

BIONEWS

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- | | | | |
|---|--|----|-----------------------------|
| 1 | Editor's Letter | 11 | Long-Term Projects Overview |
| 2 | Environmental DNA Reveals Tropical Shark Diversity in Contrasting Levels of Anthropogenic Impact | 19 | Monitoring Overview |
| 4 | NICO Expedition: Eddies | 22 | List of Acronyms |
| 5 | Bonaire Caves and Karst Nature Reserve | 23 | Reports and Publications |
| 8 | Research Overview | 24 | Calendar |
| | | 25 | Members and Contact |
| | | 26 | References |

Editor's Letter

Dutch Caribbean, June 2018

Shark populations are collapsing due to among others increased and targeted fishing pressure. Sharks play a key role in maintaining healthy oceans, leading to conservation actions in many parts of the world. Baseline data on the diversity and relative abundance of shark species is a key component of shark conservation. Bakker et al. (2017) studied shark diversity and abundance with a new emerging research method (environmental DNA (eDNA) metabarcoding) of four different locations in the Caribbean that reflect varying levels of anthropogenic impact. There appears to be much potential for the application of eDNA metabarcoding to study sharks. They found shark diversity in contrasting levels of anthropogenic impact showing the importance of conservation measures such as protected areas and fishing regulations.

In this edition we also present the preliminary results of the fourth leg of the 7-month multi-disciplinary scientific journey, the "Netherlands Initiative Changing Oceans" (NICO). This part focused on anti-cyclonic eddies and their influence on the distribution and occurrence of marine mammals and seabirds in the Caribbean. Anti-cyclonic eddies typically have surface waters that are 4°C warmer than the surrounding ocean and

form partially isolated environments with distinct physical and chemical conditions. The researchers aboard have successfully performed a detailed hydrographic survey of an eddy and its ambient Caribbean waters and found very small numbers seabirds.

Lastly we are excited to present an article on the "Bonaire Caves and Karst Nature Reserve" project that was generously funded by the Ministry of Agriculture, Nature and Food Quality (LNV). As a pilot project, a 30-hectare cave park with a rich variety of plants and animals is being created to protect among others the island's species of bat. The two-year project, which began in the summer of 2017, is a partnership between WILDCONSCIENCE, Openbaar Lichaam Bonaire (Public Entity Bonaire) and The Caribbean Speleological Society (CARIBSS) with the goal of providing optimum protection and management for the natural, cultural, recreational and scientific values contained in the Bonaire Cave System through activities in cave management, bat scientific research and education.

Happy reading!
The DCNA Team

Environmental DNA Reveals Tropical Shark Diversity in Contrasting Levels of Anthropogenic Impact

Increased and targeted fishing pressure has led to the collapse of shark populations around the world. According to worldwide estimates, a staggering 100 million sharks are killed each year (Worm et al., 2013). Modern research has shed light on the key role these oceanic predators play in maintaining healthy oceans, leading to the implementation of conservation actions in many parts of the world to reverse population collapse. Regular monitoring is key to assess the success of these efforts and to improve management strategies. Information about species abundance, migration patterns, habitat use and feeding and nursery grounds enables conservationists to prioritize conservation efforts, target threats and protect specific locations.

The lack of baseline data on the diversity and relative abundance of shark species in the Dutch Caribbean has been a significant barrier to their protection. In an effort to reduce this knowledge gap, a number of research projects that are part of DCNA's Save Our Sharks Project (generously funded by the Dutch Postcode Lottery) have helped collect information on the occurrence of sharks, their relative and seasonal abundance, movements and behavior across different management zones in the Dutch Caribbean. These include BRUV (Baited Remote Underwater Video) monitoring, acoustic monitoring and the establishment of a shark sighting network. We now know thanks to these efforts that the Saba Bank has the highest shark abundance in the area and must therefore be prioritized for shark conservation, and that endangered shark species (*Carcharhinus falciformis*, *Sphyrna mokarran* and *Galeocerdo cuvier*) live in the waters of our islands.

While traditional monitoring survey methods based on acoustic and direct visual observation have helped garner important information on species abundance and richness, they are typically expensive, labor-intensive, time-consuming and dependent on professional taxonomic identification (Deiner et al., 2017; Littlefair et al., 2017). There has been much interest in recent years in the potential of eDNA metabarcoding as a rapid, cost-effective and non-invasive monitoring tool (Deiner et al., 2017) to complement existing

methods. A new study by Bakker et al. (2017) looks into the possible application of this emerging research method for elasmobranch species. They piloted a "novel, rapid and non-invasive environmental DNA (eDNA) metabarcoding approach specifically targeted to infer shark presence, diversity and eDNA read abundance in tropical habitats" which will enhance the ability to assess and monitor sharks and therefore improve conservation strategies that depend on accurate population assessments (Bakker et al., 2017).

Environmental DNA (eDNA) metabarcoding was first used to detect rare and invasive species, and there is now much excitement over its potential to track the presence, richness and abundance of animal species within their natural environment in a fast, efficient and non-invasive way (Creer et al., 2016; Deiner et al., 2017). Animals leave behind DNA in their habitat through feces, gametes, skin cells, etc., and researchers are now able to isolate this DNA from environmental samples (water, soil), amplify and then sequence it to identify the taxonomic identity of the species (Deiner et al., 2017; Littlefair et al., 2017; Bakker et al. 2017). Because eDNA can only be detected in the water column for a few days, it is possible to know whether the species was recently in the area. Several studies have found eDNA metabarcoding to be more effective than traditional survey methods in detecting taxonomic diversity, including teleost fish in freshwater and marine ecosystems, as well as able to detect rare species that would not be detected through visual observations (Lim et al., 2016, O'Donnell et al., 2017; Port et al., 2013; Thomsen et al., 2012) However, because different animal species "have different rates of eDNA production or "origin" and exhibit different "transport" rates from other locations, eDNA in an environmental sample could be inconsistent relative to a species' true local and current abundance" (Deiner et al., 2017). Acoustic surveys of marine mammals were also found to detect greater species richness than eDNA metabarcoding (Foote et al., 2012).

The study by Bakker et al. (2017) is the first to investigate the application of eDNA metabarcoding to the study of elasmobranch abundance and diversity. Natural seawater samples were taken

in the Caribbean (55) and New Caledonia (22) in 2015. Four different locations in the Caribbean were chosen that reflect varying levels of anthropogenic impact, from most (Jamaica and Belize) to least (The Bahamas, which is a shark sanctuary). In New Caledonia samples were collected in three locations: the pristine Chesterfield Atolls, New Caledonia North and the densely populated areas of Noumea. Bakker et al. (2017) used an elasmobranch specific COI primer for the amplification of eDNA metabarcoding markers. Caribbean reef sharks (*Carcharhinus perezii*) and Lemon sharks (*Negaprion brevirostris*) were abundant in Caribbean research sites while New Caledonian waters were dominated by Grey reef sharks (*Carcharhinus amblyrhynchos*) and Whitetip reef sharks (*Triaenodon obesus*) with the exception of the most impoverished locations (e.g. Belize, Jamaica and Noumea) (Bakker et al., 2017).

The main goal of the study was to examine whether patterns of species diversity reflect the known degree of anthropogenic impact. Previous studies within the Caribbean region have found that sharks are more abundant in areas where population density is low and where strong fishing regulations or conservation measures have been implemented (Ward-Paige et al., 2010). Bakker et al. (2017) also found that MOTU (Molecular Operational Taxonomic Unit) richness and abundance patterns are linked to the level of anthropogenic impact in each location: less remote and non-protected locations showed lower values for both diversity and abundance, while the more pristine/remote/protected locations had higher species richness and abundance. The Bahamas, which was declared a shark sanctuary in 2011, displayed the greatest elasmobranch diversity (11 MOTUs) while Jamaica and Belize displayed the least (2 and 1 MOTU respectively). In New

Caledonia, the remote Chesterfield Atolls (11 MOTUs) had similar diversity to New Caledonia North (14 MOTUs) but displayed significantly higher abundance, meaning that read abundance may be correlated with remoteness (Bakker et al., 2017).

