

**Scientific Expedition Report
Ti Whale An Nou program 2024**



Pygmy killer whale (*Feresa attenuata*)

Expedition date : 14th - 29th May 2024

Expedition number : 3th of 2024

Islands monitored : North islands Lesser Antilles : St-Kitts & Nevis, Sint Maarten, Sint-Eustatius, Anguilla and Saba. (Passed by : Martinique, Dominica, Guadeloupe, Redonda, Saint-Barthelemy, Collectivity of St-Martin, Montserrat).

Project Yon Sèl Vwa Pou Baleyn

This project has been funded by the Regional Cooperation Fund (FCR) of the Prefecture of Martinique. It aligns with the FCR's objectives to strengthen regional cooperation and support environmental and biodiversity protection.

The Yon Sèl Vwa Pou Baleyn project aims to enhance cooperation among the French islands, the Organization of Eastern Caribbean States, and the Dutch territories. Its general objectives include fostering collaboration across the northern and central Caribbean as well as addressing gaps in knowledge about marine mammals and supporting their conservation. The project also seeks to strengthen regional capacity by developing skills, promoting responsible conservation policies, and building networks among stakeholders. It is part of the Ti Whale An Nou program initiated by the Caribbean Cetacean Society.

The project reaches the objectives through research expeditions that contribute to the collection of critical data on cetaceans, improving our understanding of their ecology, the threats they face, and the conservation measures needed for their protection. It supports long-term monitoring efforts while enhancing the technical skills and knowledge of local stakeholders in cetacean monitoring and identification. Importantly, the project fosters regional capacity building by connecting professionals and interested individuals, involved as crew members, creating an inter-island network dedicated to the conservation of cetaceans, marine ecosystems, and biodiversity.

The Ti Whale An Nou program

Meaning “our own little whales” in a creole mix, Ti Whale An Nou (<https://www.ccs-ngo.com/ti-whale-an-nou?lang=fr>) is a program started in 2021 focusing on cooperation, research, education and conservation of whales and dolphins. It is the largest scientific survey dedicated to obtaining essential information for conservation of cetaceans in the Caribbean region. It is a locally driven initiative led by Caribbean people, ensuring its longevity in our regions.

A minimum of 33 species of cetaceans have so far been documented in the Caribbean region, which is more than a third of the species known in the world.

The goal of each expedition is to address the lack of knowledge throughout the Caribbean region regarding the diversity, distribution, relative abundances and movement patterns of cetacean species, as well as learning about the threats they face. The missions have welcomed participants from all islands in the region to participate in training, building local capacity and experience in the field.

During the months of March to September of 2024, six scientific expeditions of 15 days are programmed throughout all the islands of the Lesser Antilles. Each expedition starts in Martinique and expeditions are grouped by regions: North (Montserrat - Anguilla), Center (Martinique - Guadeloupe) and South (Grenada - Saint Lucia).

This report is focused on the third expedition of 2024, which is the first one in the North islands of Lesser Antilles in 2024. The nine-member crew consisted of representatives from Martinique, Guadeloupe, Saba and France. This diverse crew was composed of marine biologists, one nature reserve warden at the Martinique Natural Regional Park, and one marine park officer for the Saba Conservation Foundation.



List of crew and affiliation

Expedition leader :

- **Valentin Teillard** : Marine biologist and project manager for the CCS. In residence in Martinique.

Scientific observers :

- **Yann Lucea** : Bachelor's student in Ecology and Environment at the Martinique's University, Volunteer on this expedition. In residence in Martinique.
- **Emilie Authier** : Press and journalist manager's student in internship at CCS, France.
- **Mahé Guerin** : Master's student in Tropical Marine Ecology at the University of the Antilles, interning at the CCS, Guadeloupe.
- **Emma Charbonnier** : Master's student in Biodiversity and Ecology, interning at the CCS, France.
- **Mosiah Arthus** : Natural Reserve Warden for the PNRM (Regional Natural Park of Martinique). In residence in Martinique.
- **Pierre-Louis Rault** : Marine biologist at the Antilles's University in Guadeloupe and volunteer on this expedition.

Captain :

- **Jerome Bonavent** : Skipper, Guadeloupe.

Cooperation crew :

- **Camille Tuijnman** : Marine park officers for the Saba Conservation Foundation, Saba.
- **Tricia King, Von & Rachid** : Marine management Area and Habitat Monitoring Officers from St-Kitts and Nevis.



Standardized scientific protocol

During our surveys, acoustic detection with a towed hydrophone array was combined with visual observations from at least two observers on deck, allowing both methods to complement each other for effective cetacean presence / absence monitoring. This protocol is the same applied in all the islands of the Lesser Antilles since 2021 and may be applied in other islands of the Caribbean over the next years for better regional cooperation.

Survey Protocol

The visual observer effort was limited by daylight, from 06:00 to 18:00. Boat tracks were decided by the scientific expedition leader the day before, taking into consideration the weather conditions, the navigation time and the target arrival point. The crew was divided into three teams of at least two people. Each team performed a different role, which changed every two hours in the following order: (1) data entering, (2) visual observation, and (3) logistical support and resting.

Data Entering

During the expedition, two crew members used the ObsEnMer software (altitude creation company, release 3.08) in expert mode on an iPad 8th generation. The use of this software made it possible to record, in real time, the location of the boat during the survey and to locate every data point in space and time. Every hour, on the hour, from the beginning of the survey effort, the environmental conditions and the maritime traffic were recorded, as well as an acoustic point when the hydrophone was towed. Firstly, in situ environmental parameters are recorded in order to monitor and control the detection probability of cetaceans, as certain conditions may limit the detection of species at the surface. Secondly, vessel presence or absence is recorded, as well as the numbers and types of vessels, for a future co-occurrence study between cetaceans and maritime traffic. Lastly, each hour an acoustic point sample is conducted. During an acoustic point, biological and anthropogenic information was collected to determine the quality of the recordings, the intensity of the anthropogenic noise and the presence of certain characteristic species. An acoustic point was defined with ten minutes of at least two people listening with headphones. While listening, the team would also try to visually identify any cetacean vocalization by observing the spectrogram and/or the click detector module on the screen using PAMGuard software version 2.02.07 (Gillespie et al., 2008).

Visual Observations

During the daylight effort, two observers were placed at the front of the boat on either side of the mast in order to have the highest position without being hindered by the sails. Each observer covered an observation angle between 0° and 90° on each side, considering 0° the front of the boat (Fig. 1). They observed the environment between these two angles and between the boat and the horizon. Their objective was to detect cetaceans by direct identification (e.g., dorsal fin, fluke, blows, breach) or to locate indicators that could potentially indicate the presence of cetaceans (e.g., splash, group of birds).

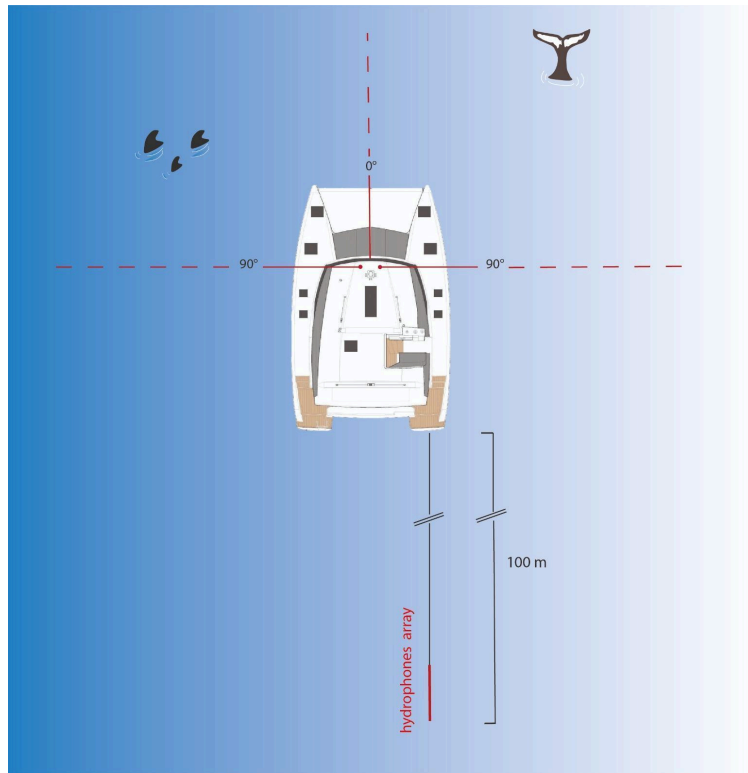


Figure 1 : Layout of the research vessel and the area observed during the effort.

Logistical support

The team that were neither observing nor collecting data served as logistical support. They were responsible for several tasks: launching or removing the hydrophone, keeping watch on the maritime traffic to avoid boats crossing the path of the hydrophone and preparing the cameras so that they were available for photo identification when cetaceans were detected.

