DEPARTMENT OF ENVIRONMENT
CAYMAN ISLANDS GOVERNMENT

March 2023

Sharklogger Network 2022 Report

Project background

This citizen science programme is part of the Department of Environment's (DoE) shark research and conservation efforts. Sharks are vital to the marine environment by keeping coral reefs and reef fish communities in balance and healthy. All sharks are protected in the Cayman Islands under the National Conservation Act, 2013, creating in effect a nationwide Shark Sanctuary (since 2015)[1]. The Sharklogger programme was designed and established by DoE's Shark Project Officer, Dr Johanna Kohler in 2016 as part of a broader collaborative project with Marine Conservation International[2]. The Sharklogger Network involves members of the local diving community (resident divers/snorkelers, dive staff and dive operators) who collect dive data throughout the year to help with the monitoring of the local shark population close to shore.

Sharkloggers are residents who dive regularly and have voluntarily committed to logging every single dive and whether they saw a shark - or not - all in the name of science. This is different from reporting just shark sightings because in order for the data to have any meaning researchers must be able to calculate the "sharks per dive" which can only be done by knowing how many times divers were at a dive site and didn't see a shark. Participants were also taught how to ID, size and sex the sharks they see. Monitoring where the sharks are helps researchers to infer what might drive them to be abundant in certain areas over others and how these patterns might change over time. This data helps inform conservation management, particularly if shark abundance overlaps with high fishing activity thus making the sharks more vulnerable in certain areas and/or times of the year.

Project Funding

DoE's shark research is continuously supported by the White Tip Fund from the Cayman Islands' Brewery. In 2008 the White tip beer was designed and created by the DoE, MCI and the brewery to generate funds for local shark research. Since then CayBrew are the main sponsor of DoE's shark research and conservation efforts, including acoustic and satellite telemetry, underwater camera traps (BRUVS), photo-identification, and diving surveys to better our understanding and ultimately conserve our local shark population on top of the coastal shelf as well as down to 2,000 m/6,500 ft of depth.

This report summarizes the results from the data collected in 2022 and discusses some of the implications.

[1] When section 33 of the National Conservation Act, 2013, came into force providing complete protection for all sharks at all times in all Cayman waters.
[2] Scottish NGO and partner of DoE's shark research

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2022 results

From January to December 2022 a total of 3,383 dives (Grand Cayman = 2,902, Little Cayman = 125, Cayman Brac = 356) were logged by 23 resident divers and snorkelers with a minimum of 203 dives in February 2022 and a maximum of 406 dives in December 2022. It is worth noting that despite a decrease in the number of participants, from 38 in 2021, the mean number of dives (282 dives/month) logged each month was three times higher in 2022 than that reported in 2021 (91 dives/month). Across all three islands, divers and snorkelers spent a total of 3,200.05 hrs (13 days, 8 hrs, 3 min) under water and at least one survey was conducted on 276 different dive sites.

