Specific Inventory of Marine Mammals and Sea Turtles in the Touho to Ponérihouen Area

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Chapter 6

Specific inventory of marine mammals and sea turtles in the Touho to Ponérihouen area

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SUMMARY

- Species diversity of cetaceans in the Touho to Ponérihouen consists of nine of the 24 species reported in New Caledonia. None are endemic.
- Only one species is known only from this area, the narrow beaked dolphin (*Steno bredanensis*) identified during a stranding.
- The lagoon area between Touho and Ponérihouen is likely to harbor resident populations of Indo-Pacific bottlenose dolphins (*Tursiops aduncus*) and/or spinner dolphins (*Stenella longirostris*).
- This area is not a breeding ground for humpback whales (*Megaptera novaeangliae*), but could serve as a transit area towards other sites.
- No dugong (*Dugong dugon*) was sighted in the area but its presence is likely and in low density.
- Three of the four turtle species known to New Caledonia were identified in the area. These are the green turtle (*Chelonia mydas*), the logger head turtle (*Caretta caretta*) and the hawksbill turtle (*Eretmochelys imbricata*). For the first two, nesting sites have been detected on some islets.
- No specific threats to marine mammals or to sea turtles were identified in the area.

INTRODUCTION

Sea turtles and marine mammals are often seen as emblematic species, particularly in the South Pacific where their cultural importance is recognized (SPREP 2008). In New Caledonia, several species such as the green turtle (*Chelonia mydas*), the dugong (*Dugong dugon*) and the humpback whale (*Megaptera novaeangliae*) are part of the lives of Melanesian populations where they have an important symbolic and cultural role. Beyond this aspect, these species have a fundamental influence in the structure and functioning of marine ecosystems. Thus, more and more studies show that the significant decrease in populations of top predators has a large scale negative impact on the entire marine system in which they live (Myers *et al.* 2007; Heithaus *et al.* 2008) . It is therefore important to establish and to take into account the status of these populations in environmental assessment programs.

In New Caledonia, the study of marine mammals has long focused on humpback whales, this is why a large number of data is available on these species (Garrigue *et al.* 2001; Garrigue

et al. 2002; Garrigue *et al*.2004; Garrigue *et al*. 2010). More recently, some research projects were developed on dugongs and Indo-Pacific bottlenose dolphins (*Tursiops aduncus*) (Garrigue *et al.* 2008b; Bordin, 2009; Oremus *et al.* 2009). The choice of these species is due to their precarious conservation status, their cultural value and/or their presence in coastal waters which makes them particularly vulnerable to human impacts but also facilitates their study by making them more accessible. This last point is important because it is a reminder of how the systematic study of marine mammals can be complicated by their aquatic environment and their ability to move quickly over great distances. Furthermore, the archipelago is exposed to a strong trade wind current which creates difficult conditions for observation and encounter rates with these animals are low.

The inventory of marine mammals and sea turtles in the area covered by this RAP is not based on a field operation, but on a compilation of all available data from various sources and from multiple field missions and sampling conducted over the last 10 years.

METHODS

The species inventory was established on an area bounded by the following geographic coordinates: -20.75 ° S, 165.23 ° E, -20.75 ° S, 165.58 E, -21.11 ° S and 165 , 23 ° E, -21.11 ° S, 165.58 ° E. This area covers different types of habitats that may be used by marine mammals and sea turtles, including coastal and lagoon areas, barrier, fringing and intermediate reefs, passes, outer slopes and the ocean habitat (Figure 6.1).

The inventory was based on historical data from systematic sampling and opportunistic observations stored in the database of Opération Cétacés*. A literature review was also conducted to best complement this inventory.

Systematic sampling was conducted by Opération Cétacés during marine and aerial data collection campaigns using standardized methods in which all habitat types represented in the area were surveyed at least partially. Opportunistic data come from animal strandings which were documented in the area as well as from observation forms completed by users of the marine environment after opportunistic encounters with animals.