Acoustic Monitoring

During the survey, whenever possible, a towed hydrophone array was used to detect cetacean vocalizations and clicks. The hydrophone was towed by the boat at a distance of 100m and deployed when the waters were at least 50m deep and with no more than moderate vessel traffic. The array is connected to a Data Acquisition Unit and a laptop with PAMGuard software (Fig. 2). The PAMGuard software allows us to monitor cetacean vocalizations not only in real time, but also to inspect and confirm the detections and species offline after the survey.

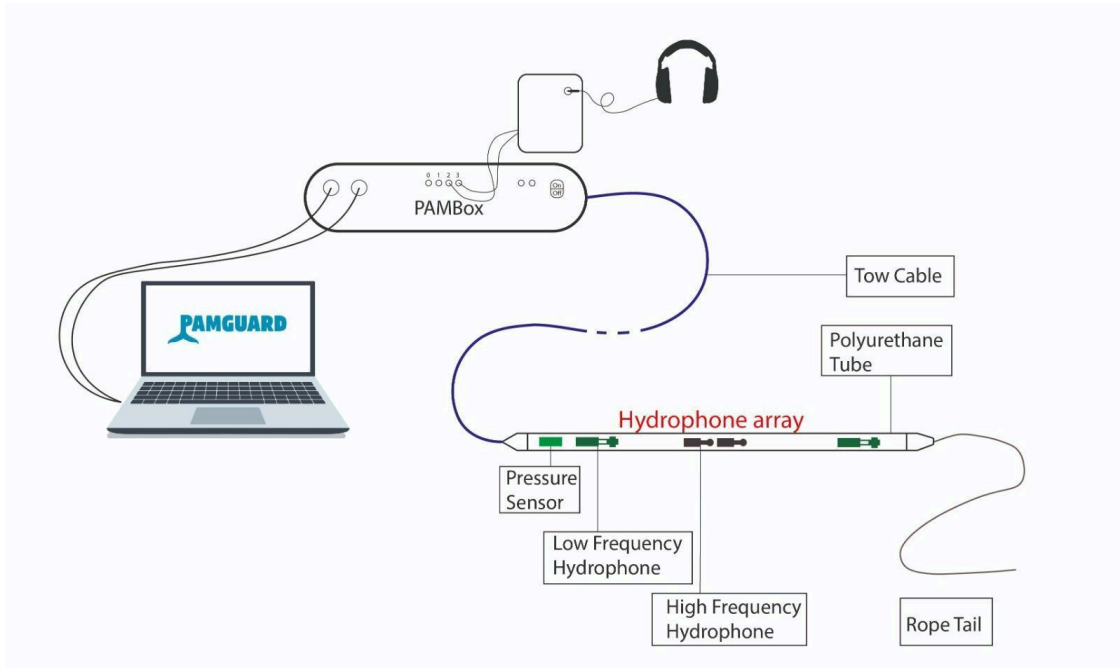


Figure 2 : Diagram of the Acoustic Configuration

When cetaceans were visually detected, the observer signaled the presence of the animal(s) to the crew and continued the observation. The expedition leader would evaluate if the observation marked the start of a cetacean survey, where additional information such as photo-identification pictures would be collected. In either case, we recorded the GPS position at the time of the observation and entered the following data: identification of the species, distance to sighting, direction of individuals, estimated number of individuals, estimated number of juveniles and number of boats around the group.

If the decision was made to collect additional information, the logistics team would then undertake photo-identification. To do this, two cameras were used across the surveys: a Canon 5D with a 100-300mm and another one with a 100-400mm lens. The objective was to take photos of the underside of the fluke for humpback whales and sperm whales and the dorsal fin for all other species. Approach of the animal would always be done with respect.

RESULTS

During expedition 3 of 2024, 6 cetaceans species were monitored (Fig. 4). The studied species include the Atlantic spotted dolphin (*Stenella frontalis*), Fraser's dolphin (*Lagenodelphis hosei*), Pantropical spotted dolphin (*Stenella attenuata*), Pygmy killer whale (*Feresa attenuata*), Sperm whale (*Physeter macrocephalus*) and one unidentified Beaked whale (*Zhiphiidae spp.*). 158 hours of research effort were conducted over a 15 days expedition monitoring from Martinique to Anguilla. The visual and acoustic effort covered 1544 km, with an average of 103 km covered per day at an average speed of 5.4 knots, depicted by the blue lines in Figure 3 below.

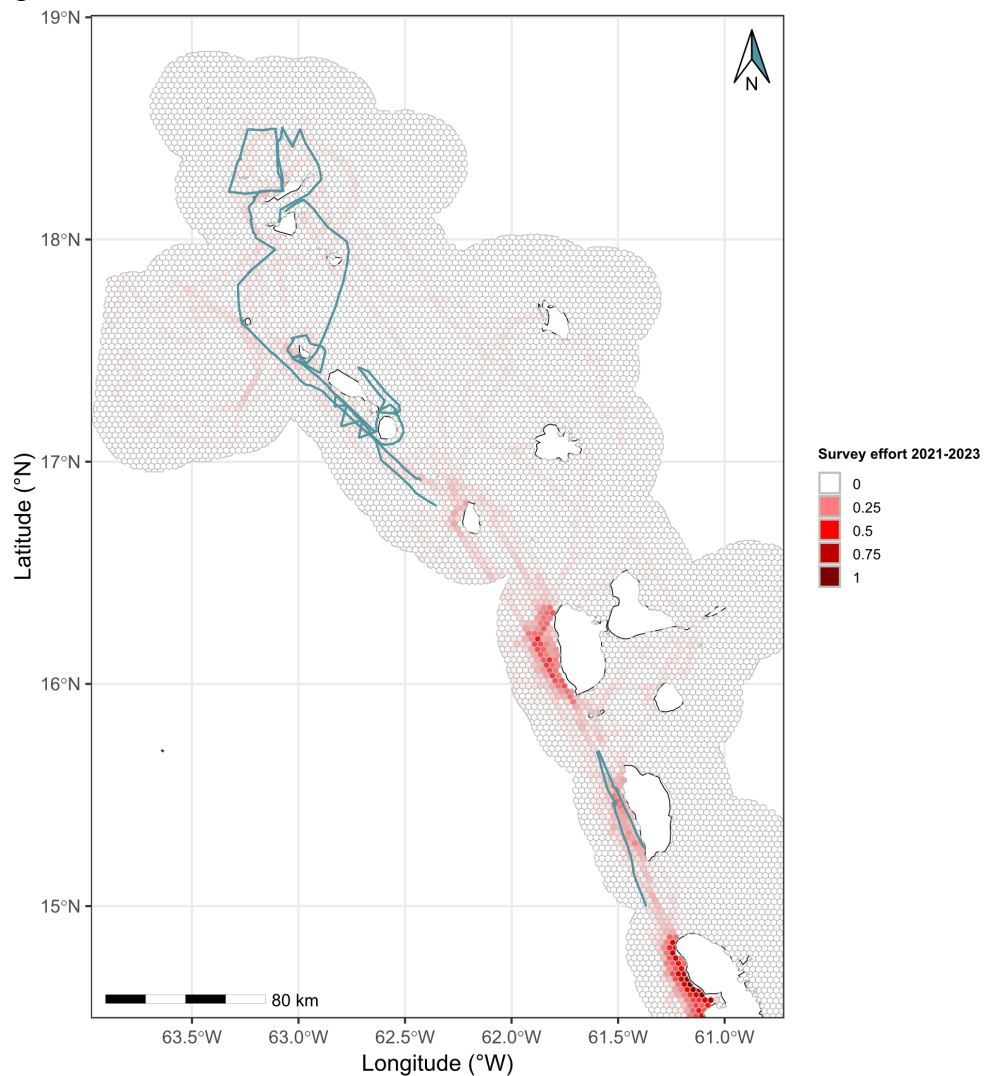


Figure 3 : Boat tracking (in blue) with positive observation effort from Expedition 3 of the Ti Whale An Nou program 2024 with 2021-2023 survey efforts (in red)

One of the goals of this expedition was to sample areas that had not been explored in depth by the CCS previously, consisting of the areas further from the coastline. These areas are shown in light red or white in Figure 3, where the search effort per hexagon has been calculated based on sightings data collected between 2021 to 2023 for all cetaceans.

Cetacean Species monitored

- Atlantic spotted dolphin (*Stenella frontalis*)
- Fraser's dolphin (*Lagenodelphis hosei*)
- Pantropical spotted dolphin (*Stenella attenuata*)
- Pygmy killer whale (*Feresa attenuata*)
- Sperm whale (*Physeter macrocephalus*)
- Unidentified Beaked whale (*Zhiphiidae sp.*)

Cetaceans sightings table :

The data collected on these species is summarized in Table 1, which provides details on their localization, identification certainty, group size estimates, calf presence, and other relevant information. This data serves as a valuable resource for understanding the distribution and behavior of these cetacean species in the surveyed regions.