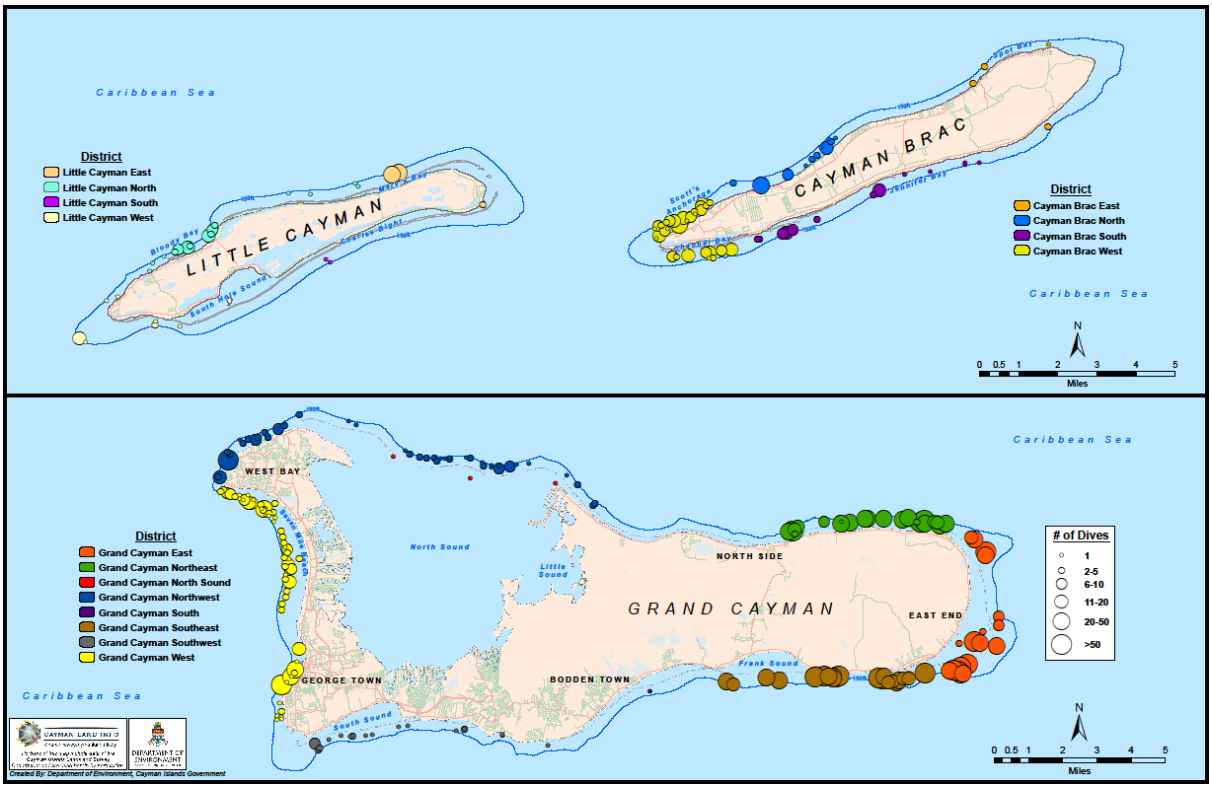

Figure 1: Distribution of dives recorded by 23 participants (SCUBA divers & snorkelers) in the Sharklogger Network

The data was reported on individual 'Shark Logs' designed and provided by the project coordinator to ensure standardized data collection. The effort was defined as the number of participants that submitted their Shark Logs divided by the total number of participants and reported as a percentage. Generally fewer than half of the participants submitted data in any given month, with a minimum of 29 % and a maximum of 57 % of participants contributing dive data each month.

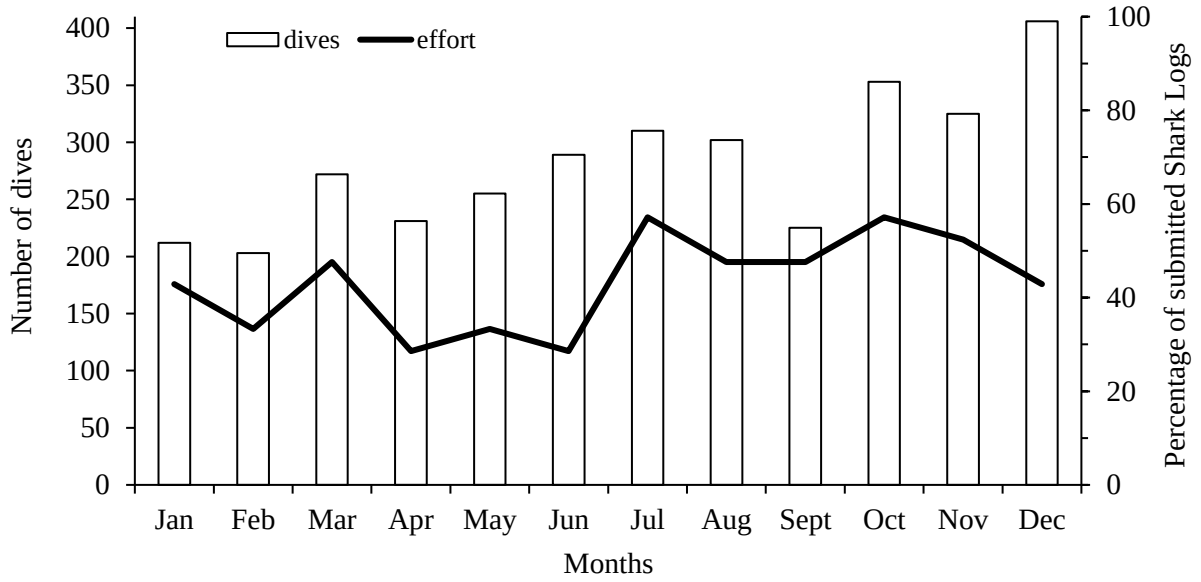

Figure 2: Monthly numbers of dives recorded by 23 participants (SCUBA divers & snorkelers) in the Sharklogger Network and their effort during 2022

Shark species sighted on dives

In 2022 participants recorded 3,383 sharks from three of Cayman's coastal shark species namely Caribbean reef, nurse, and hammerhead species. Previous surveys have shown that blacktip, tiger, and lemon sharks also inhabit Cayman's coastal shelf however these were not seen on dives logged by participants in 2022.