Based on the results of the Bakker et al. study (2017), there appears to be much potential for the application of eDNA metabarcoding to the assessment of elasmobranch species abundance and richness. Bakker et al. however site a number of concerns about the methodology that need to be addressed in future developments of elasmobranch eDNA metabarcoding approaches, including the choice of markers and primers. Certain elasmobranch species could also not be detected by the primer set selected by Bakker et al. (2017). The nurse shark (*Ginglymostoma cirratum*), which is known to be abundant in the Caribbean and was visually observed at the time of sampling was not detected by any of the eDNA sequence reads. The authors are however very optimistic about the use of eDNA metabarcoding as an objective and powerful elasmobranch assessment tool, from monitoring the success of shark sanctuaries to mapping differences in shark diversity (Bakker et al., 2017).

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NICO Expedition: Eddies

Rising ocean temperatures associated with global warming are changing our oceans and are projected to have a considerable impact on sea level, ocean acidification, hurricanes and bleaching of coral reefs over the next decades. The research vessel RV Pelagia has been at sea since December 2017 for a 7-month multidisciplinary scientific journey, the “Netherlands Initiative Changing Oceans” (NICO) expedition, with the aim of obtaining a better understanding of changing seas and oceans (NIOZ, 2017). While sailing from Aruba north to Hispaniola and then east to St Maarten, the fourth leg of the expedition focused on eddies and their influence on the distribution and occurrence of pelagic megafauna in the Caribbean, more specifically marine mammals and seabirds. Anti-cyclonic eddies typically have surface waters that are 4°C warmer than the surrounding ocean and “form partially isolated environments with distinct physical and chemical conditions” (NIOZ, 2017). Changes in biological activity within them may provide insight as to how global warming will impact these species (NIOZ, 2017).

Eddies are rotating bodies of water that spawn from meandering, unstable currents, creating a swirling motions in the ocean waters (NOAA, 2017). Mesoscale eddies, which are common in the Caribbean Sea, are large eddies with a horizontal scale of approximately 100 kms and last for several months (van der Boog, 2018; Adcroft et al., 2017; SFSU, 2018). Their impact on the ocean environment is substantial. As the center of eddies contain water with properties that differ from their environment, they are important for the heat and salt transport in the ocean. Depending on their direction of rotation, mesoscale eddies can transport water up or down. In the case of upward transport, this will favor upwelling of nutrients from deeper levels to the surface (SFSU, 2018). Such mesoscale eddies have been described as hot spots of intense biological and physical activity (Michaels, 2007) that can support and transport whole plankton communities (NIOZ, 2017; SFSU, 2018) and help supply nutrients to the surface of the ocean as well as coastal zones (Adcroft et al., 2017). The reverse may be true for eddies

that favor downwelling, which is why NICO 4 also sampled for nutrients and biological parameters. Overall, the eddies also have an important role in regulating the weather in the region by transporting heat from the tropics to the poles (Adcroft et al., 2017), and may contribute to the intensification of hurricanes in the Caribbean (van der Boog, 2018). Satellites (SFSU, 2018) can be used to track and study eddies at the ocean surface, but for the eddies in the Caribbean there is very little data about their vertical structure and what underlying processes govern their development (van der Boog, 2018).

Before departure of the RV Pelagia from Aruba, the research team used recent satellite data and ocean model forecasts to chart the circulation in the Caribbean Sea and was able to locate a mesoscale eddy that formed off the coast of Venezuela and moved east towards Aruba. The research vessel then sailed to the eddy and navigated through its center while taking measurements (van der Boog, 2018). Four autonomous floats were deployed inside and outside the eddy, which will continue to measure the temperature and salinity of the Caribbean waters. The float data will be combined with satellite observations to keep track of the eddy’s location over the following months and to learn more about the differences in water properties between eddies and the ambient waters (Heinsman, 2018b).

To assess the occurrence of pelagic megafauna, the research team used visual surveys as well as passive acoustic monitoring for whales (NIOZ, 2017). Previous studies have found that both permanent physiographic features (ocean depth, seafloor slope) and hydrographic characteristics influence the distribution of prey and therefore pelagic megafauna, however the specific influence of eddies on the distribution and occurrence of organisms at a higher trophic level has never been studied (NIOZ, 2017). Unfortunately, visual surveys for whales and dolphins on board the RV Pelagia had little success due to rough seas that made it hard to spot anything in the water. The few marine mammals that were recorded were dolphins that were attracted to the ship and accompanied it for a little while.

Throughout the journey from Aruba to St. Maarten, a team of bird experts surveyed the seabird population to assess whether the presence of an eddy affects bird density. Steve Geelhoed and Mardik Leopold, both marine ecologists at Wageningen University, observed a very small number of seabirds and wondered where all the birds have gone (Buiter, 2018). Ruud van Halewijn described a rich bird life for the area in the seventies (Buiter, 2018), however the total number of seabirds spotted was very small and included some Brown Boobies, a few Black-capped Petrels and Royal terns. What was even more confusing was the plentiful presence of flying fish, meaning that seabirds have an abundant source of food. Geelhoed and Leopold believe that changes on land rather than at sea are to blame, notably the drastic reduction of seabird breeding habitat on the islands to make way for tourism development, as well as an increased presence of introduced

predators such as rats, cats and mongoose that are very fond of bird chicks and bird eggs (Buiter, 2018). *"In this case", explains Leopold, "I think we should look not so much at the oceans but at the dramatic changes on the Caribbean islands. The bigger problems for the seabirds seem to play there."* (Buiter, 2018)

It was not all bad news, though. Geelhoed and Leopold were excited to spot not one but twelve of the very rare and almost extinct black-capped petrel. Only very few remaining colonies for this seabird are known in Haiti and the Dominican Republic, where the population is greatly endangered and hard to study because the petrels breed on steep slopes about 400 to 1200 meters above sea level (Heinsman, 2018). The unexpected discovery shows that in an age of environmental devastation and loss of species, there is still hope.

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Bonaire Caves and Karst Nature Reserve

Bonaire has a rich and complex geological history which is reflected in its current geological landscape. While the core of the island is comprised of volcanic rocks, the coastline and north of the island are made up of limestone formations such as coral-rubble beaches and limestone cliffs (de Buissonjé, 1974). Centuries of water erosion on these cliffs has resulted in extensive fresh water and marine karst (limestone) complexes with extensive caves systems. The majority of the island's estimated 200 caves are either hard to access or submerged, but several caves are open to the public with little supervision or management (Tourism Bonaire, 2018). As a result, the many important ecological, cultural and historical values of the caves are threatened by unregulated visits and illegal activities such as vandalism and waste dumping.

Thanks to generous funding from the Ministry of Agriculture, Nature and Food Quality (LNV) through the Nature Fund, Bonaire is seeing the establishment of its first caves and karst nature reserve, the "Bonaire Caves and Karst Nature Reserve". As a pilot project, a 30-hectare cave park is being created in Barkadera due to the high density of caves and sinkholes in the area. (Simal, 2016). The two-year project, which began in the summer of 2017, is a partnership between WILDCONSCIENCE, Openbaar Lichaam Bonaire (Public Entity Bonaire) and The Caribbean Speleological Society (CARIBSS) with the goal of providing *"optimum protection and management for the natural, cultural, recreational and scientific values contained in the Bonaire Cave System"* through activities in cave management, bat scientific research and education (Simal, 2016).