Marine systematic sampling

Marine campaigns were conducted in the Touho-Ponérihouen area in 2000, 2001, 2004 and 2005. Observations were conducted along transects (Figure 6.1) when weather conditions were favorable: wind below 15 knots and no rain. Indeed, observations are highly dependent on weather because although the detection of a large cetacean can be done in rough seas it is not the same in regards to smaller species of dolphins, dugongs and turtles.

Animal sighting using the naked eye and binoculars was conducted by two to three observers. During every encounter with marine mammals, the following information was noted: date, start and end of encounter, the GPS position (latitude and longitude), the pod type and number of individuals it contained, the social status of individuals and pod and/or individuals behavior. For turtles, the position, the number of individuals and, wherever possible, species were recorded. A hydrophone connected to an amplifier was used to search for marine mammals using acoustics by detecting the emitted sounds used for communication and/or location (echolocation). Listening time was about 5 minutes during which the boat was stopped, engine off.

Approached animals were photographed allowing species or individual identification (i.e. photo-identification). Photo-identification consists of recognizing an animal through photographs of unique markings naturally present in different parts of its body. The implementation of this technique allows studying the demographic status of the populations, estimating their size and obtaining information on their dynamics. In New Caledonia, it is only operational for humpback whales and Indo-Pacific bottlenose dolphins (Garrigue and Greaves 1999; Oremus *et al.* 2009).

Tissue samples were taken from live animals or stranded carcasses. Genetic analyses conducted on these particular samples allowed to identify or confirm certain species.

Aerial systematic sampling

Aerial flights over the study area were conducted in 2003 and 2008 during the ZoNéCo program (Garrigue and Patenaude 2004; Garrigue *et al.* 2008a). The area was surveyed on 19, 20 and 30 June 2003 and January 21, 2008 (Figure 6.1). A ribbon aerial count technique along transects was implemented to determine the distribution and size of dugong populations present around the mainland (Garrigue *et al.* 2008b).

In the Touho-Ponérihouen area, transects were spaced five nautical miles apart. The aerial flights were conducted between the coast and the barrier reef at a speed of 90 knots and an altitude of 900 feet. They were done in clear weather and calm seas when the wind strength did not exceed three on the Beaufort scale. The position of observed marine mammals and sea turtles groups was noted as well as the species and number of animals present. The quality of the identification of the observed species was classified into three categories: “certain”, the observer is certain of the species observed; “likely”, the observer thinks he identified the named species but a doubt remains; “uncertain”, the observer does not confirm the species.

Stranding data

Marine mammal strandings on the coast of New Caledonia have been recorded since 1991 by Opération Cétacés (N = 102) who, as far as possible, intervenes on the field

* *Translators's note: Opération Cétacés (literally translated as Operation Cetaceans) is a locally based association founder by the first author of this chapter. The original name in French is used throughout the chapter.*

to document every event as best as possible. The information collected is: the spatial and temporal localization of the stranding, stranding conditions, species identification features, biometric and physiological (stomach contents, age, parasites), genetic and environmental parameters (heavy metals) and, where possible, the cause of death or stranding (in the case of a live stranding). Some older information from witnesses, scientific publications and local newspapers are also available in the literature (Borsa 2006).

Opportunistic observations from observation sheets

Since 1991, a "marine mammals identification form" was developed by Opération Cétacés and made available to users of the sea. This form is intended to facilitate reports of marine mammals observed at sea. Collected information concern: the identity of the observer, the temporal and spatial location of the observation, the conditions of observation in terms of meteorology and means used and the characteristics for the identification of the species observed. When not specified on the form, the geographic positions of these opportunistic observations are plotted on a map in degrees and minutes depending on the locality cited.

RESULTS

Nine species of cetaceans were recorded in the study area, including five species from the Delphinidae family and two species from the Balaenopteridae family (Table 6.1). Three cetacean species were identified during marine observation campaigns, three additional species were identified from the observation forms.

Finally, six strandings for three species were documented in the region between 1980 and 2009. For two of them, tissue sample analyses confirmed the species. The causes of these strandings could not be identified. Most of the observations were conducted in the lagoon area near fringing, intermediate and barrier reefs or in the middle of the lagoon. Some observations were made in passes and in the open ocean. Twenty five hydrophone deployments spread across the area failed to detect vocalizations of dolphins or humpback whale songs. No observation of dugong was recorded from all available data.

