sea turtles
OF THE FRENCH TERRITORIES

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France's 12 overseas regions and territories range across all of the Earth's temperate, tropical, and polar seas, with a combined marine territory of nearly 10.2 million square kilometers (nearly 4 million square miles), an area larger than the mainland United States. Marine turtles are found throughout most French waters; indeed, it is easier to list the French territories where marine turtles are not found—only France's tiny sub-Antarctic and Antarctic island territories—than where they are. Thus, France bears a high level of global responsibility for the conservation of sea turtles and their habitats, and the country takes this responsibility seriously. No fewer than four sea turtle action plans have been put in place since 2007 (for Guadeloupe and St. Martin, Martinique, French Guiana, and the West Indian Ocean territories), as well as strict legislation protecting sea turtles in French Polynesia since 1990. To improve collaboration for sea turtle conservation and management among the far-flung French territories, France's Ministry of the Environment created a network—the Groupe Tortues Marines France (French Marine Turtle Group, or GTMF)—that represents more than 200 stakeholders from several government and non-profit institutions. Through regular communications, workshops, and meetings, GTMF helps facilitate exchanges among its members, prioritizes research and conservation efforts for France's sea turtle populations, and provides expertise on sea turtles to the French government and relevant international bodies, such as the Convention on Migratory Species, and the Indian Ocean South East Asian Marine Turtle Memorandum of Understanding.

SEA TURTLE DISTRIBUTION IN THE FRENCH TERRITORIES

France's sea turtle diversity can be described in measurable and immeasurable ways. French waters host six of the world's seven marine turtle species (all but the flatback), and all but the flatback and Kemp's ridley are known to nest on French beaches. The amount of France's Exclusive Economic Zone (EEZ) that serves as sea turtle foraging and migratory habitat is incalculably high, and it encompasses portions of 18 different regional management units, representing some of the world's most and least threatened sea turtle populations (see *SWOT Report*, vol. VII, pp. 20–31).

French sea turtles and their unique behaviors and biogeography are noteworthy in many respects. The leatherback nesting beaches of northern South America, which include those of French Guiana, are among the most important on the planet, as well as the most dynamic. Yalimapo beach in French Guiana, for instance, has shown dramatic swings in nesting intensity over the decades, with more than 60,000 nests recorded annually during the late 1980s and early 1990s, falling to just a few thousand nests per year more recently, due in part to habitat shifts and illegal bycatch. The dynamic nature of French Guiana's shoreline, where beaches undergo frequent dramatic changes in size and shape, provides a natural laboratory in which to study how sea turtles respond to environmental changes. French Guiana's leatherbacks also make long migrations to the North Atlantic Ocean to feed, where they have been found in the waters off Saint-Pierre-et-Miquelon, another French territory (see *SWOT Report*, vol. XI, pp. 24–25). Such migrations demonstrate the importance of working globally to protect turtles across their entire ranges.

Not far away, the presence of marine turtles in the French Caribbean territories (Guadeloupe, Martinique, St. Martin, and St. Barthélemy) has been known for centuries, but no significant studies were carried out until the early 2000s. Recent data from these islands has illuminated a very complex situation across a large number of nesting beaches, with no less than 156 beaches hosting three species of nesting marine turtles in an as yet unknown spatial distribution. More monitoring is needed to truly understand these unusual patterns, though recent research does point to a noteworthy multiyear recovery trend of green turtle stocks that had nearly disappeared at the time of European settlement.

In contrast, marine turtles have been well studied in the French islands of the Southwest Indian Ocean on the Îles Éparses (scattered islands) of Tromelin, Glorieuses, Juan de Nova, and Europa, where military and police forces remain year-round, and where biologists have gathered some of the longest sea turtle time series monitoring data in the world, dating back to the 1970s. On each of those islands, green turtles lay 5,000 to 10,000 clutches of eggs annually (except for Juan de Nova, which has much fewer). In nearby Mayotte, located in the Mozambique Channel, nest monitoring has been conducted since the 1990s, despite high levels of poaching and the difficulties of working on numerous secluded beaches.

School children observe a rare daylight-nesting leatherback in French Guiana. © THIERRY MONTFORD FOR WWF

The French territories in the South Pacific Ocean cover an enormous area, larger than Europe. French Polynesia consists of 118 islands, of which only 76 are inhabited, including Tahiti, the most populated. The region harbors marine turtles in all their life stages, yet little is known about them because monitoring is confounded by the region's size. Over the years, however, trained volunteers have begun to monitor turtles on several islands, and some data are beginning to be collected. Some monitoring also has been done in parts of New Caledonia, but long-term data on sea turtles are lacking. And the status of marine turtles in the remote Wallis and Futuna Islands is almost entirely unknown.