Caribbean reef shark was the most commonly recorded shark with a total of 1389 sightings followed by nurse sharks with 217 sightings. Participants recorded only 19 hammerhead sharks throughout the entire year.

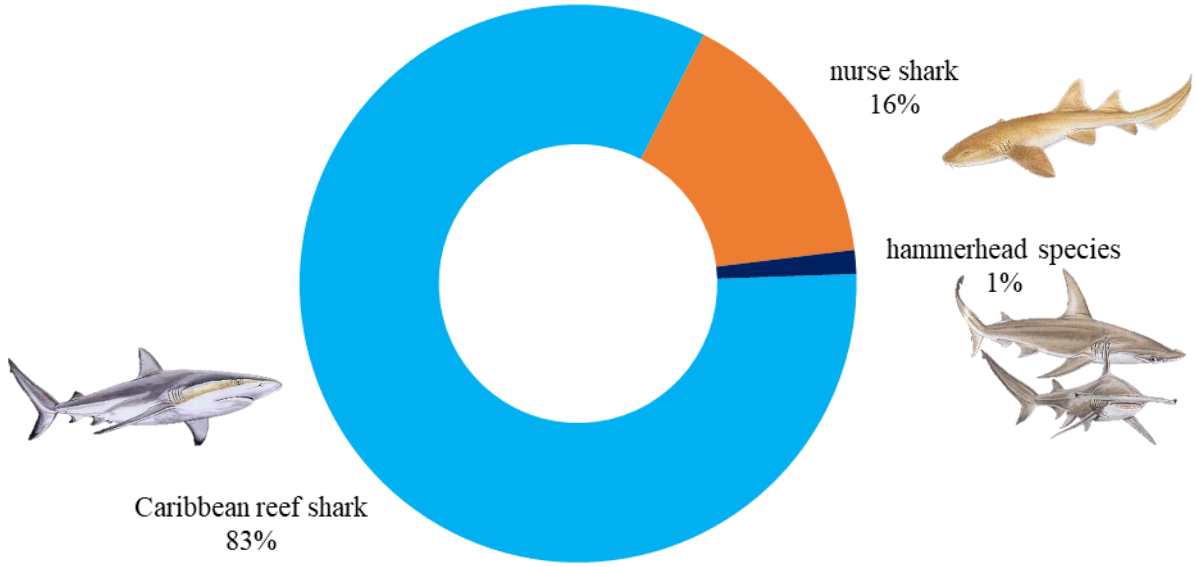

Figure 3: Shark species recorded by divers and snorkelers on their dives during 2022

Temporal trend of shark sightings

Every dive with shark sightings and those without shark sightings are recorded and 'Shark sightings per Dive' - the chance of seeing a shark on a dive is calculated. This gives an indication of the relative abundance of sharks in a particular month or area and is important information for the monitoring of our shark population throughout the year.

Sharks of three species, Caribbean reef, nurse, and hammerhead sharks[3], were encountered throughout the year. Caribbean reef shark sightings varied considerably throughout the year compared to those of nurse and hammerhead sharks. Caribbean reef shark sightings were highest in the summer months, from July to September. Two noticeable temporal lows of sightings of this species were in February and October 2022. The observed decrease in sightings might be due to a change in the behavior of sharks (avoidance of divers just before and just after the mating season) or divers (different sites or shift of number of dives to sites with typically fewer Caribbean reef sharks).

Previous surveys have shown that sharks are more mobile in summer than in winter. While this might make it less likely for divers to encounter individual sharks in their usual home range during the summer months, the high mobility of individual sharks could also increase the chance of seeing a shark anywhere around Cayman.

[3] Most likely great hammerheads (*Sphyrna mokarran*) or scalloped hammerheads (*Sphyrna lewini*). Most reef-associated shark species (except *Carcharhinus* spp. and *Sphyrna* spp.) are easily distinguished in Cayman and, subsequent to the training of divers, the data on species and sex of sharks were trusted. However, hammerhead sharks were collectively called 'hammerhead spp.' since identification to species level was not possible for most individuals reported by divers.