The presence of sea turtles in the area is proven, as evidenced by numerous aerial observations. Two species were identified in the Touho-Ponérihouen area during a study of

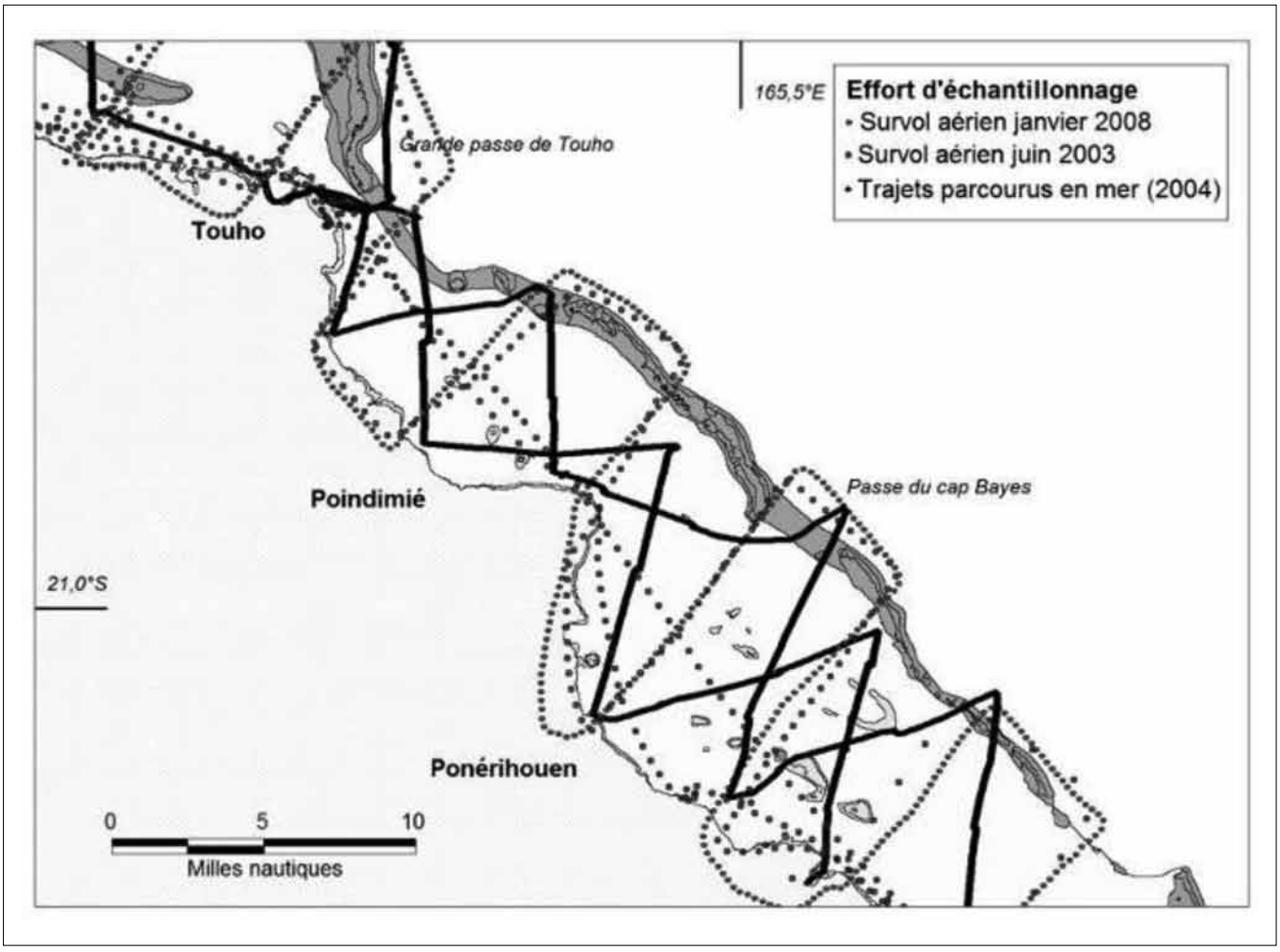

Figure 6.1. Sampling effort over the Touho-Ponérihouen area. Legend: Survol aerien janvier 2008: *aerial flight January 2008* ; Survol aerien juin 2003 *aerial flight June 2003* ; Trajets parcourus en mer (2004): *route covered at sea (2004)* ; Miles nautiques : *Nautical miles.*