Bonaire's karst and caves are extremely valuable natural resources with a rich variety of plants and animals. They typically host unique ecosystems that provide a habitat for unique species; several endemic species of shrimp, fish and brotolas with special adaptations are known to occur exclusively in Bonaire's caves (Simal, 2016). The caves are an especially important habitat for five of the island's species of bat, which in turn play a key role in maintaining the island's biodiversity. Two of Bonaire's nectar-eating bat species (*Leptonycteris curasoae* and *Glossophaga longirostris*) are highly inter-dependent with columnar cacti and agaves. They rely upon the cacti and agaves for food resources, and these plant species in turn rely upon the bats for pollination services and for some seed dispersal (Simal, 2016). The three insectivore cave-dwelling species of bat (*Mormoops megalophylla*, *Myotis nesopolus* and *Natalus tumidirostris*) help control the island's insect population, notably mosquitoes.

Some of the caves have great cultural and historical value due to the ancient inscriptions preserved in them. Rock paintings and petroglyphs have survived at the caves at Spelonk, Onima, Ceru Pungi, and Ceru Grita-Cabai. Many also have impressive speleological formations that are of great interest to both geologists and visitors. While several positive measures have recently been taken to protect and manage the island's caves (e.g. inclusion of caves in the ROB in 2010, the new Nature Ordinance, covenant between local government and the cave tour operators), there is currently no proper management of cave tourism due to a lack of capacity and funds (Simal, 2016). The many values of the caves are threatened by invasive species of fauna and flora as well as unsupervised visits and explorations that do not respect the caves' fragile ecosystem and carrying capacity (Simal, 2016).

One of the main goals of the "Bonaire Caves and Karst Nature Reserve" project is to significantly improve cave tourism on Bonaire, reducing the impact of visitors as much as possible, especially in the bat maternity caves, while giving them an upgraded and educational experience. The project aims to make cave visits and tours "controlled, safe, educative, non-damaging and non-disturbing" (Simal, 2016). The park is set to

have approximately 10 caves open to visitors to avoid overcrowding and make sure cave tourism is sustainable. "One of the most important things that we will be doing" explains Fernando Simal, project leader of the Bonaire Caves and Karst Nature Reserve project and co-managing director of WILDCONSCIENCE "is classify the caves of the park accordingly to their fragility and values. In this way we can designate them on categories that will indicate if they can be accessed freely, only under the supervision and leadership of a certified cave guide and during which periods of the year this will be possible". In order to ensure that visits are well guided and controlled, CARIBSS will offer a "Bonaire dry cave guide certification course". During the course guides will be trained on such things as adequate emergency response protocols, proper caving techniques and safety procedures (WILDCONSCIENCE, 2018).

A key focus of the Bonaire Caves and Karst Nature Reserve is the education of visitors, from safety to the many different values of the caves and surrounding habitat. Approximately four kilometers of walking trails are currently being built, with the trails connecting some caves and sinkholes. The trails will have nature interpretation signs that feature the geology, flora and fauna of the surrounding limestone terraces. Signage will also highlight and explain the different values of the caves, and easy to read cave maps will showcase the different levels of difficulty, access restrictions and safety indications. Guides, having completed the certification course, will be equipped with the knowledge to provide visitors with information about the ecological and historical importance of caves.

Approximately 2.8 kms of fencing will surround the park to keep invasive herbivores away (feral donkeys, goats, sheep and pigs) and give native vegetation a chance to recover from decades of overgrazing (Simal, 2016). Existing waste is also being cleaned up. On five other caves outside the park, motor vehicles will not be permitted within 100 meters of the caves to reduce illegal waste dumping.

Another chief goal of the Bonaire Caves and Karst Nature Reserve is to ensure the protection of five keystone species for the island and

their ecological interactions: two species of nectar-feeding bats (*Glossophaga longirostris* and *Leptonycteris curasoae*) and the three species of candle cactus that they pollinate. “*Bat-plant mutualistic*

interactions are vital for sustaining life in arid and semiarid ecosystems” explains Fernando Simal, “*The protection of this ecological interaction will benefit the entire trophic web that depends on it, which includes many species of terrestrial birds, reptiles and invertebrates.*”

Bats rely heavily on caves as diurnal and maternity roosts. The caves that serve as maternity roosts are especially vital to the survival of the island’s bat population and must therefore receive special protection. The Bonaire Caves and Karst Nature Reserve at Barkadera will include two of the island’s five most important maternity chambers, where at least three of Bonaire’s cave-dwelling bat species are known to complete their life cycle, including pregnancy and lactation (Simal, 2016). These maternity chambers will be fully protected with physical barriers and information signs.

Research is also being conducted to understand the temporal patterns of use at a new maternity cave located at the southeast of the island by the insectivore species *Myotis nesopolus* and *Natalus tumidirostris*.

The Nature Funded Bonaire Caves and Karst Nature Reserve is the first part of what is hoped will become one of the Caribbean’s best managed and protected cave parks. Next on the horizon is the application for SICOM (Site of Importance for Bat Conservation) status for the maternity caves of *Myotis nesopolus* and *Natalus tumidirostris*, which will be used as a tool to provide legal protection for the caves (Simal, 2016). To support this application, CARIBBS will be creating maps of the caves and carry out research to estimate population size, the yearly pattern of roost use and the life cycle of species. Relative abundance of the species will be estimated by setting harp traps and/or mist nets at the exit of this newly investigated cave (Simal, 2016).



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CATEGORY	SUBJECT	ISLANDS	ORGANIZATION(S): LEAD SCIENTIST
Algae	Ecology of Loborophora species	CUR	Gent University, Belgium: Christian Stolpe CARMABI
Birds	Suitability study and re-forestation of exclosures facilitating the Yellow-shouldered Amazon Parrots (<i>Amazona barbadensis</i>) on Bonaire	BON	Echo: Lauren Schmaltz, Quirijn Coolen
Coral Reef ecosystems	Larval biology of corals and reef microbiology	CUR	Marhaverlab, Curacao: Kristen Marhaver CARMABI
Coral Reef ecosystems	Coral reproduction	CUR	CARMABI: Laurent Delvoye
Coral Restoration	3D Printing of reef restoration materials	CUR	University of Illinois: Haley Thoren CARMABI
Cyanobacteria	Cyanobacteria on reefs	CUR	UvA: Petra Visser CARMABI
Fish	Fish eye physiology and evolution	CUR	Smithsonian Tropical Research Institute, Panama: Michele Pierotti CARMABI
Fish	Red Hind population on the Saba Bank	SAB	SCF (SBMU): Ayumi Kuramae Izioka WUR: Dolfi Debrot HAS: Yosha Bakkers (student)
Invasive species	Testing and comparing various lionfish traps to study their potential use in a directed lionfish fishery	SAB	Leiden University: Serena Rivero (student) WUR: Dolfi Debrot SCF (SBMU): Ayumi Kuramae Izioka 7Senses: Madelon van Eelderink & Evert-Jan van Hasselt
Invasive species	Research into mitigation measures for Sargassum Seaweed	SXM	NFSXM: Tadzio Bervoets Government of St. Maarten
Invasive species	Control methods for Corallita (<i>Antigonon leptopus</i>)	SAB	UU: Judit Planas Puig (Msc. student), Jetske Vaas

