

PRELIMINARY REPORT

Marine RAP Survey of Saba Bank, Saba Island, Netherlands Antilles, Caribbean January 4 to 15, 2006



Photo by Diane Littler

Marine RAP Overview

The Marine Rapid Assessment Program (Marine RAP) assembles teams of expert local and international scientists to survey the biodiversity and habitats of poorly known or highly threatened areas of the ocean. The objectives are to: a) collect data on biodiversity and commercially important species, b) identify threats and c) document socioeconomic issues regarding marine resource use. This information is analyzed, synthesized and geo-spatially mapped with other relevant and available data to pinpoint key sensitive and diverse habitats and to recommend realistic activities to be implemented for conservation.

During a typical Marine RAP survey, scientists spend approximately two to three weeks assessing biodiversity of selected taxa, the state or health of the habitats and the use of marine resources in an area. Surveys usually lead to discoveries of species previously unknown to science or range extensions for particular species. The scientists dive several times a day, gathering their data mainly through visual transects and observations. Part of the study usually involves on site visits to local stakeholders where dialogue and interviews are conducted.

Introduction

From January 4 –15, 2006, the department of Environment and Nature of the Netherlands Antilles (MINA) in collaboration with Conservation International's Center for Applied Biodiversity Science (CABS) led a Marine RAP survey of Saba Bank. The primary objectives of this survey were to improve knowledge of biodiversity on one of the world's most significant, though poorly known, coral-capped seamounts; increase information in support of resource management; and provide data and analysis to support a petition to the International Maritime Organization to designate appropriate parts of Saba Bank as a Particularly Sensitive Sea Area.

The multi-disciplinary team of scientists and managers of marine protected areas focused on comprehensive sampling of fishes, corals, macro-algae, and sponges on select sites of Saba Bank. Observations on other organisms such as commercially important conch and charismatic marine fauna like whales and turtles were made as opportunity allowed. The overall state or "health" of the sites surveyed was qualitatively assessed as well. For example, on reefal sites the incidence of coral bleaching and disease was noted.



Figure 1. Map with location of Saba Bank and surrounding islands in the Caribbean Sea.

Background

Saba Bank is the largest atoll in the Atlantic Ocean Basin and one of the three largest atolls on earth (Meesters et al., 1996). Located in the Dutch Windward islands approximately 250 km SE of Puerto Rico, it is a flat-topped seamount rising approximately 1000 m from the surrounding sea floor. The dimensions of the Bank are enormous, 65 by 40 km in length and breadth. The area within the 200 m isobath is 2200 km². A large portion of the Bank (about 225 km² in area) lies between 7 and 20 m in depth and contains extensive coral reefs; most of the remaining area is between 20 and 50 m in depth. The seamount is separated from the nearest islands, Saba and St. Eustatius, by deep passes.

Because of its distance from large land -masses, Saba Bank is relatively free of the problems that are degrading many Caribbean reef systems, and the few problems it faces appear to be readily manageable. These include anchoring and abrasion by oil tankers maneuvering off the petroleum trans-shipment facilities on St. Eustatius, petroleum spillage and subsequent use of dispersants, general vessel passage in a zone of very high maritime traffic, possible over-fishing for certain species, and exploration for petroleum reserves (so far unsuccessful). At the same time, the traditional fisheries are economically significant to the small community on Saba Island (about 1300 residents) that is most directly responsible for its management.

Consultations with Saba Island’s government and other organizations led to the conclusion that the best general approach to management of the Bank would be to develop a zoning plan backed by both national and international protective measures. In particular, it is deemed desirable to establish a Particularly Sensitive Sea Area (PSSA) invoking measures to ensure areas with high biodiversity and fragile habitats are avoided by ships en route and are no-anchor zones.