nesting sites (WWF 2007). These are the green and logger turtles (Table 6.2). In addition, a hawksbill turtle (*Eretmochelys imbricata*) and green turtles were observed opportunistically at sea during the fieldwork conducted by the RAP team (McKenna, pers. com.).

"Lagoon" species

The works of Opération Cétacés show that three species of cetaceans use the lagoon of New Caledonia on a regular basis. These are the Indo Pacific bottlenose dolphin, the spinner dolphin (*Stenella longirostris*) and the humpback whale. These species are also regularly or occasionally found in the ocean and cannot be considered "lagoon" species *sensu stricto*. Observations in the study area confirm the presence of these three species in the Touho-Ponérihouen lagoon.

Indo-Pacific bottlenose dolphins were observed twice in the coastal area of Touho and in the Poindimié lagoon area, near Tibarama islet, where testimonies report regular observation of this species. These sightings made during two periods of the year (September 2001 and April 2006) suggest that this species frequents the coastal waters of the area between Touho and Ponérihouen on a regular basis. It is not possible to confirm whether individuals observed in this area are residents because the data is too sparse and no photo identification is available.

Two spinner dolphins' pods were observed near the back reef of the barrier reef in front of Poindimié. The observations conducted in September 2001 and April 2008 also suggest the annual presence of this species.

Two opportunistic dolphin observations have been reported in the lagoon of Poindimié (August and October 2009). The species were not identified; however the location of these observations in the coastal area and by the intermediate reef in the Poindimié region and the small size of the

Table 6.1. Identification of marine mammals observed the Touho-Ponérihouen area, population characteristics and conservation status.

Family	Scientific name	Common name	Identification method	Habitat	Frequentation	IUCN*	CITES Appendix	CMS Appendix
Balaenopteridae	*Balaenoptera acutorostrata*	Minke whale	marine survey	ocean and lagoon	unknown	LC	I	-
	Megaptera novaeangliae	Humpback whale	opportunistic	ocean and lagoon	migratory, resident	EN	I	I
Delphinidae	*Globicephala macrorhynchus*	Short finned pilot whale	opportunistic	ocean	unknown	DD	II	-
	Orcinus orca	Killer whale	observation form	ocean	unknown	DD	II	II
	Stenella longirostris longirostris	Spinner dolphin	marine survey	ocean and lagoon	resident	DD	II	-
	Steno bredanensis	Narrow beak dolphin	stranding	ocean	unknown	LC	II	-
	Tursiops aduncus	Indo-Pacific bottlenose dolphin	marine survey	lagoon	resident	DD	II	II
Kogidae	*Kogia breviceps*	Pygmy sperm whale	stranding	ocean	unknown	DD	II	-
Physeteridae	*Physeter macrocephalus*	Great sperm whale	stranding	ocean	unknown	VU	I	I

*IUCN Red List category. EN: endangered; LC: Least Concern; DD: Data Deficient; VU: vulnerable. *IUCN Red List category. EN: endangered; LC: Least Concern; DD: Data Deficient; VU: vulnerable.

Table 6.2. Identification of marine turtles observed in the Touho-Ponérihouen area, population characteristics and conservation status.

Family	Scientific name	Common name	Identification method	Habitat	Frequentation	IUCN*	CITES Appendix	CMS Appendix
Cheloniidae	*Caretta caretta*	Logger head turtle	aerial survey	ocean and lagoon	migratory, resident	EN	I	I
	Chelonia mydas	Green turtle	aerial survey	ocean and lagoon	migratory, resident	EN	I	I
	Eretmochelys imbricata	Hawksbill turtle	opportunistic	ocean and lagoon	migratory, resident	EN	I	I

*IUCN Red List category. EN: endangered.

pods observed suggest that it could be Indo-Pacific bottlenose dolphins.