CATEGORY	SUBJECT	ISLANDS	ORGANIZATION(S): LEAD SCIENTIST
Plants	Testing effective ways to grow native plants	BON	Echo: Quirijn Coolen, Johan van Blerk
Plants	Germination of seeds of indigenous trees of Curaçao	CUR	CARMABI: John de Freitas
Phylogeography	Phylogeographic modeling	CUR	National Autonomous University of Mexico: Roberto Emiliano , Jose Daniel Zamora Mejias CARMABI
Reptiles	A population assessment of the Red-bellied racer snake in The Quill-Boven National Park	EUX	UU: Kevin Verdel CNSI: Hannah Madden
Reptiles	The impact of recreational SCUBA divers on the abundance of sea turtles (Part of STCB's new in-water surveys)	BON	VHL: Mavelly Velandia (student) STCB: Mabel Nava Wildconscience: Fernando Simal, Frank F. Rivera-Milan
Seagrass	Local and regional drivers of fish assemblages associated to seagrass meadows in the Caribbean following varying levels of protection	BON	Swansea University: Alex Bartlett
Sponges	Sponge ecology and energetics	CUR	Uva: Jasper de Goeij CARMABI
Other: finalized projects in april 2018			
Parasitology	Protist biology/ Parasitology	CUR	Laboratory of Molecular Biology of Protists, Czech Republic: J. Lukes CARMABI
Protist	Protist biology	CUR	University of Exeter, United Kingdom: Tom Richards Monterey Bay Aquarium Research Institute, U.S.A: Camille Poirier University of British Columbia, Canada: Maria Herranz , B. Leander CARMABI
Coral Reef ecosystems	Caribbean reef ecology	CUR	Canadian Institute for Advanced Research: Patrick Keeling CARMABI

CATEGORY	SUBJECT	ISLANDS	ORGANIZATION(S): LEAD SCIENTIST
Other: finalized projects in april 2018			
Coral Reef ecosystems	Carbon cycling in marine systems	CUR	Monterey Aquarium research Institute, U.S.A: Alex Worden CARMABI
Marine ecosystems	Microbiome of coastal marine organisms	CUR	University of British Colombia, Canada: Laura Parfrey CARMABI
Marine ecosystems	Marine Taxonomy	CUR	University of British Columbia, Canada: Niels Van Steenkiste Russian Academy of Sciences : Denis Tikhonenkov Institute of Parasitology Biology Centre, Czech Republic: Galina Prokopchuk CARMABI
Invertebrates	Ecology of Diadema and 3D reef monitoring	CUR	Scripps Institution of Oceanography, U.S.A.: Stuart Sandin CARMABI
Genetics	Mitochondrial genetics	CUR	Acadia University, Canada: Emily Chase CARMABI
Invertebrates	Ecology of Diadema	CUR	Scripps Institution of Oceanography, U.S.A.: Jen Smith CARMABI
Microbiology	Molecular biology and evolution of eukaryotes	CUR	Canadian Institute for Advanced Research, Canada: Claudio Slamovitz CARMABI
Microbiology	Protist Biology	CUR	University of Exeter, United Kingdom: David Milner CARMABI
Microbiology	Marine molecular and cell biology	CUR	University of California, Berkeley, U.S.A.: N. King CARMABI
Microbiology	Genetics, Molecular Biology and Bioinformatics	CUR	University of Ottawa, Canada: Melissa Peters CARMABI
Microbiology	Cora Microbiology	CUR	San Diego State University, U.S.A.: Forest Rohwer, Cynthia Silveira CARMABI
Microbiology	Microbial Ecology	CUR	NIOZ: Andi Haas CARMABI

Long Term Projects

CATEGORY	SUBJECT	ISLANDS	ORGANIZATION(S): LEAD SCIENTIST
Coral Reef Ecosystems	Deep Reef Observation Project (DROP) (ARMS: Autonomous Reef Monitoring Structures)	CUR	Smithsonian: Carole Baldwin
Coral Reef Ecosystems	St. Maarten's Coral Restoration Project	SXM	NFSXM: Tazio Bervoets, Melanie Meijer zu Schlochtern CRF
Coral Reef Ecosystems	Development of restoration methods for threatened Caribbean coral species	BON, CUR, SAB	CRF Bonaire: Augusto Montbrun, Francesca Virdis SECORE Project CARMABI: Mark Vermeij UvA: Valerie Chamberland
Coral Reef Ecosystems	Developing a plan to manage the waters around Curaçao sustainably, profitably, and enjoyably for this and future generations - including mesophotic reef dropcam project	CUR	Waitt Institute (Blue Halo Curaçao): Kathryn Mengerink
Database	Dutch Caribbean Species Register: Taxonomic knowledge system Dutch Caribbean (http://www.dutchcaribbeanspecies.org/)	All	Naturalis: Sander Pieterse, Hannco Bakker, Bert Hoeksema
Interstitial biodiversity	Moleculair biodiversity analysis of marine communities by metabarcoding	EUX	Naturalis: Arjen Speksnijder ANEMOON: Niels Schrieken
Invasive species	Global Register of Introduced and Invasive Species GRIIS	All	IUCN Invasive Species Specialist Group ISSG: Shyama Pagad
Invasive species	CIRCULATIONS (Connectivities between Islands Alters Traveling Invasive Seagrasses)	BON	Development and Knowledge Sociology, ZMT: Rapti Siriwardane Mangrove Ecology, ZMT: Lucy Gillis Algae and Seagrass Ecology, ZMT: Inés González Vianaw
Marine ecosystems	Taxonomy and biodiversity in Lac Bay	BON	STINAPA Sabine Engel, Caren Eckrich Ecosub: Godfried van Moorsel CEAB: Daniel Martin
Marine ecosystems	Marine species discoveries in the Dutch Caribbean	All	Naturalis: Bert Hoeksema CNSI CARMABI

CATEGORY	SUBJECT	ISLANDS	ORGANIZATION(S): LEAD SCIENTIST
Molluscs	Population dynamics and role in the food chain of the Queen Conch <i>Lobatus gigas</i> in the Dutch Caribbean Territories	EUX, SAB, SXM	WUR: Aad Smaal, Leo Nagelkerke, Martin de Graaf Erik Boman (PhD candidate) SCF (SBMU): Ayumi Kuramae Izioka CNSI
Public Health	DNA waterscan: Monitoring disease vectors in the Caribbean (mosquitoes and midges)	CUR EUX	Naturalis: Klaas-Douwe B. Dijkstra ECPHF: Teresa Leslie CBHRI: Delia-Maria Goilo (NWO DUCAMID project)
Sponges	Bioerosion of reefs by coral-excavating sponges	BON, CUR, SAB, EUX	NIOZ: Fleur van Duyl WUR: Erik Meesters, Didier de Bakker (PhD student)
Sponges	The role of sponges as key ecosystem engineers of coral reef ecosystems Pumping iron: can iron availability fuel the sponge loop and affect coral reef community structure? (Misha Streekstra)	CUR	Uva: Jasper de Goeij, Benjamin Mueller CARMABI: Mark Vermeij PhD students: WUR: Misha Streekstra UvA: Sarah Campana*, Meggie Hudspich*, Niklas Korner* * Part of the ERC project "SPONGE ENGINE — Fast and efficient sponge engines drive and modulate the food web of reef ecosystems"
Terrestrial biodiversity	Baseline assessments and DNA barcoding of biodiversity of St. Eustatius	EUX	Naturalis: Michael Stech, Berry van der Hoorn, Jeremy Miller STENAPA CNSI
NWO Projects in the Dutch Caribbean			
Bioproducts	Stand-alone production of algal products for food, feed, chemicals and fuels	BON	WUR: R.H. Wijffels CIEE: Rita Peachey
Coral Reef Ecosystems	Caribbean coral reef ecosystems: interactions of anthropogenic ocean acidification and eutrophication with bioerosion by coral excavating sponges - Bioerosion and climate change	BON, SAB, EUX	NIOZ: Fleur van Duyl, Steven van Heuzen (PostDoc), Alice Webb (PhD student) STENAPA CNSI
Coral restoration	Artificial Reefs On Saba and Statia (AROSSTA)	SAB EUX	VHL: Alwin Hylkema, Marlou Heemstra WUR: Dolfi Debrot STENAPA: Jessica Berkel, Erik Houtepen SCF: Kai Wulf, Aymi Kuramae Izioka CNSI: Johan Stapel Students: Marijn van der Laan, Daniel Heesink, Marit Pistor, Callum Reid, Jan Koschorrek