Table 1 : Cetacean sightings recorded during expedition 3 of 2024.

Localization	Species Name	Identification certainly	Group size estimate	Max. estimate	Min. estimate	Juv. presence	Juv. estimate
Martinique	Pantropical spotted dolphin	Certain	180	250	150	Yes	20
Dominica	Pantropical spotted dolphin	Certain	90	120	70	No	0
Dominica	Fraser's dolphin	Certain	200	250	180	Yes	30
Dominica	Pantropical spotted dolphin	Certain	100	120	80	Yes	10
Guadeloupe	Sperm whale	Certain	6	8	6	Yes	1
Guadeloupe	Sperm whale	Certain	1	NA	1	Yes	1
Montserrat	Pantropical spotted dolphin	Certain	15	20	10	Yes	1
St-Kitts & Nevis	Pantropical spotted dolphin	Certain	5	10	3	Do not know	NA
St-Eustatius	Pantropical spotted dolphin	Certain	20	25	15	No	0
Anguilla	Atlantic spotted dolphin	Certain	100	120	80	Yes	4
Anguilla	Atlantic spotted dolphin	Certain	15	20	10	Yes	1
St-Eustatius	Pygmy killer whale	Certain	6	8	4	No	0
Montserrat	Sperm whale	Certain	4	4	4	Do not know	NA
Dominica	Sperm whale	Certain	2	2	2	Do not know	NA
Dominica	Unidentified Beaked whale	Certain	1	1	1	Do not know	NA

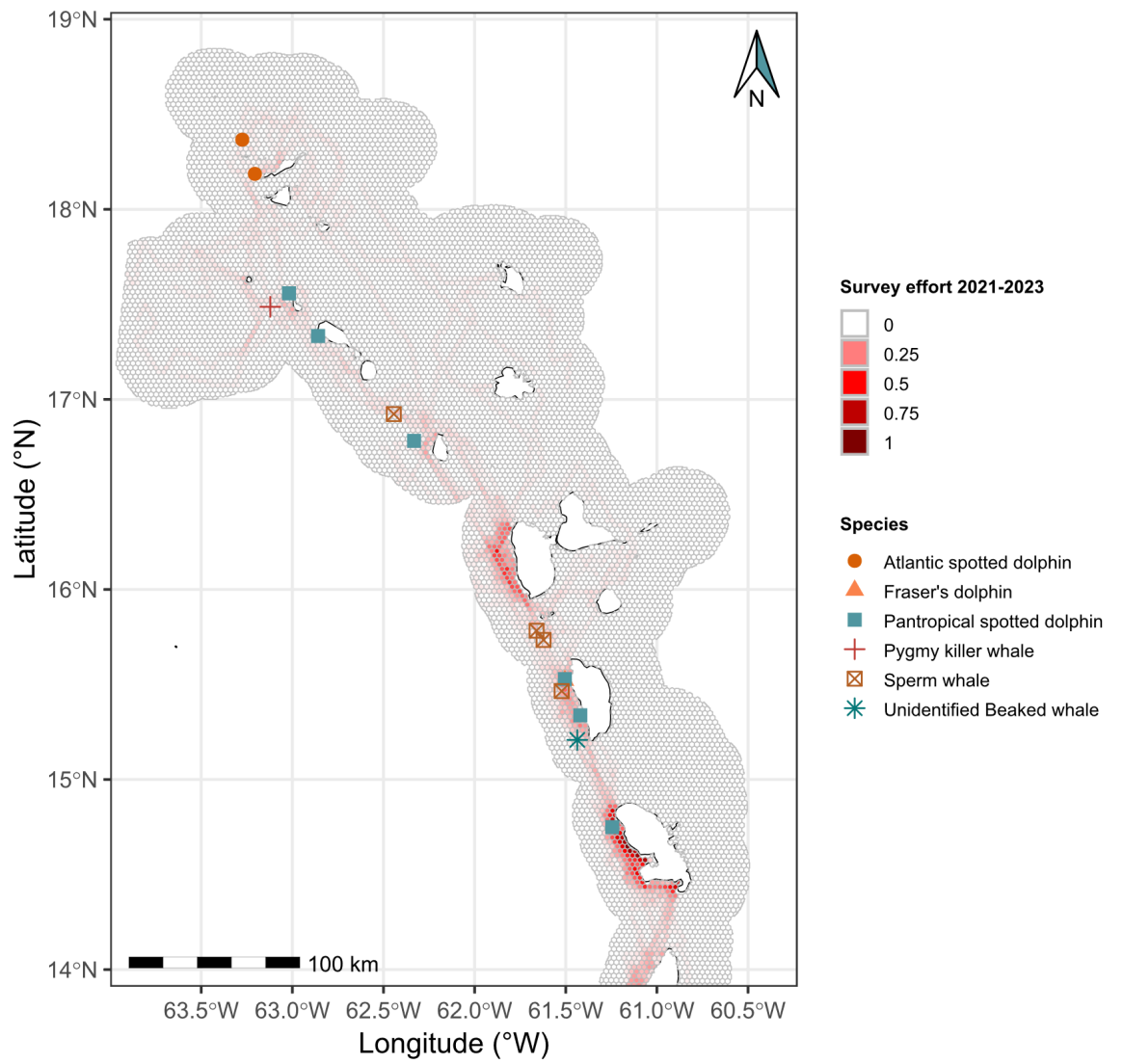


Figure 4 : Map of the confirmed cetacean sightings with survey efforts depicted in red shading for 2021-2023

Hydro acoustic sightings

During this expedition, 105 listening points were conducted with active listening while the hydrophone was towed, representing a total of at least 20 hours of listening. Of these, 29 detected the presence of cetaceans thanks to the PAMGuard software. 13 detections were of Delphinidae, 4 of sperm whales, and 14 of humpback whales. Species detection was based on listening and visual detection using the spectrogram and click detector for potential whistles, clicks, songs, and other characteristic sounds of certain cetacean species. They are each recorded and depicted in Figure 5 below.

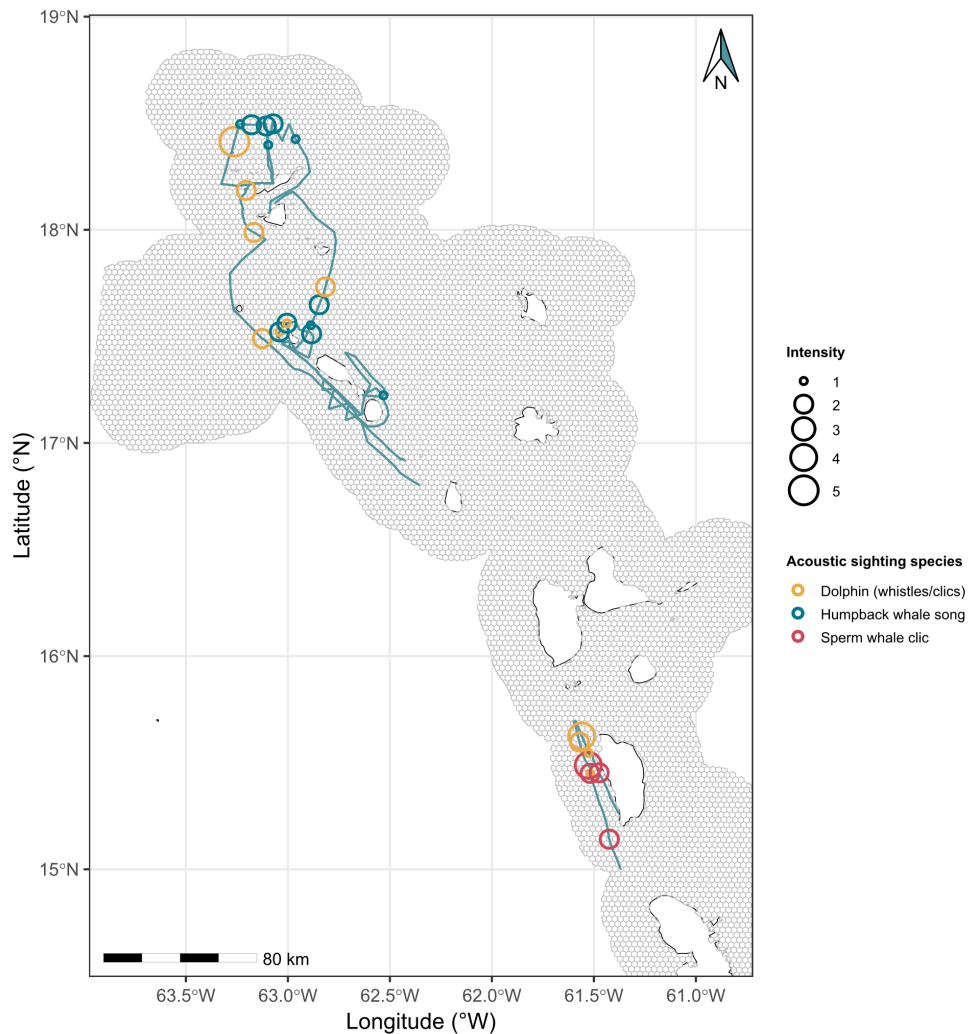


Figure 5 : Study area of the acoustic sightings of Delphinidae whistle and clicks (orange circles), humpback whale songs (blue circles) and sperm whale clicks (red circles). The active acoustic survey is represented by the blue line.