The aerial observation of thirty undetermined dolphin species was recorded in the south of Ponérihouen in June 2003. Pod size of about 30 individuals might suggest that they were spinner dolphins but the location of the observation in the coastal area rather suggests the presence of Indo-Pacific bottlenose dolphins which occasionally form large pods in the lagoon of New Caledonia (Poupon 2010).

Finally, eight opportunistic observations of humpback whales were recorded during the austral winter between July and September. The earliest report dates back from 1993 and the most recent one in 2009. There were two pods of two individuals, five pods of three and a pod of six individuals. All these observations were recorded in the lagoon area between the great pass of Touho and the south of Ponérihouen. The lack of visual or acoustic detection of this species during systematic sampling conducted during the austral winter, combined with information collected on the entire East coast, suggests that the Touho-Ponérihouen area is not used as a breeding ground for this species.

Oceanic species

Most of the 24 species of cetaceans know from New Caledonia are considered purely oceanic and are rarely, if ever, observed in the lagoon. Sampling at sea, mainly in the lagoon was therefore not optimal for identifying these species. A killer whale (*Orcinus orca*) and a minke whale (*Balaenoptera acutorostrata*) have been reported outside the lagoon.

The orca observation was recorded off Touho in July 1995 but no photograph confirms this sighting. Nevertheless, the very distinctive characteristics of this species suggest that the identification is correct. The minke whale was sighted in February 2007 outside the barrier reef north of Cape Bayes pass.

Some oceanic species can occasionally frequent the lagoon or passes. Thus a pod of nine finned pilot whales (*Globicephala macrorhynchus*) was reported in the Cape Bayes pass in May 1999 and a minke whale was also sighted from the great pass of Touho inside the lagoon in September 2004.

Finally, stranding data were useful for the inventory of oceanic species. Thus, a narrow beaked dolphin (*Steno bredanensis*) was found stranded near the Poindimié airfield in August 2006 (Garrigue 2007). Although the carcass was highly degraded, species identification was possible using molecular tools. Four sperm whale (*Physeter macrocephalus*) strandings were also recorded in the area, including a solitary individual who ran aground on Bayes Island on the barrier reef in December 2001.

Other strandings occurred on the coast. It is possible that both strandings reported as having occurred on 11 and 12 November 1980 at Cape Bayes and Ouindo, south of this point, may correspond to a single event (Borsa 2006). The latest stranding of two individuals (November 1980) occurred in Kokengone, north of Poindimié. Finally, a pygmy sperm whale (*Kogia breviceps*) specimen was discovered on the coast north of Touho in September 1997 (Opération Cétacés, unpublished data), the use of molecular analyses allowed species confirmation.

Sea turtles

All turtle sightings conducted during Opération Cétacés' systematic sampling were obtained during aerial surveys (figure 2). The flight altitude (900 feet) did not allow to identify the observed species. A total of 28 individuals were recorded, including six in 2008 and 22 in 2003. The majority of turtles were observed in the lagoon area, a single observation was made outside the barrier reef and two on the barrier reef. The Touho region includes a third of the observations. A literature research allowed identifying the presence of green and logger head turtles' nesting sites in the study area (WWF 2007). Turtles' nesting sites were located during aerial surveys conducted by the WWF in late 2006 and early 2007 and were carried out at an altitude of 115 feet. The data from this report suggest three small nesting sites for green turtles on islets on the barrier reef in front of Poindimié and could accommodate one to 10 turtles per site per year. A logger head turtle site was also identified on an islet located in front of Poindimié and able to accommodate one to 10 turtles per year. The exact location and names of the islets of these nesting sites are however not listed in the WWF report. Two other sites outside the Touho-Ponérihouen area were identified to the north (10 to 100 turtles per site per year) and to the south of the study area (one to 10 turtles per site per year). Some observations of turtles were also conducted during the fieldwork in November 2009 by the rest of the RAP team. Green turtles were observed in the passes of Cape Bayes and Touho (sites 10 and 32) and the presence of hawksbill turtles was confirmed in the area (sites 11 and 33).