SEA TURTLE MOVEMENTS IN FRENCH WATERS

Research from throughout the French territories has revealed wide-ranging movements of sea turtles both within and beyond French waters, including a number of spectacularly long migrations.

The Atlantic waters of continental France are used by leatherbacks and loggerheads on their way to and from feeding or breeding grounds. These are often juveniles that drift into French coastal areas after being ejected by weather and currents from the North Atlantic gyre. One turtle was recently tracked returning from Atlantic France to the warmer waters of the western African coast. In French Mediterranean waters, several adult and subadult loggerheads have been tracked crossing the entire western Mediterranean up to Greece, while others swim through the Straits of Gibraltar into the Atlantic Ocean. On the other side of the Atlantic, leatherbacks that nest in French Guiana forage between 30 and 40 degrees north, adjacent to the French territory of Saint-Pierre-et-Miquelon near the Gulf of Saint Lawrence, making them the most northerly distributed of all sea turtles globally. Leatherbacks of French origin are not the only species known to make such long migrations; a juvenile green turtle originating from the French Caribbean traversed the entire Atlantic and was found off the West African coast. Green turtles that nest in French Guiana also show great behavioral plasticity, adapting their diving behavior to face the strong currents at the mouth of the mighty Amazon River while they travel to foraging grounds in Brazil.

In the southwest Indian Ocean, intensive satellite tracking efforts combined with genetic analyses have illuminated highly important migratory routes for green and loggerhead turtles that regularly travel between the French islands and surrounding countries of East Africa and Madagascar. In addition, loggerheads foraging near Reunion Island were found to have originated from nesting sites as far away as the Arabian Sea—some 4,000 kilometers (2,485 miles) away and in another hemisphere—requiring them to traverse nearly 50 degrees of latitude. Such migrations again demonstrate the importance of multinational cooperation in sea turtle conservation.

In French Polynesia, a male green turtle named Popora was tracked more than 4,500 kilometers (2,796 miles) in a crossing from Tahiti (Bora Bora) to New Caledonia. Other adult female green turtles from Tahiti (Tetiaroa atoll) seem to prefer foraging in Fijian

waters, a few flipper strokes from the Wallis and Futuna Islands. A unique track of a subadult loggerhead turtle named Ariti showed a 14,000-kilometer (8,700 mile) migration from Tahiti (Moorea atoll) all the way to Fiji, then to Nauru, then to the Marshall Islands in the northern hemisphere, then back south of the equator to an area near American Samoa.

FRANCE'S EFFORTS TO ADDRESS TURTLE THREATS

Solving the bycatch threat. GTMF is addressing bycatch through collaborative fisheries research—among fishers, scientists, managers, and consumers—and developing and implementing conservation mitigation measures in the nations and territories where it has influence. Since its creation, GTMF has recognized the threat to sea turtles caused by widespread illegal, unreported, and unregulated fishing activities. The group is now taking action through its partners to gather available information on this most serious hazard. A report on a survey conducted among all GTMF partners, published in 2010, described the situation on France's mainland and territories, identified priority activities, and listed recommendations for specific actions to be carried out in locations where high mortality of marine turtles was reported. The current work also fills data gaps for other areas where impacts are suspected but remain unquantified. The report provides a comprehensive description of the research projects and actions dealing with sea turtle bycatch that have so far been implemented in the French continental waters of the Atlantic, Pacific, and Indian Oceans and the Mediterranean Sea.

GTMF has established a bycatch group whose purpose is to help local and national stakeholders better understand and address the problem, including how to develop more selective fishing gear, how to impose temporal and spatial fisheries closures, and much more. One example is GTMF's support for an initiative to ensure that the European Union (EU) requires the use of turtle excluder devices (TEDs) by trawl fishers in all nations from which it imports wild-caught shrimp. If adopted, such a regulation could save hundreds of thousands of marine turtles (see article on pp. 38–39, this issue).