CATEGORY	SUBJECT	ISLANDS	ORGANIZATION(S): LEAD SCIENTIST
NWO Projects in the Dutch Caribbean			
Environmental	Caribbean island biogeography meets the anthropocene	AUA, BON, CUR, EUX, SXM	VU: Jacintha Ellers, Matt Helmus, Wendy Jesse (PhD. Student), Jocelyn Behm (Postdoc) CNSI
Environmental psychology	Confronting Caribbean Challenges: Hybrid Identities and Governance in Small-scale Island Jurisdictions - Behavioral differences between/within the BES islands when it comes to nature conservation and cultural heritage.	BON, SAB, EUX	KITLV, Leiden University: Gert Oostindie (Project director) KITLV, Leiden University: Stacey Mac Donald (PhD student)
Geosciences	Stability of Caribbean coastal ecosystems under future extreme sea level changes (SCENES) - The effects of climate change on calcifying algae	BON, EUX, SXM	UU: Henk Dijkstra, NIOZ: Peter Herman, Rebecca James (PhD student) TU Delft: Julie Pietrzak STENAPA CNSI
Geomorphological	4D crust-mantle modelling of the eastern Caribbean region: toward coupling deep driving processes to surface evolution - Reconstructing past climate change	EUX	UU: Wim Spakman NIOZ: Lennart de Nooijer Alfred Wegener Institute Germany CNSI
Invasive species	Exotic plant species in the Caribbean: foreign foes or alien allies? (1) Socio-economic impacts of invasive plant species (2) Ecological impacts of invasive plant species	BON, SAB, EUX	(1) UU: Jetske Vaas (PhD student), Peter Driessen, Frank van Laerhoven and Mendel Giezen (2) UU: Elizabeth Haber (PhD student), Martin Wassen, Max Rietkerk, Maarten Eppinga. CNSI
Invasive species	Global defaunation and plant invasion: cascading effects on seagrass ecosystem services	BON	WUR: Marjolijn Christianen, Fee Smulders (PhD student) Smithsonian: Olivier Kramer STINAPA: Sabine Engel
Reptiles	Ecology and conservation of green and hawksbill turtles in the Dutch Caribbean	AUA, BON, CUR, SAB, EUX, SXM	RuG: Per Palsbøll, Jurjan van der Zee (PhD student) WUR: Lisa Becking, Marjolijn Christianen STCB: Mabel Nava STINAPA CARMABI STENAPA CNSI

CATEGORY	SUBJECT	ISLANDS	ORGANIZATION(S): LEAD SCIENTIST
NWO Projects in the Dutch Caribbean			
Tourism and sustainable development	Vulnerability is dynamic: Enhancing adaptive governance to climate change for Caribbean tourism through interac- tive modelling	CUR	WUR: Jillian Student, Machiel Lamers UOC: Filomeno A. Marchena
BO-projects in the Dutch Caribbean (Min EZ)			
Coral Reef Ecosystems	BO-43-021.04-003 – Inventory corals Includes monitoring and research of the longest coral reef time-series in the world (since 1973)	BON, CUR	WUR: Erik Meesters
DCBD	BO-43-021.04-001 - Expansion knowledge system Dutch Caribbean	AUA, BON, CUR, SAB, EUX, SXM	WUR (Alterra): Peter Verweij
Environmental Hazards	BO-43-021.04-008 - Sunscreen and risks for coral reefs	BON	WUR: Diana Slijkerman
Fisheries	BO-11-019.02-006 - Fish stocks and fisheries Caribbean Netherlands	EUX, SAB, BON	WUR: Dolfi Debrot CNSI: Kimani Kitson-Walters PiskaBon, STINAPA SCF: Kai Wulf, Ayumi Kuramae
Marine biodiversity	BO-43-021.04-002 – Saba Bank – Marine biodiversity	SAB	WUR: Erik Meesters (benthic communities), Dolfi Debrot, Thomas Brunel, Leo Nagelkerke (fish stocks)
Marine mam- mals & sharks	BO-43-021.04-005 – Management plan marine mammal and shark sanctuary Yarari	SAB, EUX	WUR: Dolfi Debrot, Dick de Haan, Meike Scheidat, Ayumi Kuramae Izioka SCF (SBMU): Ayumi Kuramae Izioka
Marine mammals	BO-43-021.04-009 Acoustic monitoring of cetacean distribution	SAB	WUR: Dolfi Debrot, Dick de Haan, Hans verdaat SCF: Kai Wulf, Ayumi Kuramae
Marine mammals	BO-43-021.04-007 – Marine mammals in the Dutch Caribbean	BON, SAB, EUX	WUR: Dolfi Debrot, Dick de Haan, Meike Scheidat
World Heritage nomination	BO-43-021.04-004 – World Heritage nomina- tion Bonaire National Marine Park	BON	WUR: Dolfi Debrot Wolfs Co.: Esther Wolfs UNESCO: Josephine Langley DRO: Frank v Slobbe CARMABI: Mark Vermeij, John de Freitas Curacao Footprint Foundation: Leon Pors

CATEGORY	SUBJECT	ISLANDS	ORGANIZATION(S): LEAD SCIENTIST
"Nature Funding" Projects in the Dutch Caribbean (Min EZ)			
Coastal ecosystems (Lac Bay: Mangroves and seagrass beds)	Ecological restoration Lac Bay and South coast, Bonaire	BON	STINAPA: Sabine Engel WUR: Klaas Metselaar STCB: Mabel Nava DRO: Frank van Slobbe
Sustainable Agriculture	The sustainable agriculture and rural development program (POP Bonaire)	BON	Bonaire Agri & Aqua Business BV: Sherwin Pourier Wayaká Advies BV: Jan Jaap van Almenkerk DRO: Frank van Slobbe
Invasive species	Feral Pig Control	BON	Echo: Julianka Clarenda DRO: Frank van Slobbe
Reforestation	Reforestation Project	BON	Echo: Lauren Schmaltz, Quirijn Coolen DRO: Frank van Slobbe
Invasive species	Goat eradication and control in Washington Slagbaai National Park	BON	STINAPA DRO: Frank van Slobbe
Coral ecosystems	Coral Restoration	BON	CRF Bonaire: Augusto Montbrun DRO: Frank van Slobbe
World Heritage nomination	World Heritage Nomination Bonaire Marine Park and/or other interconnected sites	BON	Wolfs Company: Esther Wolfs, Boris van Zanten, Amilcar Guzman, Viviana Lujan DRO: Frank van Slobbe
Terrestrial ecosystems	Combating Erosion and Nature Restoration on Bonaire	BON	Bonaire Agri & Aqua Business BV: Sherwin Pourier Wayaká Advies BV: Jan Jaap van Almenkerk DRO: Frank van Slobbe
Terrestrial ecosystems	Cave and karst nature reserve	BON	DRO: Frank van Slobbe CARIBSS: Fernando Simal
Nature communication	Campaign environment and nature on Bonaire	BON	DRO: Frank van Slobbe, Peter Montanus
Agriculture	Horticultural Project	SAB	Government of Saba: Randall Johnson
Recreation	Hiking trails	SAB	Government of Saba: Robert Zagers
Pollution	Tent Reef Protection	SAB	Government of Saba: Robert Zagers
Invasive species	Goat buy-back program	SAB	Government of Saba: Randall Johnson
	Yacht mooring project	SAB	Government of Saba SCF: Kai Wulf