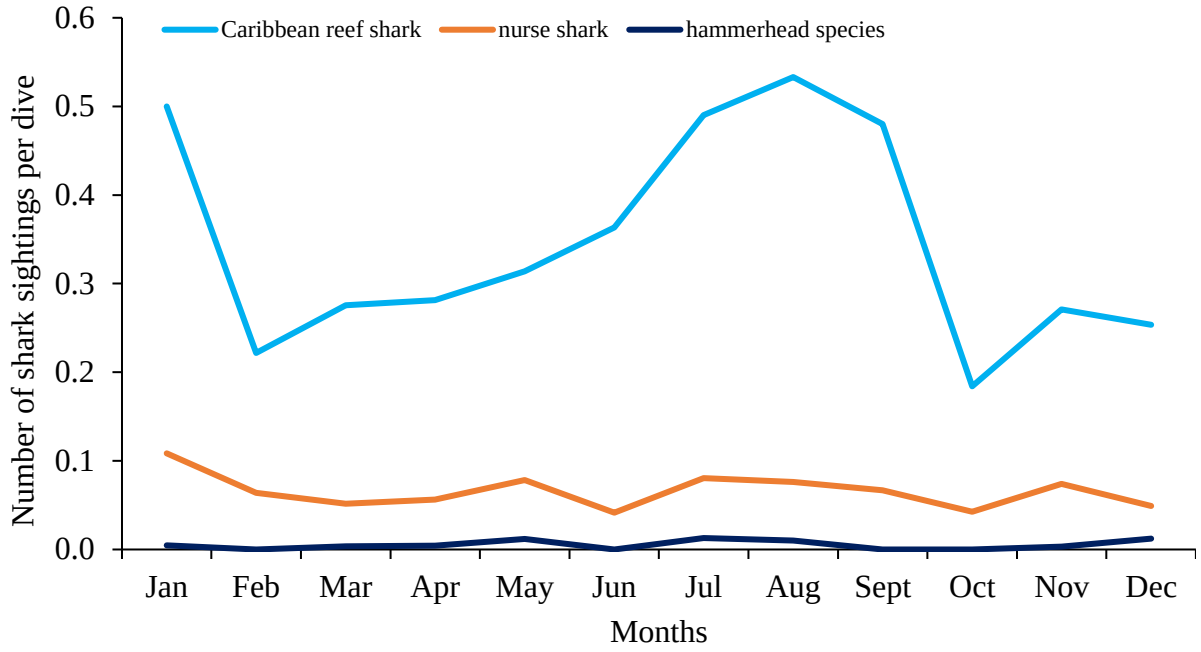

Figure 4: The number of shark sightings per dive for each species recorded by divers and snorkelers during 2022

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Spatial trend of shark sightings

This shows a number of 'hot spot' areas where participants recorded relatively large numbers of shark sightings on dives in 2022. Exact locations of hot spots are species specific. The majority of hot spots are located on the NW of Little Cayman, SE of Cayman Brac, as well as NW, SE and NE of Grand Cayman. Despite species specific variability, the spatial trend of the distribution of sharks implies that sharks, in general, seem to prefer areas with least human disturbances and relatively high current and wave exposure, likely representing areas with relatively high prey availability.