DISCUSSION

Three of the nine species of cetaceans observed are listed in Annex I to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), while others are listed in Annex II (Table 1). Two species are listed in Annex I to the Bonn Convention on the Conservation of Migratory Species (CMS) and two in Annex II (Table 1). Only sperm whales are considered "endangered" on the IUCN Red List.

However, humpback whales populations in the Pacific region have recently been reclassified from "vulnerable" (VU) to "endangered"(EN) by the IUCN, which indicates a precarious conservation status with a risk of extinction, unlike most other world populations of this species that are considered "least concern" (LC). Two sea turtle species are also included in Annex I of CITES and CMS and considered Endangered on the IUCN Red List.

There are no endemic species of marine mammals or sea turtles in New Caledonia, which is confirmed in this study.

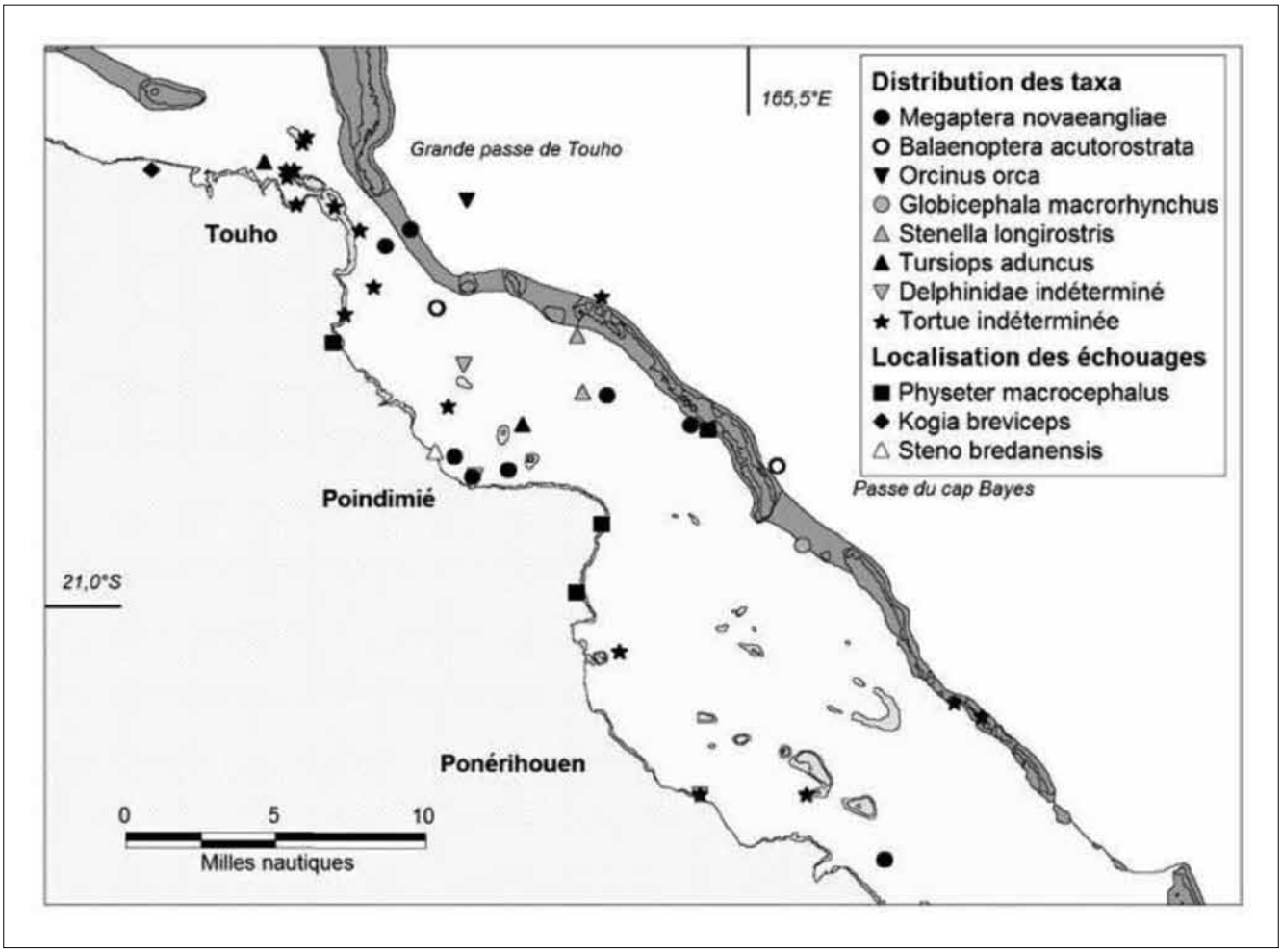

Figure 6.2. Distribution of scientific and opportunistic observations in the Touho-Ponérihouen area. Legend: Distribution des taxa : *Taxa distribution* ; Localisation des echouages : *Stranding sites* ; Miles nautiques : *Nautical miles.*

Indeed, all species observed in the area have already been identified elsewhere and all have been reported in other localities around New Caledonia, with the exception of the narrow beaked dolphin which has only been observed in this area. This oceanic species appears to be limited preferentially to areas of greatest depth (Gannier and West 2005, Baird *et al.* 2008). Although the only evidence of the presence of this species is the stranding in Poindimié, this does not mean that the species is found only in this region of the East coast where the research effort was focused. The narrow beaked dolphin is most likely rare in New Caledonia since no individuals have yet been observed at sea. As the species is relatively common in other parts of the Pacific such as Hawaii or French Polynesia (Gannier and West 2005, Baird *et al.* 2008), it is interesting to note that it seems rarer in New Caledonia. However, narrow beaked dolphins are rarely seen in the Solomon Islands (Kahn 2006; Oremus obs. pers.), which could suggest a lower density of the species in the Southwest Pacific. The scope of the study area is restricted and the research effort remains limited, however nine of the 24 cetacean species known from New Caledonia, equivalent to