Age-size relationship at reproduction of South African female loggerhead turtles *Caretta caretta*. *Endangered Species Research*, 23, 167-175.
11. Dutton P.H., Roden S.E., Stewart K.R., LaCasella E., Tiwari M., Formia A., Thomé J.C., Livingstone S.R., Eckert S., Chacon-Chaverri D., Rivalan P. & Allman P. (2013). Population stock structure of leatherback turtles (*Dermochelys coriacea*) in the Atlantic revealed using mtDNA and microsatellite markers. *Conservation Genetics*, 14, 625-636.
12. Nel, 50 year report - Unpublished
13. Nel, 2013-15 report - Unpublished season report
14. Hickman, S. 2017 Unpublished BSc Hons project , Nelson Mandela University
15. Rambaran Unpublished Data (MSc is being written up)
16. Ezemvelo Unpublished Data
17. Nathan J. Robinson, Kelly R. Stewart, Peter H. Dutton, Ronel Nel, Frank V. Paladino, and Pilar Santidrian Tomillo (2017). Standardising curved carapace length measurements for leatherback turtles, *Dermochelys coriacea*, to investigate global patterns in body size. *Herpetological Journal*. 26. The British Herpetological Society.



# TANZANIA

Lindsey West<sup>1</sup>

<sup>1</sup> Sea Sense, Tanzania

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

RMU	CM-SW IND	Ref #	EI-SW IND	Ref #	DC-SW IND	Ref #	CC-SW IND	Ref #	LO-SW IND	Ref #
<b>Occurrence</b>										
Nesting sites	Y	1,2,5,6,7,8,9,16,17,18	Y	8,9,16,17	N	8,9	N	8,9	N	8,9
Pelagic foraging grounds	n/a		n/a		n/a		n/a		n/a	
Benthic foraging grounds	Y	2,3,4,6,9,10,22	Y	3,9,10	n/a		Y	14	n/a	
<b>Key biological data</b>										
Nests/yr: recent average (range of years)	336 (2002-2019)	1	8 (2002-2016)	PS, 16,17	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)	6	1,7,9,18, PS	0	9	n/a		n/a		n/a	
Number of "minor" sites (<20 nests/yr OR <10 nests/km yr)	11	8,9,16,17	2	9,16,17,	n/a		n/a		n/a	
Nests/yr at "major" sites: recent average (range of years)	51 (2002-2019)	1,7, PS	0		n/a		n/a		n/a	
Nests/yr at "minor" sites: recent average (range of years)	n/a		8 (2002-2016)	PS, 16,17	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	300	9	50	9	n/a		n/a		n/a	
Nests / female season (N)	n/a		n/a		n/a		n/a		n/a	
Female remigration interval (yrs) (N)	n/a		n/a		n/a		n/a		n/a	
Sex ratio: Hatchlings (F / Tot) (N)	n/a		n/a		n/a		n/a		n/a	
Sex ratio: Immatures (F / Tot) (N)	n/a		n/a		n/a		n/a		n/a	
Sex ratio: Adults (F / Tot) (N)	n/a		n/a		n/a		n/a		n/a	
Min adult size, CCL or SCL (cm)	n/a		n/a		n/a		n/a		n/a	
Age at maturity (yrs)	n/a		n/a		n/a		n/a		n/a	
Clutch size (n eggs) (N)	n/a		n/a		n/a		n/a		n/a	
Emergence success (hatchlings/egg) (N)	n/a		n/a		n/a		n/a		n/a	
Nesting success (Nests/ Tot emergence tracks) (N)	n/a		n/a		n/a		n/a		n/a	
<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)	(300) 1982	24	50 (1982)	24	n/a		n/a		n/a	
<b>Published studies</b>										
Growth rates	N		N		n/a		n/a		n/a	
Genetics	Y	22,25	N		n/a		n/a		n/a	
Stocks defined by genetic markers	N		N		n/a		n/a		n/a	
Remote tracking (satellite or other)	Y	4	N		n/a		n/a		n/a	
Survival rates	N		N		n/a		n/a		n/a	