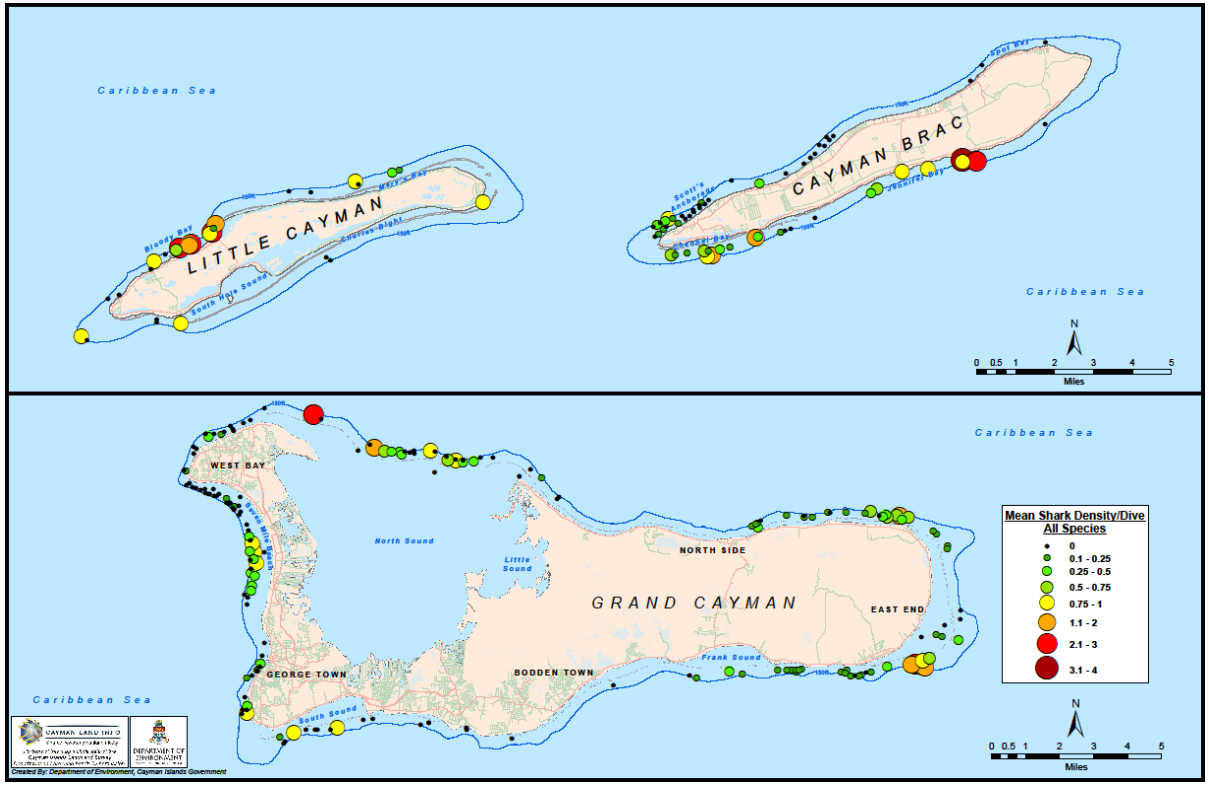

Figure 5: The distribution of all shark sightings of three species combined. The circle size is proportional of the mean number of shark sightings reported by divers and snorkelers during 2022

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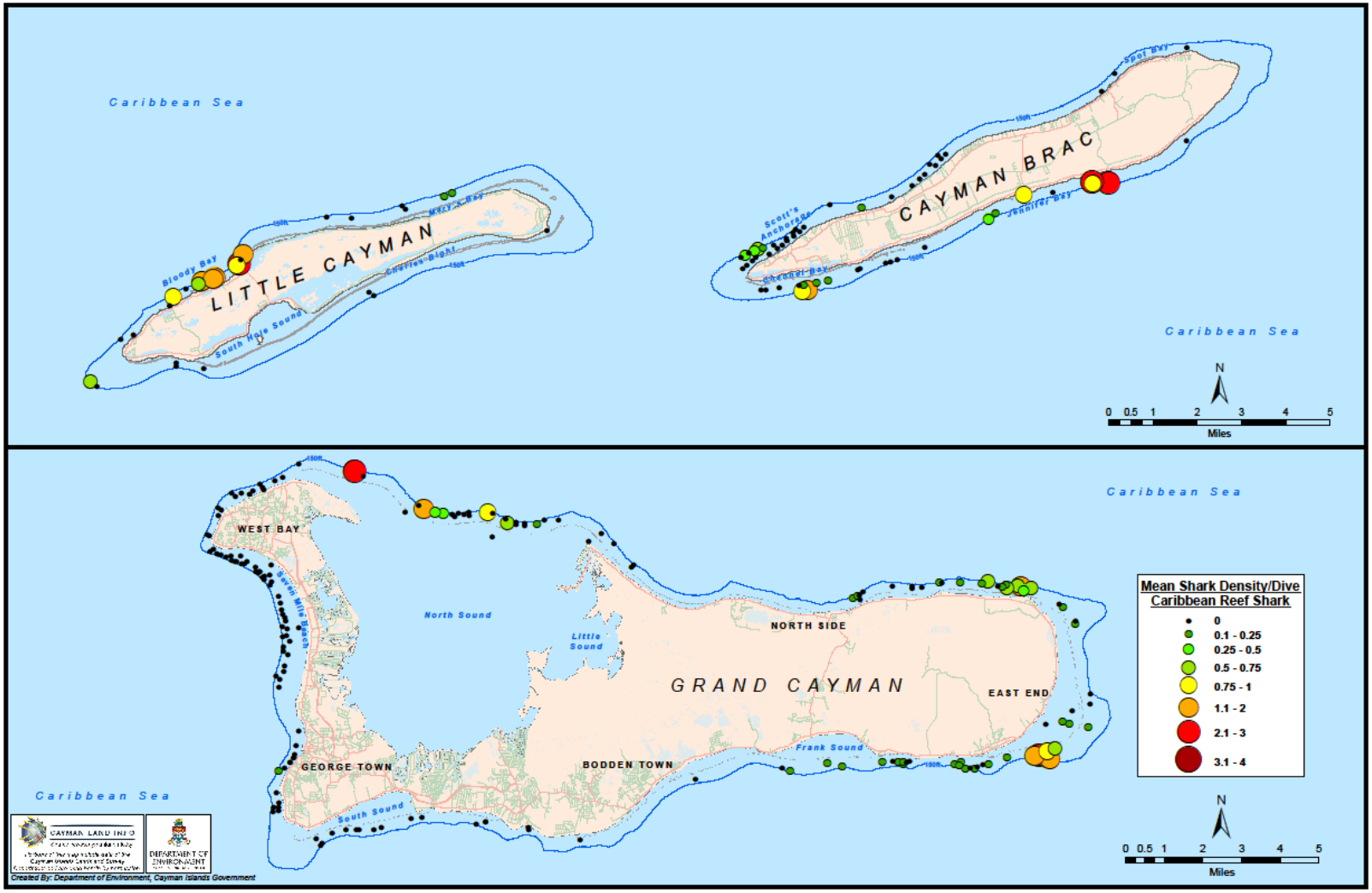