CATEGORY	SUBJECT	ISLANDS	ORGANIZATION(S): LEAD SCIENTIST
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Coastal ecosystems (Lac Bay: Mangroves and seagrass beds)	Ecological restoration Lac Bay and South coast, Bonaire	BON	STINAPA: Sabine Engel WUR: Klaas Metselaar STCB: Mabel Nava DRO: Frank van Slobbe
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CATEGORY	SUBJECT	ISLANDS	ORGANIZATION(S): LEAD SCIENTIST
"Nature Funding" Projects in the Dutch Caribbean (Min EZ)			
	Saba national park	SAB	Government of Saba SCF: Kai Wulf SABARC: Ryan Espersen
	Crispeen trail project	SAB	Government of Saba: Robert Zagers SCF: Kai Wulf
Community outreach	Nature Awareness project	EUX	Government of St Eustatius STENAPA: Clarisse Buma CNSI: Johan Stapel, Hannah Madden
Nature management	Strengthening management of nature	EUX	Government of St Eustatius STENAPA: Clarisse Buma
Invasive species	Rodent assessment and control	EUX	Government of St Eustatius CNSI: Johan Stapel, Hannah Madden ECPHF: Teresa Leslie
Coral ecosystems	Coral restoration	EUX	Government of St Eustatius STENAPA: Jessica Berkel CNSI: Johan Stapel
Erosion	Erosion control	EUX	Government of St Eustatius CNSI: Johan Stapel
EU-BEST funded Projects in the Dutch Caribbean			
Marine ecosystems	Marine Park Aruba	AUA	Directie Natuur en Milieu: Gisbert Boekhoudt TNO: Kris Kats
Coral Reef Restoration	Scaling-up efforts to rehabilitate threatened coral communities using recruits reared from wild-caught gametes	CUR	CARMABI: Mark Vermeij
Coral Reef Restoration	Pop-Up Nursery and Coral Restoration (Oil Slick Leap)	BON	CRF: Francesca Virdis

CATEGORY	SUBJECT	ISLANDS	ORGANIZATION(S): LEAD SCIENTIST
EU-BEST funded Projects in the Dutch Caribbean			
Coral Reef Restoration	Restoration Ecosystem Services and Coral Reef Quality (Project RESCO)	SAB, EUX	WUR: Erik Meesters SCF (SBMU): Ayumi Kuramae Izioka STENAPA: Clarisse Buma Turks & Caicos Reef Fund Students: Ginger Fairhurst en Mirka Fontijn
Conservation	Watershed & Biodiversity Conservation of Roi Sangu valley	BON	Echo: Lauren Schmaltz, Quirijn Coolen
Reptiles	Enacting a news regional recovery plan for the Lesser Antillean iguana: an endangered ecological keystone species	EUX	STENAPA: Clarisse Buma
Terrestrial ecosystems	North Saba National Park, Phase I	SAB	Government of Saba: Menno van der Velde SCF: Kai Wulf SABARC
Terrestrial habitat restoration	Restoration of Key Biodiversity Areas of St. Maarten	SXM	EPIC (Project lead): Kippy Gilders Subcontractors: Les Fruits des Mer: Mark Yokoyama (reptile, amphibian, and invertebrate assessment) The Leon Levy Native Plant Preserve, Bahamas: Ethan Freid (plant assessment)

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CATEGORY	SUBJECT	ISLANDS	ORGANIZATION(S): LEAD SCIENTIST
Birds	Flamingo Abundance	BON	DRO: Frank van Slobbe Cargill STINAPA: Paulo Bertuol
Birds	Monitoring vulnerable parrot nests (remote camera sensing work)	BON	Echo: Laura Schmaltz, Sam Williams
Birds	Yellow-shouldered Amazon parrot roost counts	BON	Echo: Lauren Schmaltz DRO: Peter Montanus STINAPA: Paulo Bertuol
Birds	Bird Monitoring (Caribbean Waterbird Census)	BON SXM	STINAPA: Paulo Bertuol EPIC: Adam Brown
Birds	Tern monitoring (artificial nesting islands)	BON	STINAPA: Paulo Bertuol Cargill DRO WUR: Dolfi Debrot
Birds	Terrestrial Bird Monitoring Program	BON	Echo: Lauren Schmaltz STINAPA STENAPA
Birds	Red-billed Tropicbird monitoring	SAB EUX	STENAPA SCF: Kai Wulf
Birds	Pelican monitoring	SXM	NFSXM: Melanie Meijer zu Schlochtern
Coral reef ecosystems	Global Coral Reef Monitoring Network	BON CUR SAB EUX SXM	STINAPA: Caren Eckrich CARMABI: Mark Vermeij SCF (SBMU): Ayumi Kuramae Izioka STENAPA: Jessica Berkel NFSXM: Tadzio Bervoets CNSI: Johan Stapel, Kimani Kitson-Walters
Coral reef ecosystems	Monitoring and research of the longest coral reef time-series in the world (since 1973) (Part of BO-11-019.02-022 –Inventory corals)	BON CUR	WUR: Erik Meesters, Didier de Bakker (PhD student) NIOZ: Fleur van Duyl, Rolf Bak
Environmental	Water quality testing	SXM	NFSXM: Tadzio Bervoets EPIC: Natalia Collier

CATEGORY	SUBJECT	ISLANDS	ORGANIZATION(S): LEAD SCIENTIST
Environmental	Nutrient (phosphate, ammonium, nitrate and nitrite) monitoring of St Eustatius' coastal waters	EUX	CNSI: Johan Stapel
Fish	Shark monitoring: - Shark sightings - Shark Abundance, distribution and movements (tagging, acoustic telemetry)	BON CUR SAB SXM EUX	WUR: Erwin Winter, Dolfi Debrot, Martin de Graaf STINAPA: Caren Eckrich CARMABI: Mark Vermeij SCF(SBMU): Ayumi Kuramae Izioka, Guido Leurs STENAPA: Jessica Berkel NFSXM: Tadzio Bervoets
Fish	Spawning monitoring: Red hind surveys on Moonfish Bank	SAB	SCF (SBMU): Ayumi Kuramae Izioka
Fish	Fish and fishery monitoring (Barracuda's, sharks and eagle rays, tarpons, marine mammals, (fishing) boats, fisherman)	BON	STCB: Mabel Nava
Insects	Bee tracking	BON	Echo: Lauren Schmaltz
Invasive species	Goat and/or donkey removal: - Washington Slagbaai National Park - Lac Bay area (exclusion plots) - Quill National Park (exclusion plots)	BON EUX	STINAPA: Paulo Bertuol WUR: Dolfi Debrot DRO: Frank van Slobbe STENAPA
Invasive species	Lionfish abundance and control	BON CUR SXM SAB EUX	STINAPA: Paulo Bertuol (50 meter traps) CARMABI: Mark Vermeij NFSXM: Tadzio Bervoets SCF (SBMU): Ayumi Kuramae Izioka STENAPA: Jessica Berkel
Invasive species	Monkey Monitoring: abundance and distribution	SXM	NFSXM: Tadzio Bervoets
Invasive species	Feral pig population assessment (trapping)	BON	Echo