Population dynamics	N		N		n/a		n/a		n/a	
Foraging ecology (diet or isotopes)	N		N		n/a		n/a		n/a	
Capture-Mark-Recapture	Y	1,7	N		n/a		n/a		n/a	
<b>Threats</b>										
Bycatch: presence of small scale / artisanal fisheries?	Y (SN, DN, FP, PLL, DLL, OTH - purse seine & beach seine)	11,12,21	Y (SN, DN, FP, PLL, DLL, OTH - purse seine & beach seine)	11,12,13,21	Y (SN, DN, FP, PLL, DLL, OTH - purse seine & beach seine)	6	Y (SN, DN, FP, PLL, DLL, OTH - purse seine & beach seine)	12	Y (SN, DN, FP, PLL, DLL, OTH - purse seine & beach seine)	12
Bycatch: presence of industrial fisheries?	Y (PLL,ST)	9,10	Y (PLL,ST)	9,10	Y (PLL, ST)		Y (PLL, ST)		Y (PLL, ST)	
Bycatch: quantified?	Partially	3,11,19,20	Partially	3,11,19,20	n/a		Partially	14	n/a	
Take. Intentional killing or exploitation of turtles	Y	8,9	Y	8,9	n/a		n/a		n/a	
Take. Egg poaching	Y	8,9	Y	8,9	n/a		n/a		n/a	
Coastal Development. Nesting habitat degradation	Y	9,11	Y	9,11	n/a		n/a		n/a	
Coastal Development. Photopollution	n/a		n/a		n/a		n/a		n/a	
Coastal Development. Boat strikes	n/a		n/a		n/a		n/a		n/a	
Egg predation	Y	8,9	Y	8,9	n/a		n/a		n/a	
Pollution (debris, chemical)	Y	9	Y	9	n/a		n/a		n/a	
Pathogens	n/a		n/a		n/a		n/a		n/a	
Climate change	n/a		n/a		n/a		n/a		n/a	
Foraging habitat degradation	Y	9	Y	9	n/a		n/a		n/a	
Other	N		N		n/a		n/a		n/a	
<b>Long-term projects (&gt;5yrs)</b>										
Monitoring at nesting sites (period: range of years)	Y (2001-ongoing)	PS	Y (2001-ongoing)	PS	n/a		n/a		n/a	

Number of index nesting sites	1	7	1	16,17	n/a		n/a		n/a	
Monitoring at foraging sites (period: range of years)	N		N		n/a		n/a		n/a	
<b>Conservation</b>										
Protection under national law	Y	9	Y	9	Y		Y		Y	
Number of protected nesting sites (habitat preservation) (% nests)	5 (70%)		2 (100%)		n/a		n/a		n/a	
Number of Marine Areas with mitigation of threats	5		2		n/a		n/a		n/a	
N of long-term conservation projects (period: range of years)	1 (2001-ongoing)		2 (2001-ongoing & 1998-ongoing)	PS, 16,17	1 (2001-ongoing)		1 (2001-ongoing)		1 (2001-ongoing)	
In-situ nest protection (eg cages)	Y		Y		n/a		n/a		n/a	
Hatcheries	Y	1	N		n/a		n/a		n/a	
Head-starting	N		N		n/a		n/a		n/a	
By-catch: fishing gear modifications (eg, TED, circle hooks)	N		N		n/a		n/a		n/a	
By-catch: onboard best practices	n/a		n/a		n/a		n/a		n/a	
By-catch: spatio-temporal closures/reduction	n/a		n/a		n/a		n/a		n/a	
Other	n/a		n/a		n/a		n/a		n/a	