Figure 6: The distribution of Caribbean reef shark sightings. The circle size is proportional of the mean number of shark sightings reported by divers and snorkelers during 2022

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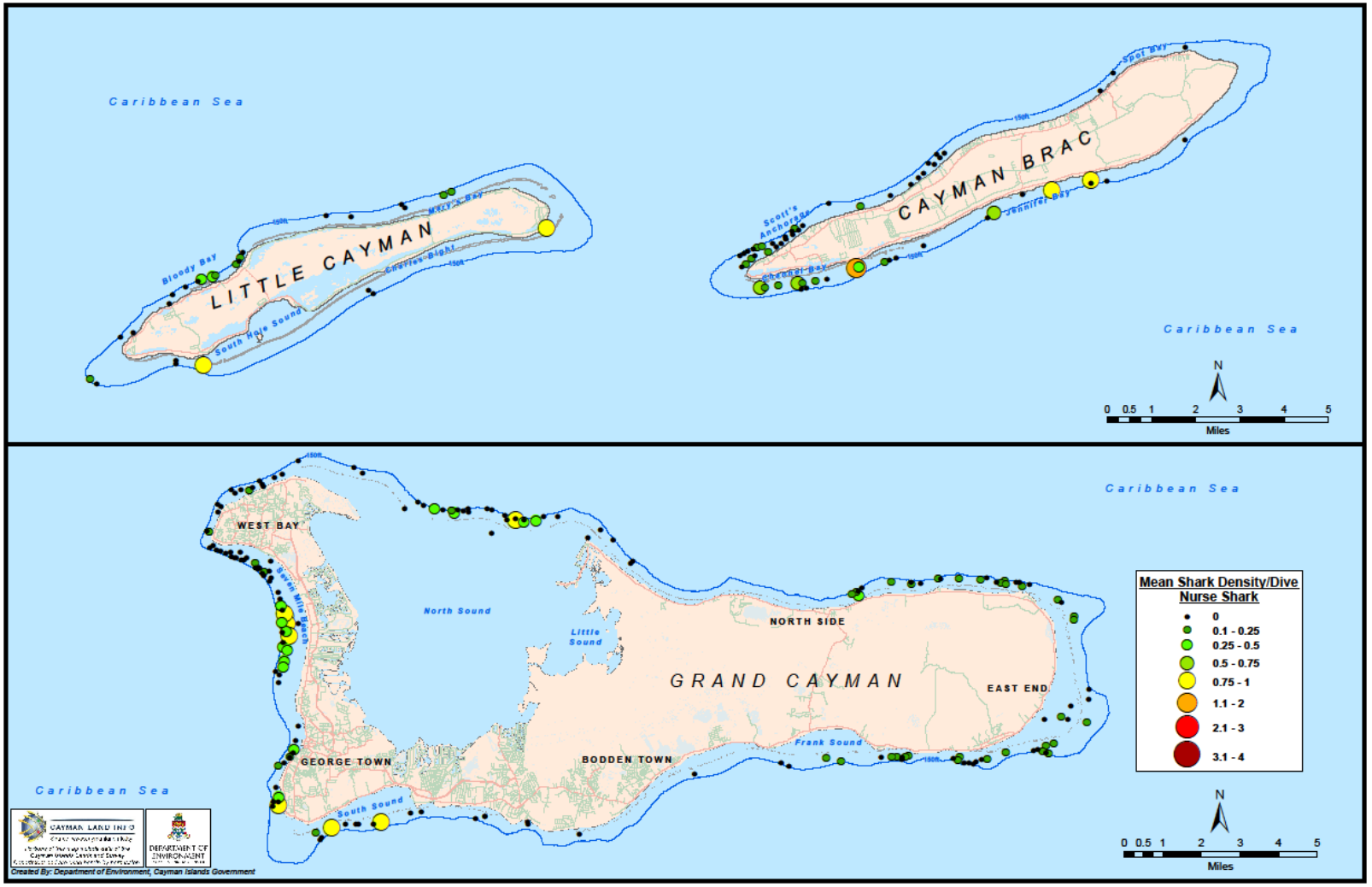