Survey Area

Site	Name	Latitude	Longitude	Date	Depth (m)
RAP01	North East Reef	N 17° 28.788	W 63° 13.655	4/01/06	27
RAP02	Small Bank South	N 17° 26.933	W 63° 54.044	5/01/06	37
RAP03	Rhodolith Reef	N 17° 25.822	W 63° 40.929	5/01/06	35
RAP04	Redman Bulge3	N 17° 24.607	W 63° 11.766	6/01/06	27
RAP05	Seaweed city	N 17° 26.032	W 63° 16.538	6/01/06	22
RAP06	Grouper Bank	N 17° 33.087	W 63° 28.744	7/01/06	32
RAP07	Rendezvous Hill	N 17° 34.896	W 63° 24.404	7/01/06	28
RAP08	Butterfly reef	N 17° 14.083	W 63° 26.947	8/01/06	26
RAP09	Brain coral reef	N 17° 14.379	W 63° 26.912	8/01/06	19
RAP10	Fishpot surprise	N 17° 33.805	W 63° 17.806	9/01/06	24
RAP11*	Barrel sponge alley	N 17° 33.925	W 63° 18.167	10/01/06	29
RAP12*	Red Hind meadows	N 17° 33.925	W 63° 18.176	10/01/06	18
RAP13	Lost anchor	N 17° 33.857	W 63° 17.880	10/01/06	24
RAP14	Moonfish Bank	N 17° 33.689	W 63° 17.631	10/01/06	26
RAP15	Poison Bank	N 17° 30.755	W 63° 13.632	12/01/06	29
RAP16	Brown fields	N 17° 28.049	W 63° 14.971	12/01/06	19
RAP17	Red flats	N 17° 26.390	W 63° 27.776	13/01/06	25
RAP18	Field of Greens	N 17° 30.579	W 63° 27.598	13/01/06	27
RAP19	Coral Gardens	N 17° 20.771	W 63° 15.012	14/01/06	30
RAP20	Conch Valley	N 17° 21.162	W 63° 15.135	14/01/06	18

*yellow tail and Sabina 2 separate dive sites from Saba Girl



Figure 2. Photo of the investigators of the Saba Bank Marine RAP (please note Not all participants are in this photo). Photo by Suzanne Nielsen

List of Marine RAP Team Participants with role in survey and affiliation

- Barrett Brooks – algae specialist, Smithsonian Institution, Washington, DC, USA
 Andy Caballero – underwater video-grapher and boat captain “yellowtail”, Nature Foundation St. Maarten, St. Maarten, Netherlands Antilles
 Kent Carpenter – fish specialist, Old Dominion University and Conservation International/IUCN, Virginia and Washington DC, USA
 Peter Etnoyer – soft coral specialist, Natural History Museum of Los Angeles County and Aquanautix, California, USA
 Paul Hoetjes – survey team leader, Department of Environment & Nature, Ministry of Public Health & Social Development, Curaçao, Netherlands Antilles
 Mark Littler – algae specialist, Smithsonian Institution, Washington, DC, USA
 Diane Littler – algae specialist, Smithsonian Institution, Washington, DC, USA
 Sheila McKenna – coral reef ecologist, Center for Applied Biodiversity Science at Conservation International, Washington, DC, USA
 Stanley Peterson – boat captain “Sabina 2” and field support, Saba National Marine Park, Saba, Netherlands Antilles
 Michael Smith – fish specialist, Center for Applied Biodiversity Science at Conservation International, Washington, DC, USA
 James Van Tassell – fish specialist, Hofstra University, New York, USA
 Robert Thacker – sponge specialist, University of Alabama at Birmingham, Alabama, USA
 Jeff Williams – fish specialist, Smithsonian Institution, Washington, DC, USA
 Armand (Picky) Simmons – field support, Saba, Netherlands Antilles
 Sue Hurrell – field support, Saba National Marine Park, Saba, Netherlands Antilles
 Leroy Peterson - boat captain “Saba girl”, Saba, Netherlands Antilles