about 40% of these, and three of the four species of sea turtles were identified on the Touho-Ponérihouen area. The species diversity of this region is potentially interesting, but there is no indication that it is richer than other coastal, ocean or lagoon waters of New Caledonia. The proportion of odontocetes (toothed whales) compared with mysticetes (baleen whales) observed in the study area is similar to that reported for all of New Caledonia, with over 70% of species known being odontocetes. The species most commonly found along the coast are represented here. These are the humpback whale, the Indo-Pacific bottlenose dolphin, the beaked dolphin, the sperm whale and the finned pilot whale (Poupon 2010). Still, one can note the absence of observation for the common bottlenose dolphin (*Tursiops truncatus),* which is mainly pelagic in New Caledonia since it is regularly observed outside but never inside the lagoon (Poupon 2010). It is likely that its absence from the list of species is related to the low research effort in the ocean habitat. Thirteen other cetaceans species recorded in New Caledonia were not recorded in the study area; these are all pelagic species, rarely or never observed in the lagoon or

near the barrier reef. It is likely that many of them temporarily frequent the lagoon area to the right of the great pass of Touho as this is deep area, and is wide open to the ocean and may be appropriate for the presence of pelagic species. Certainly other pelagic species may be encountered outside the barrier reef but their survey would require a much more important research effort.

All the information gathered on humpback whales since 1995, showed that the presence of the species is seasonal and that the main breeding ground is located in the south of the mainland (Garrigue 2008). According to available data, the Touho-Ponérihouen area does not seem to be an area of particular interest for humpback whales. Nevertheless, it appears that it could serve as a transit zone for individuals moving from the breeding area in southern lagoon to other breeding areas not yet identified that could be located in the far northern lagoon, the Loyalty Islands or in Vanuatu (Garrigue 2005). Humpback whales of New Caledonia are a self-sustaining population compared to neighboring populations of Australia and the Polynesian archipelagos, with a high degree of fidelity to the breeding site (Garrigue *et al.* 2001; Garrigue *et al.* 2004).