Figure 7: The distribution of nurse shark sightings. The circle size is proportional of the mean number of shark sightings reported by divers and snorkelers during 2022

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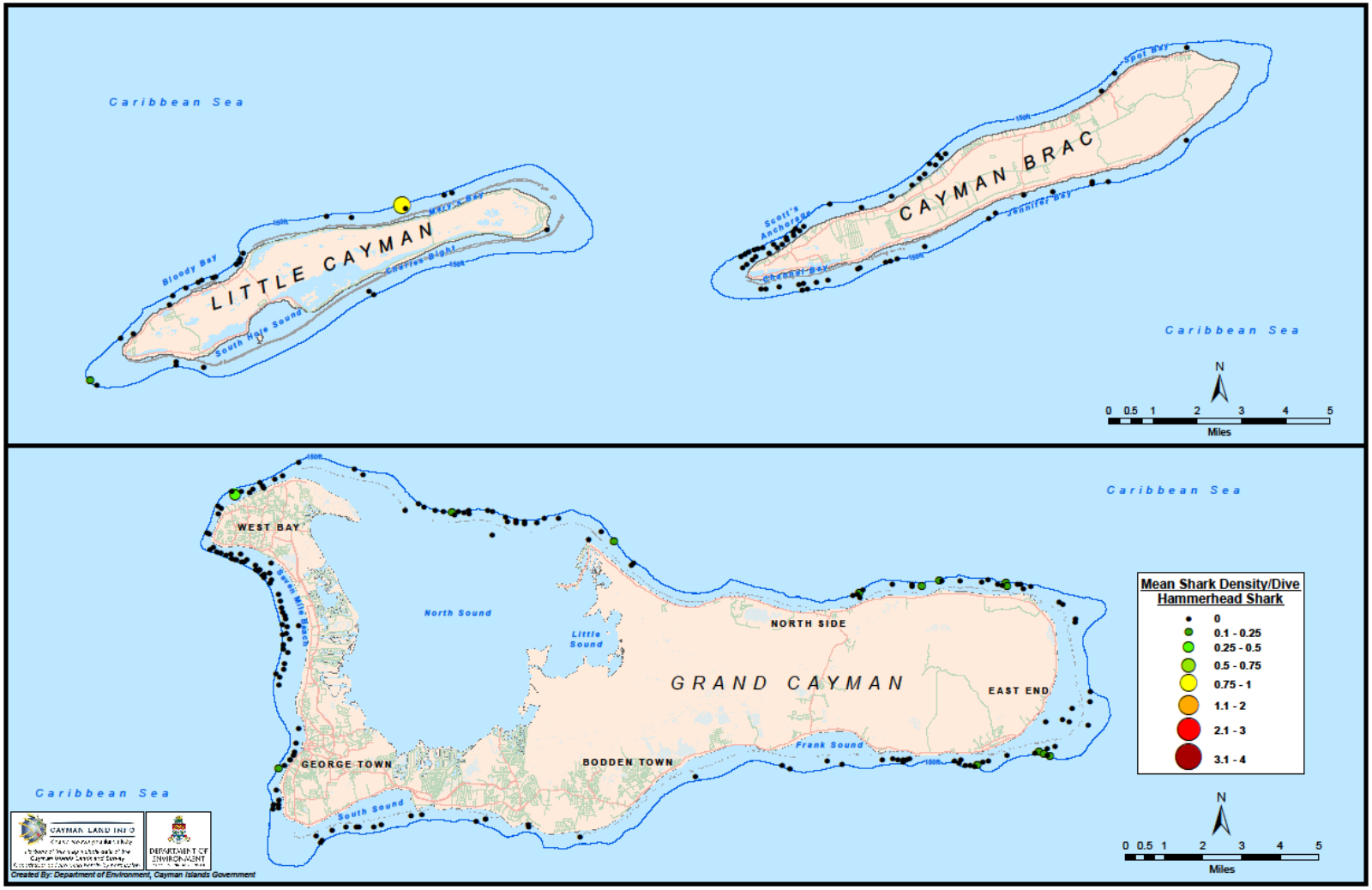

Figure 8: The distribution of hammerhead species sightings. The circle size is proportional of the mean number of shark sightings reported by divers and snorkelers during 2022

Environmental information

In 2022, of the dives where data was reported, the minimum depth was 3 m and the maximum depth was 40 m while the mean depth of dives was 24.7 m. Of the total 3,383 dives, participants were culling lionfish on 287 dives (less than 8.5% of the dives). Since the culling of lionfish could potentially attract predators such as sharks and therefore bias the abundance data, this report is considered to give a reasonable overview since the majority of dives reported (91.5%) did not include lionfish culling. The visibility on dives recorded by participants was good (mean visibility = 24.7 m) with a minimum of 3 m and a maximum of 60 m. Therefore it seems reasonable to assume that if a shark was present it could be seen by participants and implies that the possibility of missing a shark on a dive was relatively low.