Marine traffic

A total of 253 boats were observed during the visual survey of this expedition (Fig. 6.1), with sailboats accounting for the majority (72% of observations) evenly across the study area (Fig. 6.2 C). There were 24 small fishing boats (Fig. 6.2 A), primarily sighted near the coast. Cargo ships numbered 17 (Fig. 6.2 D), notably near Fort-de-France in Martinique and around the islands of St-Eustatius, St-Kitts and Nevis.

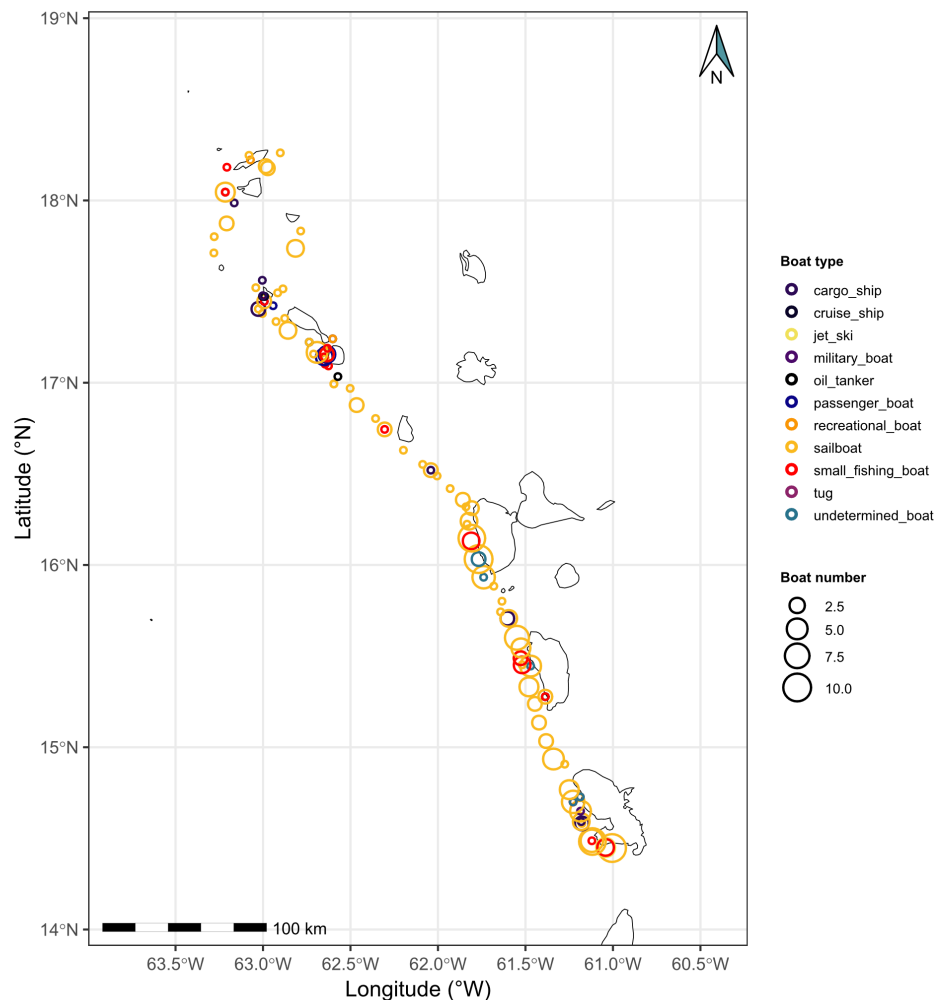


Figure 6.1 : Map of the number and type of boats observed during visual survey

Due to the diversity and large number of boats recorded, the map has been divided into 4 separate maps for clarity (Fig. 6.2), categorizing boats into 4 main categories: motor vessels less than 20m (A), motor vessels over 20m (B), sailboats (C), and motor vessels over 50m (D).

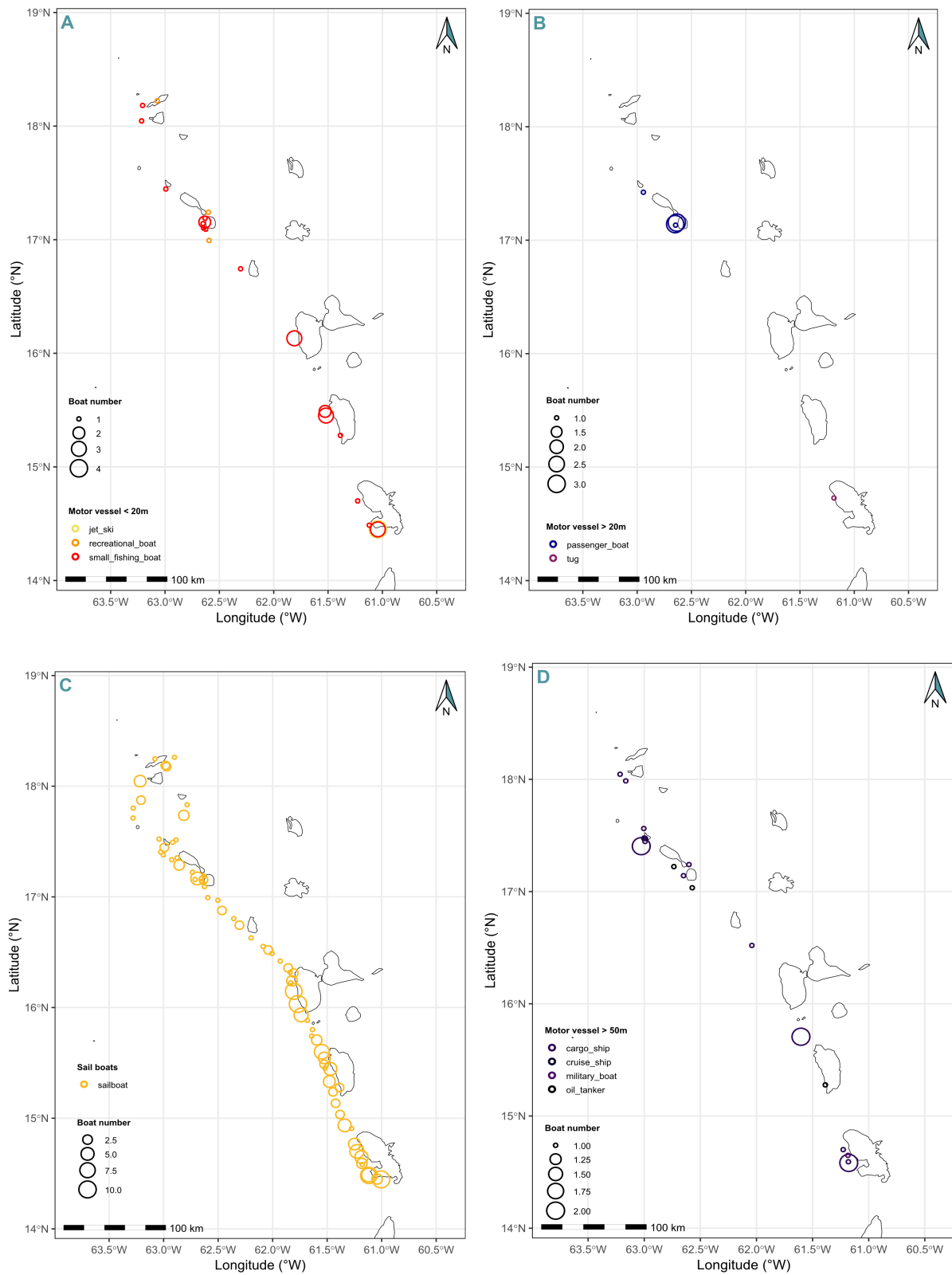


Figure 6.2 : Maps of the different categories of boats observed during the visual survey with A) the motor vessels < 20m ; B) motor vessels > 20m ; C) Sailboats ; and E) the motor vessels > 50m

In 2023, CCS started monitoring seabirds with some pretty exciting sightings, even if the data collection protocol is still developing. In the results the observation numbers are an underestimation and possibly some occasions of misidentification occurs but there is still valuable data to have preliminary data of species presence and species diversity.