Two dolphin species are likely to form resident populations, possibly confined to the Touho-Ponérihouen area; these are the long beaked dolphin and the Indo-Pacific bottlenose dolphin. Both species have been identified as the only cetacean species to frequent the lagoons of New Caledonia on a regular basis. The long beaked dolphin subspecies present in New Caledonia (*S. l. longirostris*) feeds in the ocean environment at night but frequents shallow reef areas during the day, presumably in order to socialize and to rest in an environment less exposed to oceanic predators (Norris et al. 1994). It has been shown elsewhere that the use of coastal and reef habitat by this species appears to generate site fidelity of animals to certain geographical areas resulting in small scale population structuring (Oremus *et al.* 2007). In New Caledonia, the use of photo-identification has revealed that some individuals are regularly re-identified in the same areas, suggesting that the resident population model also applies here (Oremus *et al.* 2009). It seems quite possible that such populations exist in the Touho-Ponérihouen area although it is difficult to predict the geographic boundaries. A recent study has shown that Indo-Pacific bottlenose dolphins frequenting the lagoon of the mainland form small populations, in the order of tens to hundreds of individuals at most, which are demographically and genetically isolated from one another (Oremus *et al.* 2009). Unfortunately, this study does not include the Touho-Ponérihouen area; the available sample being too small. Nevertheless, the detection of distinct and genetically highly differentiated populations in Koumac and Kouaoua and confirmation of the regular presence of Indo-Pacific bottlenose dolphins in the Touho-Ponérihouen region, strongly suggests that it also harbors a local population of the species. In contrast to spinner dolphins, the habitat range of Indo-Pacific bottlenose dolphins appears to be restricted to the lagoons and reef environment, with a preference for areas near the coast. The Indo-Pacific bottlenose dolphin is the only cetacean species feeding in the lagoon of New Caledonia.

The ecological characteristics of the Indo-Pacific bottlenose dolphin and to a lesser extent, the long-beaked dolphin, make these species particularly vulnerable to human pressures such as overfishing, collisions with boats, pollution and interactions with drifting nets/fishing lines (Garrigue 2005). None of these risks seem particularly important in the Touho-Ponérihouen area because of low human activity, in terms of coastal infrastructure, presence and economic activity. This is true for all cetacean species described in the area. However, no study to date has attempted to make an accurate assessment of this. It would be useful to monitor the Indo-Pacific bottlenose and longed beaked dolphins in the Touho-Ponérihouen area to verify residence potential of these two species and to estimate the size of their populations.

Several species were only sighted during strandings such as the great sperm whale, the pygmy sperm whale and the narrow beaked dolphin. These pelagic species do not evolve in the shallow waters of the lagoon. However the stranding frequency of great sperm whales suggests the regular presence of this species off the coast. These results show the full value of a stranding network to survey species in a region. The establishment of such a network in New Caledonia would ensure a better coverage of strandings and information on diversity, ecology and threats to these species.

Dugongs were not sighted in the area. The species, widely distributed on the West coast and on the North East coast, seems less common elsewhere (Garrigue *et al.* 2008b). Nevertheless, the observation of a pod of five individuals in breeding action in January 2008 near Ouao Island just north Touho suggests a possible presence of the species in the Touho-Ponérihouen area. It is unclear whether the current distribution is representative of the original distribution of the species but it is possible that high hunting pressure in the past has affected the population of dugongs in certain areas. Thus, it is difficult to say whether the absence or at least the low density observed to date in the Touho-Ponérihouen area is the result of natural (eg, unsuitable habitat) or anthropogenic factors. However, the low number of historical catches (1963–1986) for customary hunting around Ponérihouen (n = 2) lets one assume that this species was rare in the region since the 1960s. Studies on the habitat and population dynamics are likely to provide information on this matter. The dugong is classified as "vulnerable" by the IUCN. In New Caledonia, it constitutes the largest population in the Pacific and one of the largest in the world (Garrigue *et al.* 2008b).

Regarding sea turtles, several nesting sites for green and logger head turtles reveal the interest of the Touho-Ponérihouen area. Knowing that 20% of female breeding logger head turtles come to lay eggs in New Caledonia, it is necessary to ensure effective protection of these sites. Currently, none of the islets in the area of the RAP are part of a marine

protected area or have any particular protection status. Improved assessment and location of nesting sites should be considered in this area to allow the establishment of appropriate safeguards.

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