The temperature ranged from 25°C to 35°C throughout the year 2022, with a mean temperature of 27.6°C. Participants reported mostly low current strength on dives which likely reflects the safety protocol of individual participants and dive companies, rather than a true representation of water current conditions in the Cayman Islands.

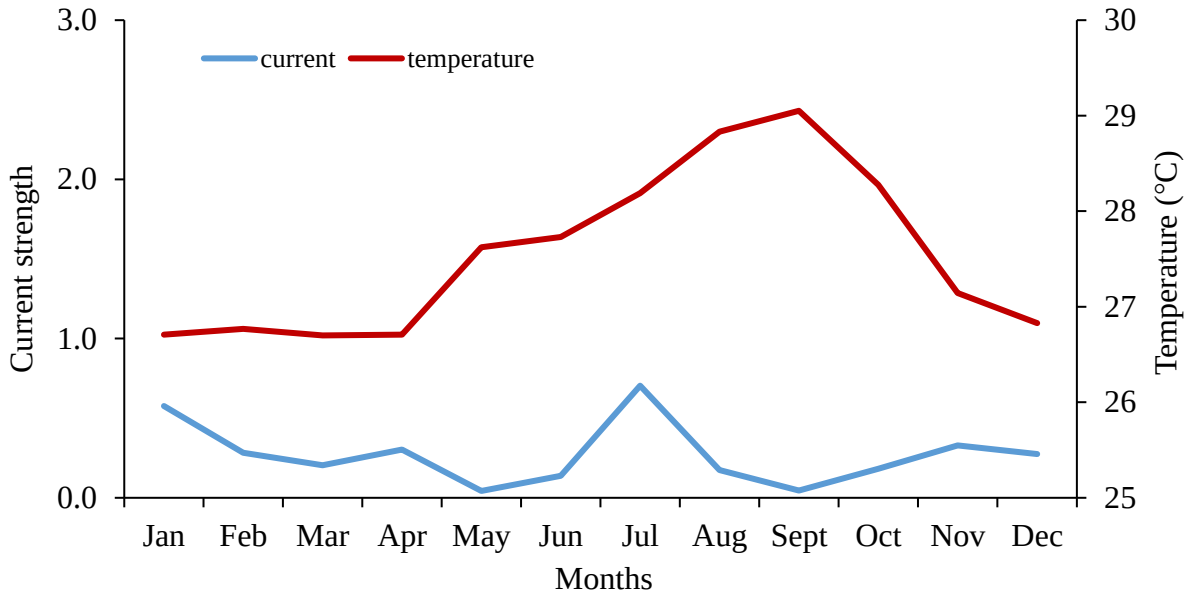

Figure 9: Temperature and current recorded by divers and snorkelers during 2022

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Programme Participants

Dive companies:

Brac Scuba Shack
Ocean Frontiers
Red Sail

Resident individuals:

Amanda Brown
Amanda Lawrence
Andy Holloway
Annie Nguyen
Christine Ward
Daniel Haywood
David McGibbon
Edward Belsey
Elaine Shalvey
Enno Krebbers
Hayley Reid
Jen McLemore
Jospephine Imparato Horwitz
Joy Mulholland
Kerry Glanfield
Len de Vries
Nina Baxa
Patricio Rio
Sandra Macko
Toby Buist

Acknowledgements

Thank you to all Sharkloggers for your participation in the Sharklogger Network. This project is only successful because of your involvement. The Sharklogger Network relies purely on volunteers and the dedication of every one of you is essential to the work that we do. The data you've collected on your dives contribute directly to DoE's shark research and have made an impact.

We cannot do it without you. We would not want to do it without you. You add useful data such as specific shark behavior documenting mating & predation events as well as valuable descriptions of diver-shark interactions.

Thank you so much for supporting shark research efforts. We look forward to teaming with you again in 2023 and continuing to monitor our local shark populations together.

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Contact Information

For more information please visit DOE's website (www.doe.ky) or email sharkloggers@gmail.com.

Divers, snorkelers, and even boaters who are on the water very regularly and are interested in becoming a citizen scientist for the Sharklogger Network can sign up by emailing sharkloggers@gmail.com.