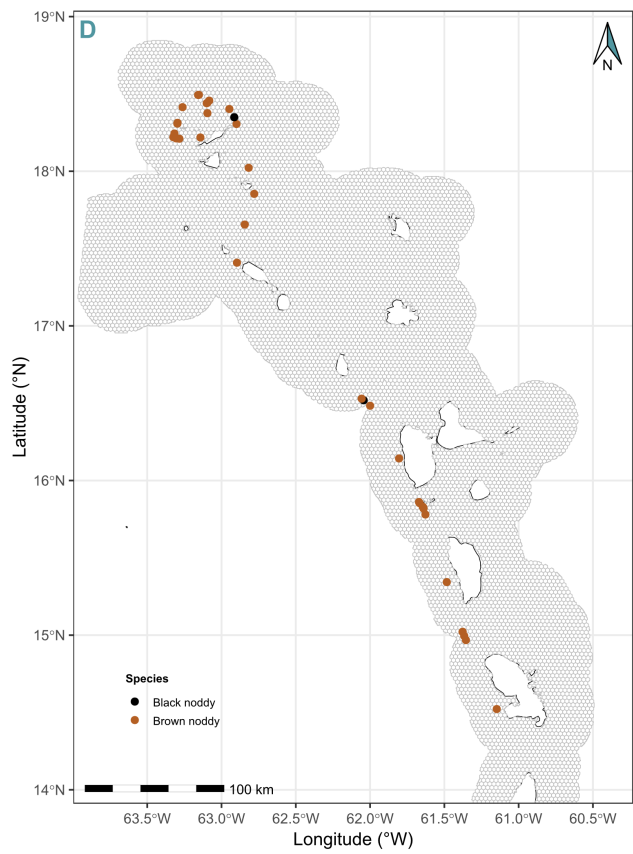
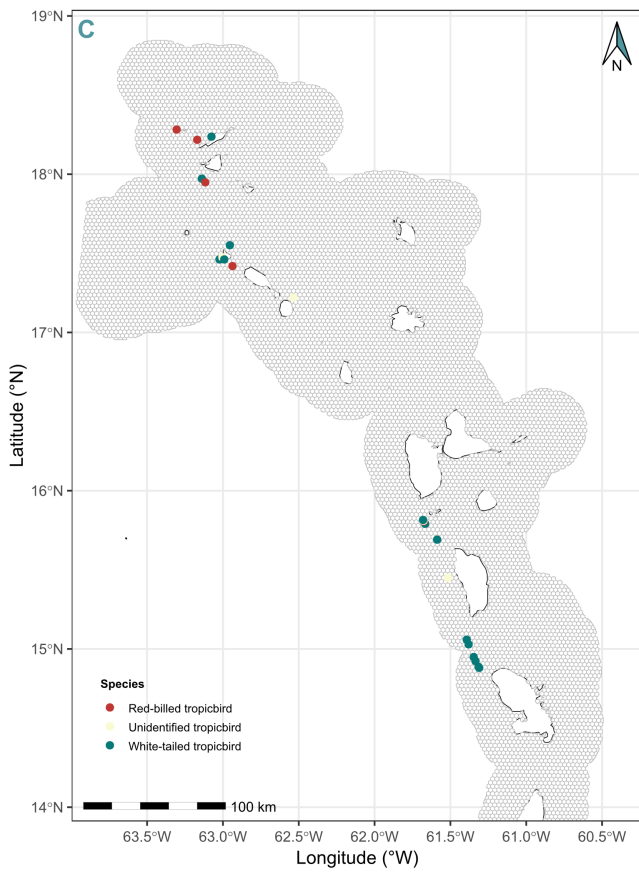
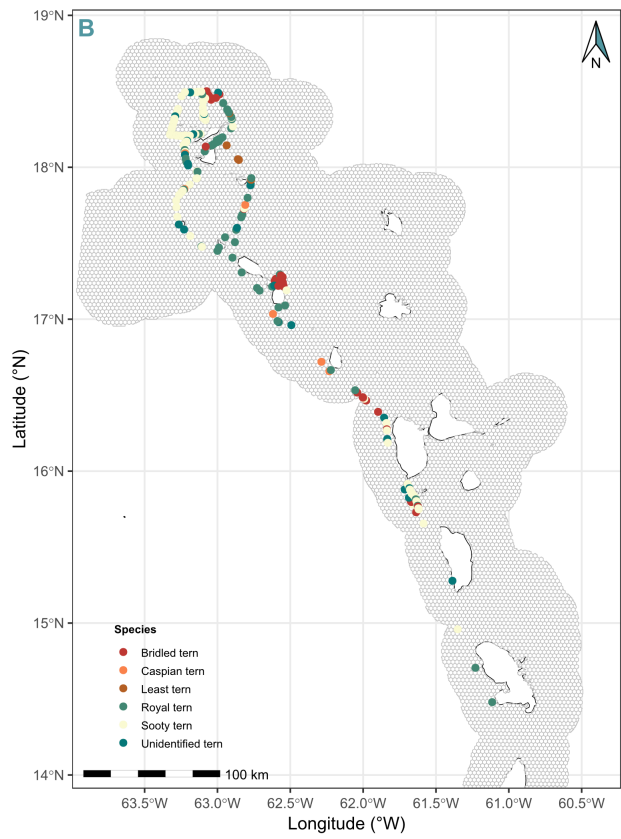
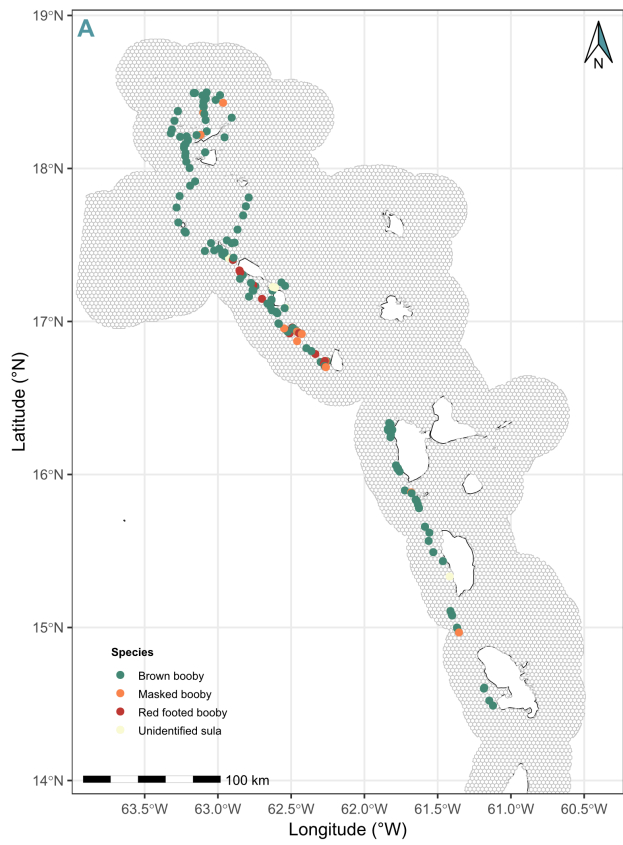
During this expedition, 1784 individuals of 20 different species of seabirds were recorded and listed below (Table 2), with 1633 certain identifications. Among the latter, the Laridae family dominates with 56% of the observations, followed by the Sulidae (29%) and the Phaethontidae (2%). The brown booby was widely distributed throughout the expedition, while observations of masked boobies were less frequent, mainly concentrated between St. Kitts and Montserrat, as well as north of Anguilla. These data provide valuable insights into the distribution and frequency of seabird species in the region, contributing to a better understanding of their ecology.

Seabird species monitored :

Table 2 : Seabird sightings recorded during expedition 3 of 2024.

Species	Scientific name	Nbr of observation
Black noddy	<i>Anous minutus</i>	3
Bridled tern	<i>Onychoprion anaethetus</i>	61
Brown booby	<i>Sula leucogaster</i>	372
Brown noddy	<i>Anous stolidus</i>	131
Brown pelican	<i>Pelecanus occidentalis</i>	1
Caspian tern	<i>Hydroprogne caspia</i>	8
Laughing gull	<i>Leucophaeus atricilla</i>	72
Least tern	<i>Sternula antillarum</i>	8
Magnificent frigatebird	<i>Fregata magnificens</i>	135
Masked booby	<i>Sula dactylatra</i>	13
Red-billed tropicbird	<i>Phaethon aethereus</i>	5
Red footed booby	<i>Sula sula</i>	20
Royal tern	<i>Thalasseus maximus</i>	79
Sooty tern	<i>Onychoprion fuscatus</i>	509
Unidentified puffin	<i>Procellariidae spp.</i>	1
Unidentified sula	<i>Sulidae spp.</i>	67
Unidentified tern	<i>Sterninae spp.</i>	117
Unidentified tropicbird	<i>Phaethontidae spp.</i>	4
White-tailed tropicbird	<i>Phaethon lepturus</i>	26
Wilson's storm-petrel	<i>Oceanites oceanicus</i>	1

Due to the number of individual birds sighted, several maps have been created for each genus of seabirds for clarity. They are presented in the maps labeled A to E in Figure 5.