CATEGORY	SUBJECT	ISLANDS	ORGANIZATION(S): LEAD SCIENTIST
Mammals	Bat monitoring	AUA BON	FPNA WildConscience: Fernando Simal, Linda Garcia
Mammals	Dolphin monitoring (since 1999)	BON	Ron Sewell
Mammals	Marine Mammal Monitoring (noise loggers Saba Bank)	SAB	WUR: Dick de Haan, Dolfi Debrot SCF (SBMU): Ayumi Kuramae Izioka
Molluscs	Conch (<i>Strombus gigas</i>) on St. Eustatius, Saba Bank, Anguilla	SAB EUX	WUR: Martin de Graaf, Erik Boman (PhD student) SCF (SBMU): Ayumi Kuramae Izioka
Natural resource use	Fishery monitoring (including lionfish, shark bycatch and marine mammal sightings) (* Part of BO-11-019.02-055 – Fisheries Dutch Caribbean)	SAB EUX	SCF (SBMU): Ayumi Kuramae Izioka, Guido Leurs Gem City Consulting: Erik Boman LVV: Kiman Kitson-Walters WUR: Dolfi Debrot, Fedor den Elzen (student), Ivo (student) Damen
Plants	Monitoring of tree growth and survivorship in reforestation areas	BON	Echo: Quirijn Coolen
Plants	Terrestrial Habitat Monitoring Program for Bonaire	BON	Echo: Lauren Schmaltz
Reptiles	Lesser Antillean Iguana: Monitoring population density & removing invasive Green Iguana and hybrids	EUX	STENAPA: Clarisse Buma RAVON: Tim van Wagenveld
Reptiles	Boa and Cascabel Monitoring	AUA	FPNA Toledo Zoological Society: Andrew Odum
Reptiles	Red-bellied racer snake monitoring	EUX	CNSI: Kimani Kitson-Walters
Reptiles	Behavior of the endemic Aruban Whiptail lizard	AUA	FPNA Auburn University: Jeff Goessling
Seagrass and mangrove ecosystems	Seagrass and mangrove monitoring (BON: also conch and benthic fauna)	BON EUX SXM	STINAPA: Sabine Engel, Caren Eckrich WUR: Klaas Metselaar NFSXM: Tadzio Bervoets CNSI: Kimani Kitson-Walters
Reptiles	Sea turtle monitoring: -Satellite tracking -Nest monitoring -In water surveys (BON, CUR, SXM) -Fibropapillomatosis presence (BON)	AUA, BON, CUR, SAB, EUX, SXM	TurtugAruba Foundation STCB: Mabel Nava CARMABI (STCC): Sabine Berendse STENAPA: Jessica Berkel SCF: Kai Wulf NFSXM: Tadzio Bervoets

List of Acronyms

AUA	Aruba	Naturalis	Naturalis Biodiversity Center, The Netherlands
BON	Bonaire	NIOZ	NIOZ Royal Institute for Sea Research, the Netherlands
CUR	Curaçao	NWO	NWO Netherlands Organisation for Scientific Research
SAB	Saba	RAVON	Reptielen Amfibieën Vissen Onderzoek Nederland
EUX	St. Eustatius	RuG	University of Groningen, the Netherlands
SXM	St. Maarten	RU	Radboud University Nijmegen, the Netherlands
AMMF	Aruba Marine Mammal Foundation	SABARC	Saba Archaeological Center
BEST	Biodiversity and Ecosystem Services in Territories of European overseas	SBMU	Saba Bank Management Unit
BO project	Policy Supporting Research project	SCF	Saba Conservation Foundation
CARIBSS	Caribbean Speleological Society	Smithsonian	Smithsonian's National Museum of Natural History
CARMABI	Caribbean Research and Management of Biodiversity Foundation	STCB	Sea Turtle Conservation Bonaire
CEAB	The Blanes Centre for Advanced Studies, Spain	STCC	Sea Turtle Conservation Curacao
CRF	Coral Restoration Foundation	STENAPA	St. Eustatius National Parks Foundation
DCNA	Dutch Caribbean Nature Alliance	STINAPA	National Parks Foundation Bonaire
DCBD	Dutch Caribbean Biodiversity Database	UsA	University of St. Andrews, Scotland
DRO	Directorate of Spatial Planning and Development, Bonaire	UU	University of Utrecht, the Netherlands
DLVV (Santa Rosa)	Department of Agriculture, Livestock, Fishery and Farmers market (Santa Rosa), Aruba	UvA	University of Amsterdam, the Netherlands
EcoPro	Ecological Professionals Foundation	VHL	University of Applied Sciences VHL, the Netherlands
ECPHF	Eastern Caribbean Public Health Foundation	VU	VU University Amsterdam, the Netherlands
EPIC	Environmental Protection in the Caribbean	Wildconscience	Wildlife Conservation, Science and Education
FPNA	Fundacion Parke Nacional Arikok, Aruba	WNF	World Wide Fund for Nature
HAS	HAS University of Applied Sciences, the Netherlands	WUR	Wageningen University and Research Centre, the Netherlands
LVV	Department of Agriculture, Animal Husbandry & Fisheries, St. Eustatius	WUR (Alterra)	Wageningen Environmental Research, the Netherlands
MinLNV	Ministry of Agriculture, Nature and Food Quality		
NFSXM	Nature Foundation St. Maarten		

Reports and Publications Overview

Below you will find an overview of the reports and publications on biodiversity related subjects in the Dutch Caribbean that have recently been published.

"Arikok (2018).

Spaans Lagoen Species List"

"Bakker et al. (2018).

Quantification of chemical and mechanical bio-erosion rates of six Caribbean excavating sponge species found on the coral reefs of Curaçao. PLoS One 13: 5."

"Berendse, S. (2018).

Action and monitoring 2017 Sea turtle Conservation Curacao, 1-43."

"Debrot, A.O. et al. (2017)

Description of the Outstanding Universal Value (OUV) of the Proposed Marine Nomination Properties of the Bonaire and Curaçao Marine Parks (BCMP). Wageningen University & Research Report Coo3/18."

"Jesse, W.A.M., Behm, J.E., Helmus, M.R., Eilers, J. (2018).

Human land use promotes the abundance and diversity of exotic species on caribbean islands. Global Change Biology."

"Perry, C.T. et al (2018).

Loss of coral reef growth capacity to track future increases in sea level. Nature 558, 378-379 "

"Roberts, M., Cresswell, W., Hanley, N. (2018).

Prioritising Invasive Species Control Actions: Evaluating Effectiveness, Costs, Willingness to Pay and Social Acceptance. Ecological Economics 152: 1-8."

"Schut, K., Nava, M., Rivera-Milán, F.F. (2018)

Research and Monitoring of Bonaire's Sea Turtles: 2017 Technical Report, 1-23."

"Scott, A.R., Pawlik, J.R. (2018).

A review of the sponge increase hypothesis for Caribbean mesophotic reefs. Marine biodiversity."

These reports and publications can be found in the Dutch Caribbean Biodiversity Database (DCBD) (<http://www.dcbd.nl>). The DCBD is a central online storage facility for all biodiversity and conservation related information in the Dutch Caribbean.