Monitoring of habitat. France's coasts and overseas regions and territories are home to all types of sea turtle habitats, including seagrass meadows where green and hawksbill turtles feed. French turtle teams work closely with the French Coral Reef Initiative (IFRECOR) to assess seagrass health in the Caribbean and Indo-Pacific. In the Western Indian Ocean, the teams also help facilitate international cooperation to standardize seagrass monitoring protocols. Beyond habitat monitoring, the teams survey foraging populations and interspecies interactions within food resources. For example, one current study in the Caribbean is assessing the effects of invasive seagrass expansion on green turtle foraging grounds. Other vulnerable and crucial habitats are monitored all around France, including coastal forests in the French West Indies where hawksbills nest and where beaches are threatened by illegal sand mining, light pollution, and other hazards. In collaboration with coastal cities in the Caribbean, French national action plans are addressing light pollution using the experience of the Wider Caribbean Sea Turtle Conservation Network (WIDECAST) to develop technical recommendations.

Cécile Gaspar releases a rehabilitated green turtle in French Polynesia. © TE MANA O TE MOANA

Monitoring of debris and other pollution. Ocean pollution is another threat to turtles in French waters as well as globally. GTMF published a survey in 2011 about interactions between marine debris and sea turtles in French territories. The survey found different levels of impact and interaction rates throughout French territories, as well as ingestion rates of up to 100 percent in stranded animals. In response to these shocking statistics, GTMF now works with other agencies in the eastern Atlantic, Mediterranean, and Indian Ocean waters to better understand and respond to the threats plastic pollution poses to turtles. GTMF's Marine Strategy Framework Directive considered Mediterranean loggerheads a good indicator of the impacts of marine debris in European states, and they are now used to determine trends in the monitoring programs of the United Nations Environment Programme's Regional Seas Conventions. French teams carried out a risk assessment and mapping exercise for sea turtle–debris interactions that supports this scheme. Other studies are also under way to evaluate the prevalence of turtle entanglement and define relevant metrics for measuring and under- standing the impacts of such pollution.

Turtle rescue and rehabilitation. Six rescue centers and several stranding networks rehabilitate sea turtles throughout the French territories. GTMF also has created a working group for pathology and rescue to support this important aspect of sea turtle conservation and to develop and share standardized protocols throughout the French territories. French stranding networks receive alerts when a sea turtle is dead or in difficulty. Since the early 2000s, more than 1,800 turtles have been rescued in France's territories, including about 200 in 2016 alone. To better understand the causes of strandings, the team records the species and causes of distress, which vary by region. For example, in French Polynesia, the Moorea sea turtle clinic treats mainly juvenile and subadult green and hawksbill turtles, most of them injured as a result of poaching for meat by spear guns. In the Mediterranean and Indian Ocean (Reunion), rescued turtles are mainly loggerheads that were accidentally captured by fishermen. And in Reunion, boat strikes are the second highest cause of rescue or stranding of greens and hawksbills. In Mayotte, the poaching of nesting green turtles for meat is the cause of 80 percent of stranded turtles reported by the local network. On France's western mainland, the La Rochelle rescue center admits mostly leatherbacks and loggerheads, as well as occasional Kemp's ridleys and green turtles; the center's necropsies show that 50 percent of stranded leatherbacks died from the ingestion of plastics, and others from boat strikes. The French Mediterranean rescue center (CESTMed) collaborates closely with local fishermen and has successfully rehabilitated more than 300 sea turtles since 2003. Disease is also monitored among sea turtles found in French territories. In Guadeloupe, for instance, 15 percent of the turtles monitored in Malendure Bay are affected by fibropapillomatosis. In Mayotte, this was reported only twice on adult green turtles. In some instances, remission was observed in both territories, which is encouraging.

Education and outreach. Education and outreach programs are one of the main actions for sea turtle conservation in all of the French territories. For example, Kelonia, a public education and tourism facility located in Reunion, receives 140,000 visitors annually. In French Polynesia, Te Mana O Te Moana has reached more than 80,000 children with education programs since its creation in 2004. In several other locations (French Guiana, Mayotte, New Caledonia), ecotourism aims to educate and regulate tourists who visit beaches to observe turtle nesting and hatching. French media channels are also used to disseminate news and information about penalties and fines for disturbing or poaching turtles and to stimulate citizen participation in conservation. French divers, sailors, and beach users enjoy sharing observations that can be used for scientific purposes. To aid in such citizen reporting, almost all GTMF members have observation templates on their websites, and several mobile phone applications have been created to let citizen scientists share data. Both researchers and the general public can use the photo ID software to identify and monitor individual turtles and provide feedback. Programs to adopt or sponsor a turtle also raise awareness. Side-by-side with officials in charge of marine turtle action plans, local sea turtle volunteer networks are very active in many parts of France.