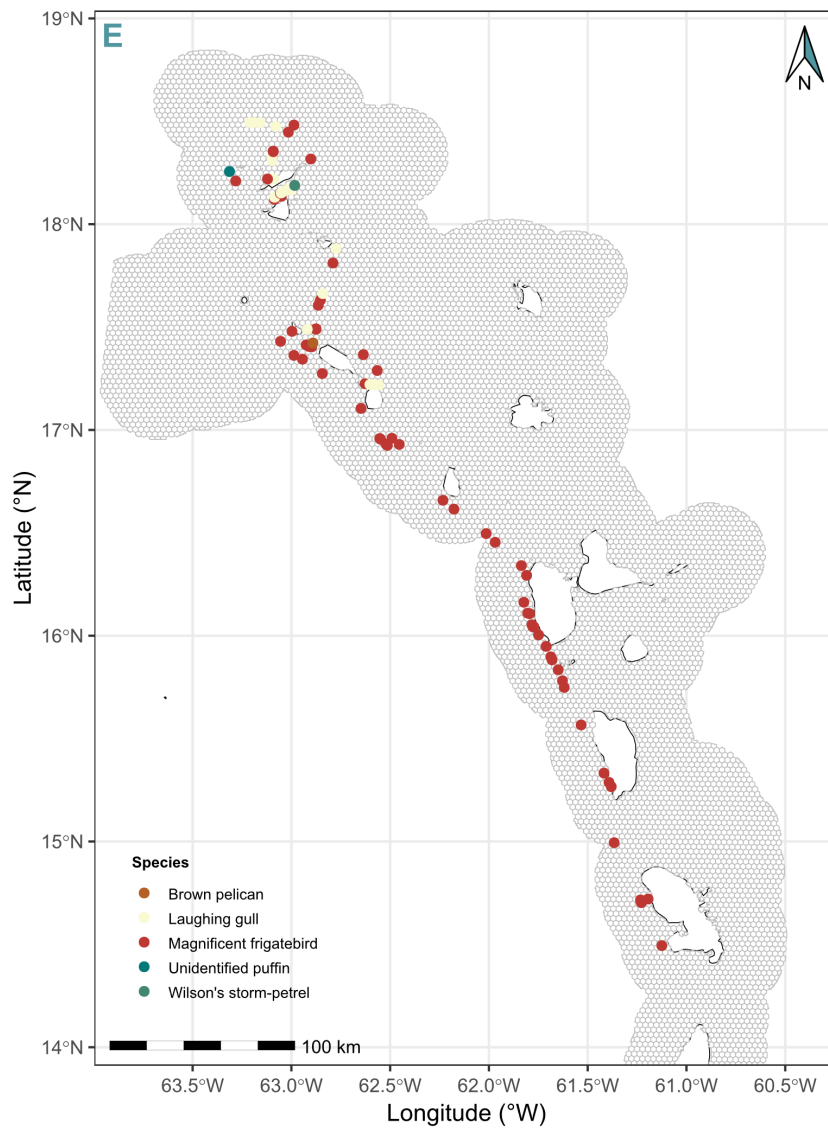
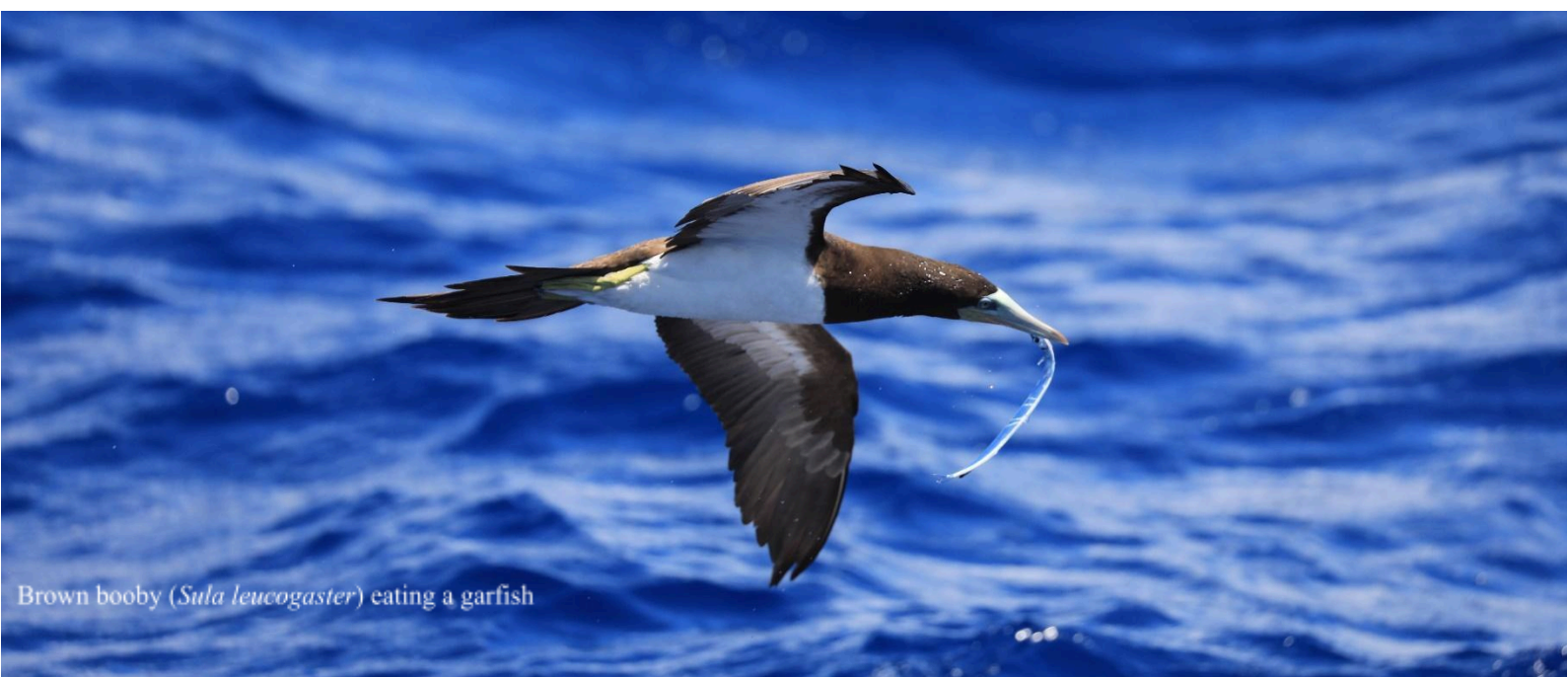


Figure 7 : Maps of sightings seabirds families recorded during expedition 3 of 2024 with A) the Booby sightings; B) Terns sightings; C) Tropicbirds sightings; D) Noddy sightings; and E) Others sightings.