If you have research and monitoring data, the DCNA secretariat can help you to get it housed in the DCBD. Please e-mail us: research@DCNANature.org

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Calendar

More events to add to this calendar?
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June

2-8	Symposium	4th International Symposium on the Effects of Climate Change on the World's Oceans, Washington, D.C., USA
3-8	Conference	Sharks International Conference, Brazil.
4-8	Workshop	Coral reproduction and restoration workshop, SECORE, CARMABI, Curaçao.
5-8	Working Group	3rd meeting of the Regional Working Group on IUU Fishing, Barbados.
5-9	Meeting	9th Ordinary Steering Committee Meeting of RAC/ REMPEITC-Caribe, Curaçao.
5	Event	World Environment Day
8	Event	World Oceans Day
9	Event	Coralpalooza, CRF, Bonaire.
9-17	Event	4th edition of the "Save Our Sharks" week, the Netherlands and Dutch Caribbean.
15	Event	Global Wind Day
16	Event	World Sea Turtle Day
17-22	Conference	Mesophotic Coral Reef Ecosystems, Bates College, Maine, USA.
18-20	Meeting	CLME + Steering Committee Meeting, Panama.
20	Meeting	12th meeting of the Committee for Marine Biodiversity and Fisheries of the waters of the Dutch Caribbean (EEZ Committee), St. Maarten
24-29	Congress	International Marine Conservation Congress in Kuching, Sarawak
25-27	Meeting	BIOPAMA Protected Areas Management Effectiveness, TBD.
26-29	Conference	EMA CWWA Waste Management Conference, Trinidad & Tobago.
27-29	Meeting	Regional Forum on Disaster Risk Reduction and Meeting of the Council of Ministers of Caribbean Disaster Emergency Management Agency (CDEMA), Jamaica.

July

25-27	Congress	Latin America and Caribbean Congress for Conservation Biology (LACCCB), Trinidad & Tobago.
16-27	Meeting	the 13th meeting of the CITES Animals Committee, Geneva, Geneva, Switzerland.
16-20	Meeting	4th Meeting of the Scientific & Technical Advisory Ctee of the Land-Based Sources of marine pollution Protocol (LBS STAC), Jamaica
26	Event	International Day for the Conservation of the Mangrove Ecosystem

August

20-23	Meeting	Latin American & Caribbean Climate Week, Uruguay.
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The International Coral Reef Initiative (ICRI) has declared 2018 the third International Year of the Reef (IYOR 2018)

Members of the Dutch Caribbean Nature Alliance



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Ministry of Agriculture,
Nature and Food Quality

References

Environmental DNA Reveals Tropical Shark Diversity in Contrasting Levels of Anthropogenic Impact

Bakker, J., Wangensteen, O.S., Chapman, D.D., Boussarie, G., Buddo, D., Guttridge, T.L., Hertler, H., Mouillot, D. & Vigliola, L. and Mariani, S. (2017). Environmental DNA reveals tropical shark diversity in contrasting levels of anthropogenic impact. *Scientific Reports*. 7. 10.1038/s41598-017-17150-2.

Creer, S., Deiner, K., Frey, S., Porazinska, D., Taberlet, P., Thomas, W. K., Potter, C., Bik, H. M. (2016). The ecologist's field guide to sequence-based identification of biodiversity. *Methods in Ecology and Evolution*, 7, 1008–1018.

Deiner, K., Bik, H. M., Mächler, E., Seymour, M., Lacoursière-Roussel, A., Altermatt, F., et al. (2017). Environmental DNA metabarcoding: transforming how we survey animal and plant communities. *Mol. Ecol.* 26, 5872–5895.

Foote, A. D., Thomsen, P. F., Sveegaard, S., Wahlberg, M., Kielgast, J., Kyhn, L. A., Salling, A.B., Galatius, A., Orlando, L. and Gilbert, M. T. P. (2012). Investigating the potential use of environmental DNA (eDNA) for genetic monitoring of marine mammals. *PLoS ONE*, 7, e41781.

Lim, N. K., Tay, Y. C., Srivathsan, A., Tan, J. W., Kwik, J. T., Baloğlu, B., Meier, R., Yeo, D. C. (2016). Next-generation freshwater bioassessment: eDNA metabarcoding with a conserved metazoan primer reveals species-rich and reservoir-specific communities. *Royal Society Open Science*, 3, 160635.

Littlefair, J., Carreau, J., Webb, M. and Cristescu, M. (2017). Environmental DNA(eDNA) as a next-generation biomonitoring tool. WSP Canada Inc. 20 pp.

O'Donnell, J. L., Kelly, R. P., Shelton, A. O., Samhouri, J. F., Lowell, N. C., & Williams, G. D. (2017). Spatial distribution of environmental DNA in a nearshore marine habitat. *PeerJ*, 5, e3044.

Port, J. A., O'Donnell, J. L., Romero-Maraccini, O. C., Leary, P. R., Litvin, S. Y., Nickols, K. J., Yamahara, K.M., Kelly, R. P. (2016). Assessing vertebrate biodiversity in a kelp forest ecosystem using environmental DNA. *Molecular Ecology*, 25, 527–541.

Thomsen, P. F., Kielgast, J., Iversen, L. L., Møller, P. R., Rasmussen, M., & Willerslev, E. (2012). Detection of a diverse marine fish fauna using environmental DNA from seawater samples. *PLoS ONE*, 7, e41732.

Ward-Paige, C. A., Mora, C., Lotze, H. K., Pattengill-Semmens, C., McClenachan, L., Arias-Castro, E., & Myers, R. A. (2010). Large-Scale Absence of Sharks on Reefs in the Greater-Caribbean: A Footprint of Human Pressures. *PLoS ONE*, 5(8), e11968.

Worm, B., Davis, B., Kettermer, L., Ward-Paige, C.A., Chapman, D., Heithaus, M.R., Kessel, S.T. and Gruber, S.H. (2013). Global catches, exploitation rates, and rebuilding options for sharks. *Marine Policy* 40: 194-204.

NICO Expedition: Eddies

Adcroft, A., Griffies, S. and Hallberg, R. (2017). Ocean Mesoscale Eddies. Geophysical Fluid Dynamics Laboratory, NOAA. Retrieved from: <https://www.gfdl.noaa.gov/ocean-mesoscale-eddies/>

Buiter, R. (2018). Zero is also a number. Published on February 15, 2018. Vogelbescherming website. Retrieved from: <https://www.vogelbescherming.nl/actueel/previ-ew/?&filter=2409&frommid=1043>

References

NICO Expedition: Eddies. Continued >

Heinsman, E. (2018a). Almost extinct bird seems to make a comeback. NEMO Kennislink website. Retrieved from: <https://www.nemokennislink.nl/publicaties/terugkeer-van-bijna-uitgestorven-vogel/>

Heinsman, E. (2018b). Measured for the first time: the silence in the storm. NEMO Kennislink website. Retrieved from: <https://www.nemokennislink.nl/publicaties/voor-het-eerst-opgemeten-stilte-in-de-storm/>

Michaels, A.F. (2007). Highly Active Eddies. *Science* Vol. 316, Issue 5827, pp. 992-993.

NIOZ (2017). NICO revised proposal.

NOAA (2017). What is an eddy? National Ocean Service website. Retrieved from: <https://oceanservice.noaa.gov/facts/eddy.html>

SFSU (2018). Eddies in the Ocean. Retrieved from: http://tornado.sfsu.edu/geosciences/classes/m415_715/Monteverdi/Satellite/Oceanography/eddy.htm

van der Boog, C. (2018). The search for an eddy. Published on 8 February 2018. Retrieved from: <https://nico-expeditie.nl/blogs/de-zoektocht-naar-een-wervel>

Bonaire Caves and Karst Nature Reserve

Simal, F. (2016). Project Plan: Bonaire Cave and Karst Nature Reserve. WILDCONSCIENCE B.V., 19pp.

WILDCONSCIENCE B.V. (2018). Our work. Retrieved from: <http://wildconscience.org/our-work>.

de Buisonjé, P.H. (1974). Neogene and Quaternary geology of Aruba, Curaçao, and Bonaire. Utrecht, 293pp.

Tourism Bonaire (2018). Bonaire Caving. Retrieved from: <http://www.tourismbonaire.com/bonaire-activities-events/details/caving>

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