In the French West Indies and Reunion, where sea turtle consumption was part of local traditions, education and outreach efforts driven by the Marine Turtle Network of Guadeloupe and by Kelonia since 1998 have helped to reduce turtle harvests significantly. In New Caledonia, regulation of turtle meat consumption permits ancestral customs within specific cultural groups, and quotas are defined by authorities for each province with respect to traditional events. In French Guiana, Amerindian people are allowed to consume turtle eggs under certain conditions. In other regions, such as Polynesia, despite education efforts, local customs remain deeply embedded, and the fight against poaching is still a big challenge.

CONCLUSION

Geopolitics of the past have left France with many territories that are spread across the globe, and the coincidental overlap of so many sea turtle regional management units is a fortunate consequence that allows France to play a disproportionately important role in sea turtle conservation. France does not take this high level of global responsibility lightly and, indeed, GTMF's long-term goal is to rise to the challenge of protecting turtles wherever they may roam by addressing all the key threats. France must become a global leader in demonstrating that by protecting these sentient beings we further enhance the resilience of entire ecosystems. ■

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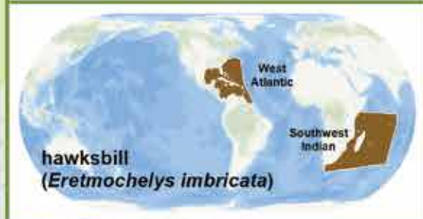
Nesting Biogeography of Sea Turtles in French Territories



scale: 1:65,000,000
projection: Eckert IV (central meridian 75W)
data: The SWOT team and reviewed literature (see end of report for citations); Ocean Basemap — Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors; boundary data — Esri Maps and Data for ArcGIS 2016; area calculations — GeoScience Australia, 2012.
notes: [1]Sites with confirmed nesting in the past but no nesting in the most recent year for which data are available are given as a count of zero; [2]species that comprise less than 5% of the clutches at nesting sites are not displayed on the map but are reflected in the data citations; [3] the territories of Wallis and Futuna in the Pacific Ocean may have nesting but no data are currently available; [4]Regional Management Units are only shown that cover French territories; [5]EEZ stands for Exclusive Economic Zone.
produced in partnership with: Oceanic Society, Groupe Tortues Marines France, and the IUCN-MTSG.

Regional Management Units

Saint Pierre and Miquelon

France

6 Saint Barthélemy and Saint Martin

5 Guadeloupe

4 Martinique

7 French Guiana

Clipperton Island

8 Southwest Indian Ocean

French Southern Islands

Wallis and Futuna

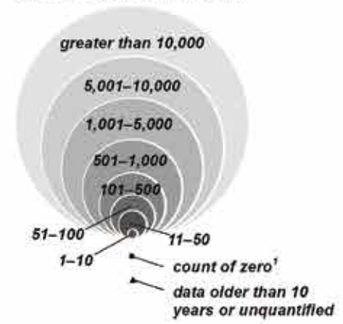
1 & 2 New Caledonia

3 French Polynesia

N

2000 km

total clutches for all species combined (most recently available year)



proportion species composition[2]

— country borders

French territories and EEZs with nesting

French territories and EEZs with little or no nesting[3]

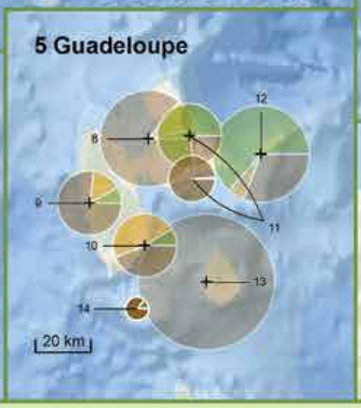
1 New Caledonia

2 Southern New Caledonia (detail)

3 French Polynesia

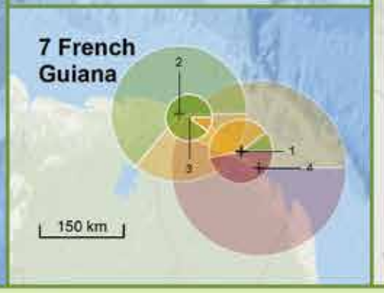
4 Martinique

5 Guadeloupe



6 Saint Barthélemy and Saint Martin

7 French Guiana



8 Southwest Indian Ocean