## References

1. West, L. 2017. Green Turtle (*Chelonia mydas*) nesting behaviour in Kigamboni District, United Republic of Tanzania. *Testudo*, Vol 8 No.4.
2. West, L., Pastory, T., & Mchomvu, B. 2016. Surveys of Nesting Beaches in Lindi Region, Tanzania, Reveal Threats to Nesting and Foraging Green Turtle (*Chelonia mydas*) populations. *African Sea Turtle Newsletter*. Issue 5/2016.
3. West, L & Mchomvu, B. 2016. A pilot study of the interactions between marine turtles and the artisanal gill net fishery in Temeke District, Tanzania. *22nd Indian Ocean Turtle Newsletter*.
4. West, L. 2014. The first documented case of foraging ground philopatry in a female green turtle (*Chelonia mydas*) in Tanzania. *Africa Sea Turtle Newsletter*. Issue 2/2014.
5. Trindade, J. & West, L. 2014. A trans-boundary green turtle (*Chelonia mydas*) nesting event in East Africa. *Africa Sea Turtle Newsletter*. Issue 1/2014.
6. West, L. & Hoza, R.B. 2014. Recognising the regional importance of the central Tanzanian coast to marine turtles. *Africa Sea Turtle Newsletter*. Issue 1/2014.
7. West, L., Mchomvu, B., Abdallah, O. & Mapoy, S. 2013. Green turtle nesting activity at Juani Island, Tanzania, during the 2012 peak nesting season. *17th Indian Ocean Turtle Newsletter*.
8. West, L. 2010. A multi-stakeholder approach to sea turtle conservation in the United Republic of Tanzania. *11th Indian Ocean Turtle Newsletter*.
9. Muir, C. 2005. The Status of Marine Turtles in the United Republic of Tanzania, East Africa. National Tanzania Turtle Committee. 35pp.
10. Muir, C. & Ngutunga, B. 2009. Rapid Bycatch Survey of the Tanzania Industrial Prawn Trawl Fishery. Report to the Tanzania Fisheries Research Institute (TAFIRI). 15pp.
11. Bourjea, J., Nel, R., Jiddawi, N.S., Koonjul, M.S. and Bianchi, G. 2008. Sea turtle bycatch in the West Indian Ocean: review, recommendations and research priorities. *Western Indian Ocean Journal of Marine Science*, 7(2), pp.137-150.
12. Moore, J.E., Cox, T.M., Lewison, R.L., Read, A.J., Bjorkland, R., McDonald, S.L., Crowder, L.B., Aruna, E., Ayissi, I., Espeut, P., Johnson-Hicks, C., Pilcher, N., Poonian, C.N.S., Solarin, B., Kiszka, J. 2010. An interview-based approach to assess marine mammal and sea turtle captures in artisanal fisheries. *Biological Conservation*, 143: 795-805.
13. Whiting, S.D., Macrae, I., Murray, W., Thorn, R., Flores, T., Joynson-Hicks, C. and Hashim, S., 2010. Indian Ocean crossing by a juvenile hawksbill turtle. *Marine Turtle Newsletter*, (129), p.16.
14. Hamann M., Kamrowski, R. L., and Bodine, T. 2013. Assessment of the conservation status of the loggerhead turtle in the Indian Ocean and South-East Asia. IOSEA Marine Turtle MoU Secretariat, Bangkok.
15. Giorno, T. and Herrmann, M. 2016. Nesting trends of the Green (*Chelonia mydas*) and Hawksbill (*Eretmochelys imbricata*) turtles on Misali Island, Pemba. Independent Study Project (ISP) Collection. 2343.
16. Pharaoh, A.M., Fanning, E. and Said, A., 2003. Observations of sea turtles nesting on Misali Island, Pemba. *Journal of East African Natural History*, 92(1), pp.127-134.
17. Dunbar, T. 2011. Monitoring Nesting Trends and Hatchling Success of the Green Turtle (*Chelonia mydas*) Population on Mnemba Island, Zanzibar. Independent Study Project (ISP) Collection. 1006.
18. Temple, A.J., Kiszka, J.J., Stead, S.M. et al. Marine megafauna interactions with small-scale fisheries in the southwestern Indian Ocean: a review of status and challenges for research and management. *Rev Fish Biol Fisheries* 28, 89–115 (2018).

19. Temple, A.J., Wambiji, N., Poonian, C.N., Jiddawi, N., Stead, S.M., Kiszka, J.J. and Berggren, P., 2019. Marine megafauna catch in southwestern Indian Ocean small-scale fisheries from landings data. *Biological Conservation*, 230, pp.113-121.
20. Salmin, Y.N., Jiddawi, N.S., Gray, T., Temple, A.J. and Stead, S.M. 2019. Improving bycatch mitigation measures for marine megafauna in Zanzibar, Tanzania. *Western Indian Ocean Journal of Marine Science*, 18(1), pp.19-28.
21. Dalleau, M., Kramer-Schadt, S., Gangat, Y., Bourjea, J., Lajoie, G. and Grimm, V. 2019. Modeling the emergence of migratory corridors and foraging hot spots of the green sea turtle. *Ecology and Evolution*, 9(18), pp.10317-10342.
22. Humphrey S.L & Salm R.V. (eds) 1996. Status of Sea Turtle Conservation in the Western Indian Ocean. UNEP Regional Seas Reports and Studies No. 165
23. Taquet, C. 2007. Diversité et différenciation génétiques des populations de tortues vertes (*Chelonia mydas*) dans les sites de ponte et d'alimentation du sud-ouest de l'océan Indien: Application aux stratégies de conservation de l'espèce. Sainte-Clotilde, Réunion: Université De La Réunion.