Brown booby (*Sula leucogaster*) eating a garfish

IMPACT

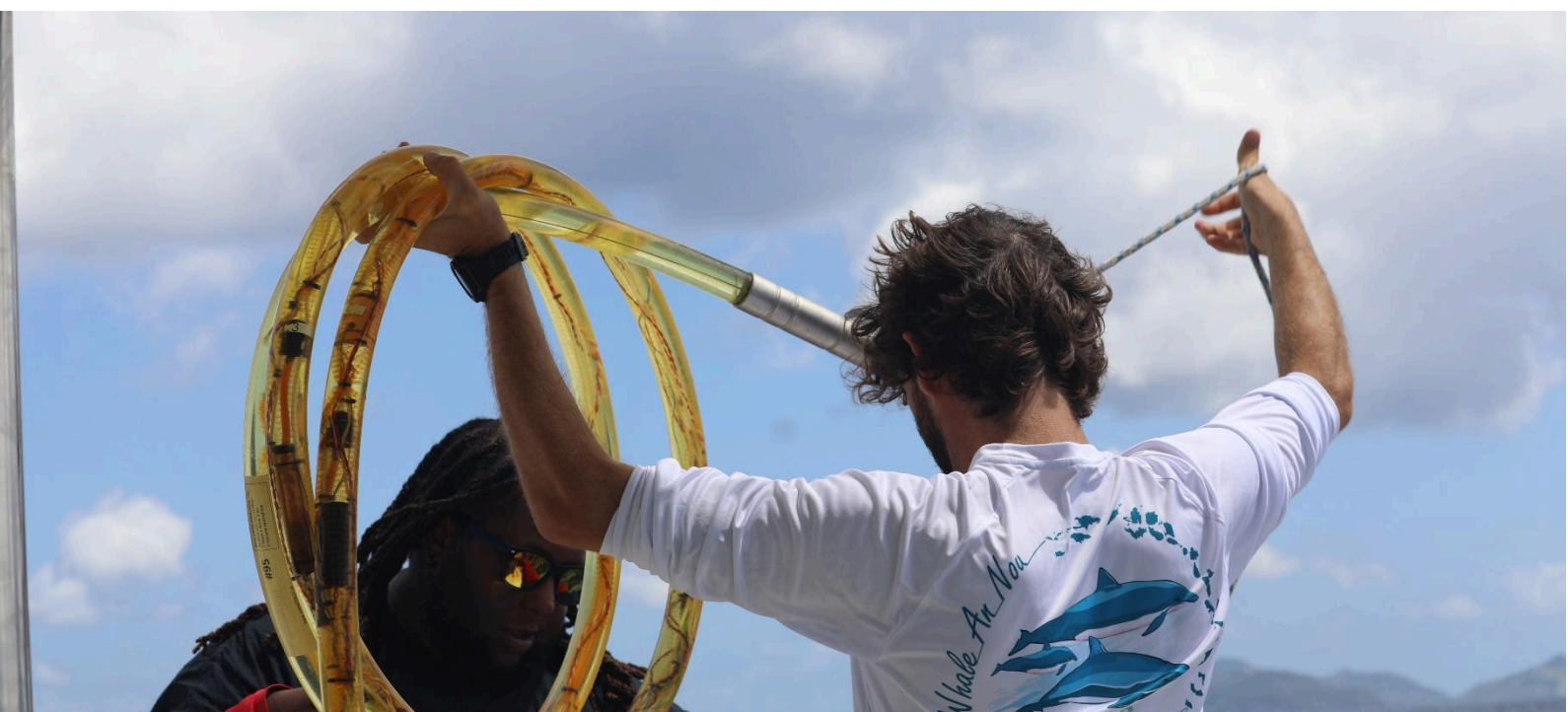
The CCS Ti Whale An Nou program aims to act towards cetacean protection acting on four axes:
Cooperation, Education, Research and Conservation.

Impact on Cooperation :

Through the Yon Sèl Vwa Pou Baleyn project supported by the Regional Cooperation Fund of Martinique's prefecture significant and far-reaching effects of regional cooperation have been achieved. There were passengers on this expedition from Guadeloupe, Martinique, St. Kitts and Nevis, and Saba. It fosters knowledge and expertise sharing by uniting individuals from various islands and backgrounds, bolstering group efforts to protect cetaceans.

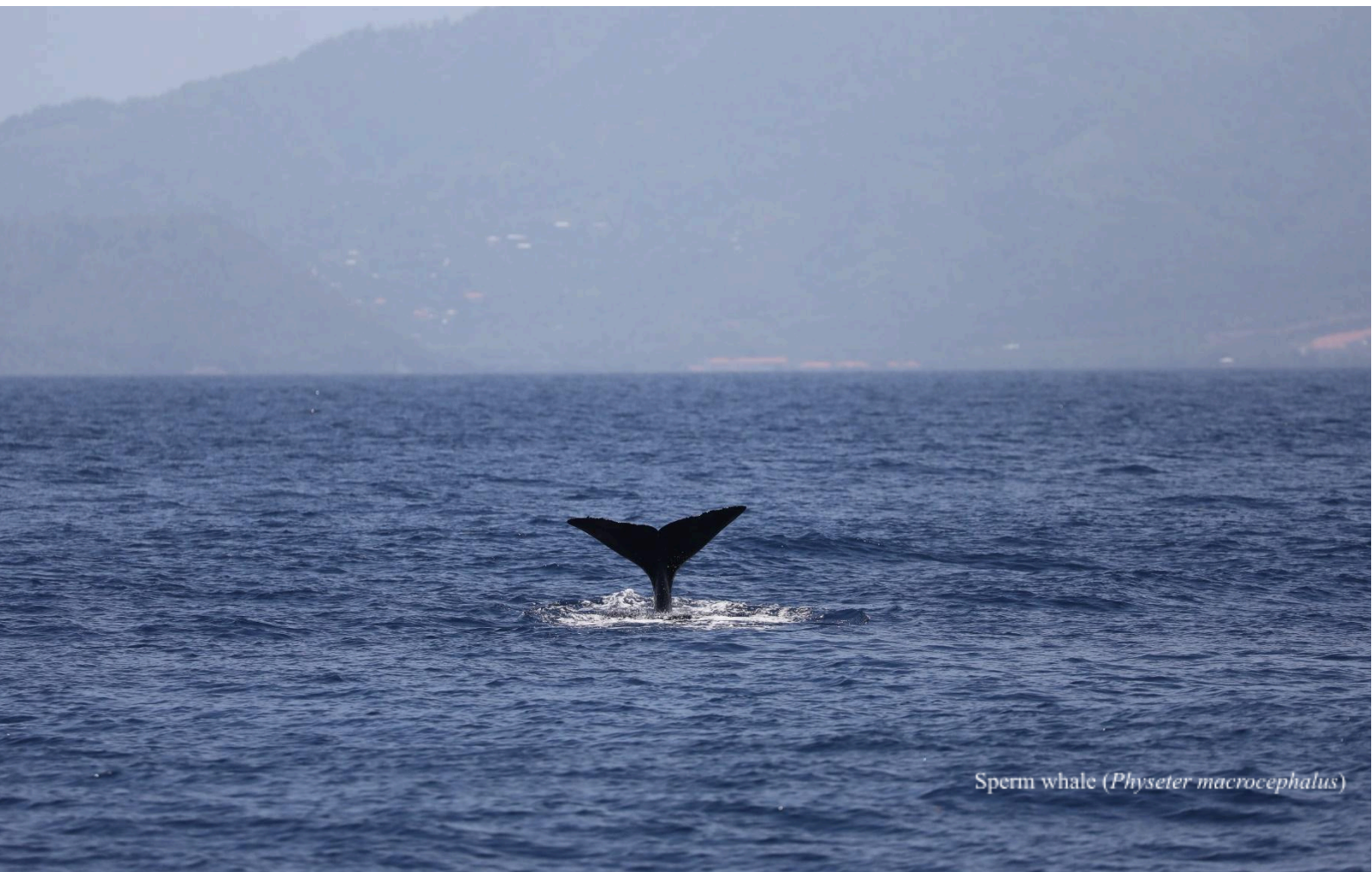
Four of the crew members who were actively involved in the May 2024 expedition north of the Lesser Antilles were from the Lesser Antilles. Tuijnman Camille, a Marine Park Officer from the Saba Conservation Foundation in the Netherlands Islands, who had received onboard training in cetacean conservation, was also welcomed. She has spent four days training as an active crew member and learning the "Ti Whale An Nou" protocols and tools.

Three Marine Management Area and Habitat Monitoring Officers from St. Kitts and Nevis joined for a day the crew and actively participated in research and data collection, which further strengthened cooperation on this expedition. Through the provision of training opportunities and the cultivation of local expertise in marine biology and conservation, "Ti Whale An Nou" guarantees the development of a skilled group of professionals who can effectively support marine mammal conservation initiatives throughout the Caribbean.



Furthermore, the diversity of professional backgrounds emphasizes how the program can bring all of the participants together. The effectiveness of research and conservation efforts is increased by this multidisciplinary collaboration, which includes marine biologists, biology and biodiversity students, marine park officers, and natural reserve ranger. It makes information and experience more easily shared, which strengthens group efforts to protect cetaceans. "Ti Whale An Nou" is a prime example of regional cooperation and marine conservation initiatives because of its inclusive and cooperative approach, which has been instrumental in advancing the cause of cetacean conservation in the Caribbean. The fact that Mosiah Arthus, the Natural Regional Park of Martinique's Reserve ranger, is on board for the third time, is an additional evidence that CCS expeditions are a component of a long-term local perspective.

Finally, this strategy increases the program's sustainability and gives the local people a sense of pride and accountability for the conservation efforts taking place in their community. Furthermore, the program offers beneficial training opportunities, enabling people who are enthusiastic about marine conservation to become knowledgeable locally and actively participate in the preservation of their marine environment.



Sperm whale (*Physeter macrocephalus*)

Impact on Research :

During this expedition, part of the Yon Sèl Vwa Pou Baleyn project, a total of 15 observations of 6 different species were recorded during the expedition. The discovery of pygmy killer whales between Saba and St. Eustatius during this third Ti Whale An Nou 2024 expedition is an infrequent observation in this region and is thus inherently important. The sighting of a beaked whale in the south of Dominica is especially notable, as these whales are usually spotted further south of the Lesser Antilles.

During the previous year's expedition number 3 of the Ti Whale An Nou program, conducted from May 5 to 16, 2023, numerous humpback whale sightings were recorded in the northern islands of the Lesser Antilles. However, during the current expedition (the 3rd of the Ti Whale An Nou program in 2024), carried out from May 14 to 29, no humpback whale sightings were reported. Despite this, their songs were clearly detected by hydrophone between the islands of St. Kitts and north of Anguilla (Fig. 5). This follows the observations made during the last expedition where humpback whales' density of observation was weak when compared to the past years at the same time.



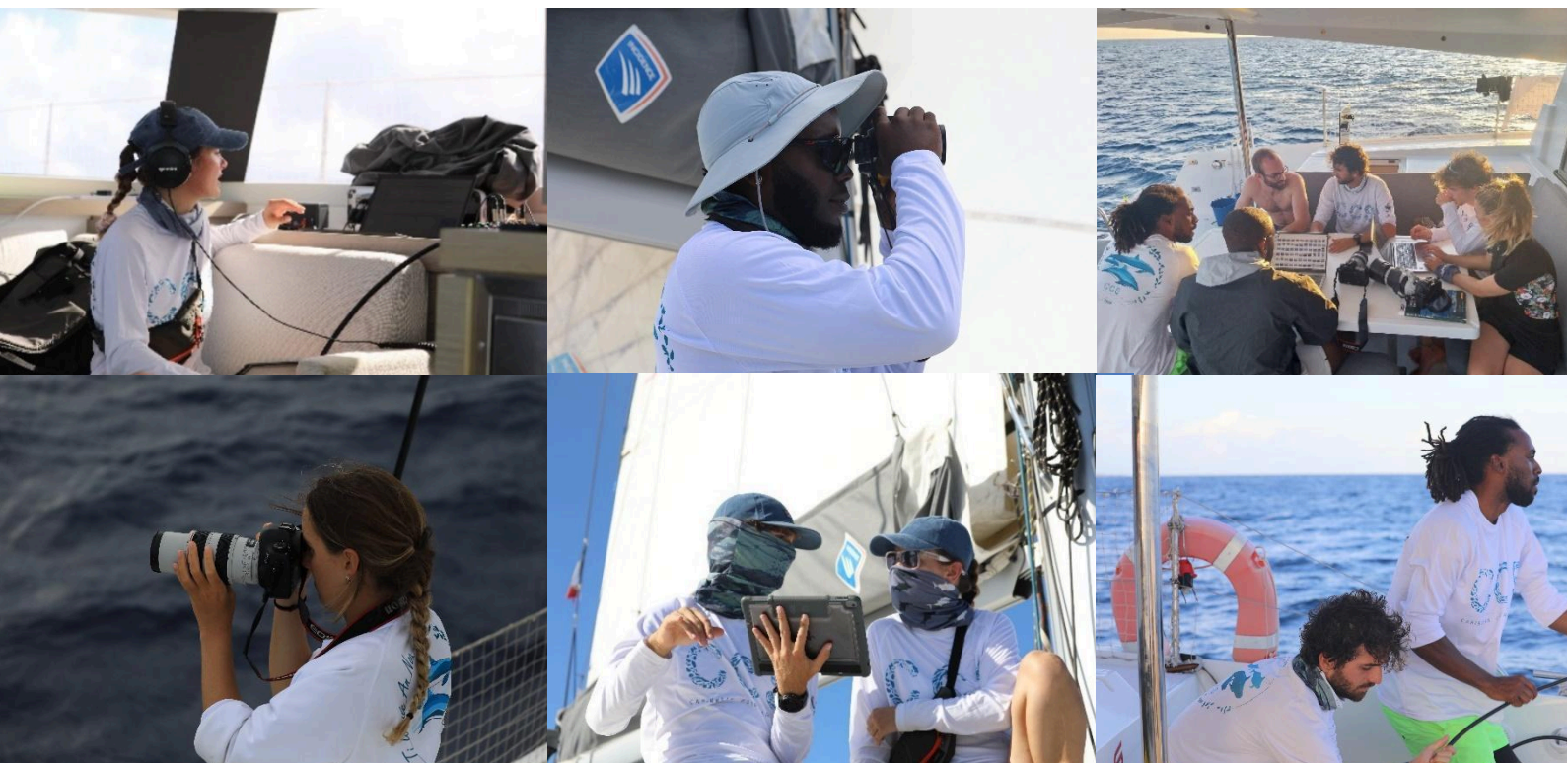
Deployment of the hydrophone complemented the observation work, which could sometimes be difficult given the bad weather conditions. This acoustic analysis method facilitated the detection of species that are difficult to observe due to their immersion time, such as sperm whales.

Interestingly, most of the Lesser Antilles' islands are included in the program's expeditions, which cover the entire Caribbean region. This all-encompassing strategy guarantees that scientific and conservation efforts are not limited to particular areas but rather span the Caribbean. These "breakthroughs" highlight the program's contribution to continuously gaining fresh perspectives on the cetacean populations in the area.

In order to better predict the areas of particular interest for each species and establish conservation strategies tailored to the various territories, we will be able to update and specify the distribution of these various species in the Lesser Antilles through the analysis of GPS and acoustic data. To identify potential new unmarked individuals or to highlight recaptures of individuals previously marked in prior years, the newly collected photographic data will be compared with data gathered in other years thanks to the Flukebook software.

To highlight the various threats that differ depending on the species involved, these data will also be utilized to identify potential injuries and the types of harm they could cause. When appropriate, it is also possible to study more precisely the relationships between individuals or between species by analyzing photographic data in parallel with other types of data collected (start/end of monitoring, type of behavior observed). This helps us, in particular, to understand the structure and complexity of the relationships that unite all of these species.

In the end, all of these observations advance our knowledge of the social dynamics and migratory patterns of these marine mammals as well as their utilization of habitat within the larger Caribbean region's marine ecosystems.



Impact on Conservation :

For improved species conservation in Lesser Antilles waters, and especially to support legislative demands for cetacean conservation in the Lesser Antilles, all of the data gathered on the three territories is crucial. With an emphasis on St. Kitts and Nevis in particular, the entire data collection will allow us to finish the current understanding of the species found in the northern waters of the Lesser Antilles, which stretches from Martinique to Anguilla.

Based on scientific data, the CCS conservation effort is a component of a larger global protection effort on a Caribbean scale, especially in light of the 30x30 objectives, which seek to conserve 30% of marine biodiversity by 2030. An increasing number of territories are requesting assistance from the CCS, whose expertise is now recognized globally, to establish marine protected areas (MPAs) surrounding their islands and improve the status of cetacean protection in the Caribbean.





Impact on Education :

Raising awareness is facilitated by the education programs run by the Caribbean Cetacean Society, especially the "Ti Whale An Nou" program. A key factor in this effect is the program's constant focus on education, which is entwined with collaboration, research, and conservation.

Four students, two of whom were from local universities, participated in the training opportunities that are an essential part of these missions, which actively involve participants from a variety of Caribbean islands. Individuals gain priceless skills and knowledge from this practical work in the fields of marine biology and conservation, which advances the body of knowledge locally.

Limitations and Challenges

The Yon Sèl Vwa Pou Baleyn project has undoubtedly made significant progress in Caribbean marine mammal conservation. This project is part of the wider CCS program Ti Whale An Nou which faces numerous challenges, including concerns about its long-term sustainability.

Logistical challenges have been encountered in obtaining sampling permits for the different islands of the archipelago, especially for the OECS islands and the British Overseas Territories. This led to the impossibility of collecting data around Antigua and Barbuda during this expedition. Furthermore, we did not have the necessary authorizations to conduct scientific surveys in Guadeloupe, Martinique, Saint-Martin, Saint-Barthélemy and Montserrat.

The weather conditions in the northern Caribbean are relatively unstable, and the sea state in this region, with smaller and more exposed islands, does not facilitate observations, leading to rougher seas, with many white caps. These conditions can negatively impact our data collection efforts.

Finally, although community engagement is a major strength of our program, it also presents specific challenges. Building trust and fostering collaboration with local communities is a time-consuming and demanding process. Overcoming cultural and linguistic barriers is often essential. Ensuring the long-term sustainability of the "Ti Whale An Nou" program and its initiatives is of paramount importance, which involves maintaining local engagement and support while ensuring continuous funding.

Acknowledgements

This work has been achieved thanks to the financial support of the Regional cooperation fund of the prefecture of Martinique.

The Caribbean Cetacean Society thanks Corail Caraïbes for its commitment to the association since 2021 and for the partnership regarding the rental of catamarans.

We would also thank the Regional Natural Park of Martinique (PNRM), which also works in the protection of the marine environment, for supporting this project by providing a park ranger of the Nature Reserve during the mission.

Finally, we thank all the participants in the mission, whether it be the mission leader, the skipper, or the volunteers, for their motivation and good spirits. Finally, we would like to thank our master's students Mahé Guerin and Emilie Authier for all the data analysis and writing.

The Caribbean Cetacean Society team

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