INITIAL SURVEY RESULTS

Algae

- Mark and Diane Littler of the Smithsonian Institution each have 30 years experience while their assistant Barrett Brooks has 20 years experience working on algae. Prior to this survey, the two most diverse areas for algae in the Caribbean had been Diamond Rock, Martinique and Pelican Cays, Belize (a mangrove, seagrass, coral complex). Habitats on Saba Bank have far exceeded these places for species diversity.
- The preliminary estimate of number of species in total for algae on Saba Bank ranges from 150 to 200. The exact number will be determined following further scientific laboratory examinations.
- Possibly 12 new species of alga may be named following further scientific study.
- Three places surveyed were dominated by previously unknown algal communities (2 sites red filamentous and fleshy, 1 green and 1 brown). These included “field of greens” (N 17 26.359: W 63 27.769) dominated by green as well as filamentous reds, “brown fields” (N 17 28.027: W 63 14.944) dominated by brown algae and “seaweed city” (N 17 26.032: W 63 16.538) with red fleshy algae.

Sponges

- Only one previous survey of Saba Bank sponges is known. This collection is stored at the Leiden Museum of Natural History (Netherlands); however, we have found no scientific documentation that describes this collection.
- In nine dives, a single roving diver recorded approximately 50 species of sponges. Species identifications will be validated using microscopy.
- Overall, Saba Bank hosts a diverse and healthy sponge community that is representative of known Caribbean sponges.
- In particular, there is a large population of the giant barrel sponge, *Xestospongia muta*, that appears healthy with no observed disease or bleaching.

Soft Corals

- This is the first systematic examination of the gorgonian fauna of Saba Bank
- Twenty different species were documented during the survey, with at least 3 new records
- The gorgonian fauna is very rich, abundant, and representative of the Caribbean.
- Gorgonians dominated the benthic megafauna in some vast areas (> 1km²) of low relief
- *Pseudopterogorgia* sp. (sea plumes), *Plexaura* sp. (sea rods) and *Gorgonia* sp. (sea fans) had the highest abundance
- *Pseudopterogorgia* sp. grew to 1.5 m tall, and *Gorgonia* sp grew more than 1 m across
- *Plexaura homomalla* occurred in abundance. This species has demonstrated bio-pharmaceutical benefits. Prostaglandins isolated and synthesized by drug companies have proven useful in fighting rejection of organ transplants.

- Large colonies of *Iciligorgia* sp. on the crest and wall of the most seaward reefs (at 120'+) suggest high quality gorgonian habitat in deeper waters.
- Gorgonians have a vertical range that descends to the abyss, so Saba Bank's shallow tableau is just the 'tip of the iceberg' for these soft-coral species. A 15km wall drops from 85' to 2400' between Coral Gardens and Overall Bank, and this wall is a prime target for new and un-described deep coral species.

Hard Corals

- Potentially five new records of coral species for Saba Bank were found. Select coral species were collected for verification of identity and are under further study. This will allow for confirmation of species requiring laboratory scrutiny especially for those in the genus, *Agaricia*, *Scolymia* and *Mycetophyllia*. Pending results, a total of possibly 40 plus species will be known to occur on Saba Bank. Meesters (1996) had observed 28 while Hoetjes (1999) added another 5 species to bringing the total to 32.
- The coral species on the bank are representative and typical of that found elsewhere in the Caribbean. For the sites surveyed, the number of coral species observed ranged approximately from zero in algal dominated habitats to over 25 at a reef habitat on the southern part of the bank (N 17 14.000; W 63 27.000). Five reef sites surveyed had clusters of the staghorn coral *Acropora cervicornis*, this species is under review for consideration of inclusion under the USA endangered species act.
- A total of three coral colonies were observed to have disease. These included black band and white plague on separate colonies of *Diploria strigosa* and white plague on *Montastrea faveolata*.
- The Saba National Marine Park reported a severe bleaching event on the Saba Bank in 2005. Bleaching of colonies was first noted in September with the majority of coral colonies bleaching in October/November. Observations on the reefs from this survey suggest that the reefs are in the latter stages of recovery from the bleaching event.
- At one site (Coral Gardens, N 17° 20.771, W 63° 15.012) a number of recently dead *Porites porites* colonies were observed, supposedly killed by the bleaching event
- Corals noted to be bleached with some colonies appearing to be in stages of recovery included *Agaricia agaricites*, *A. humulis*, *A. lamarki*, *Dendrogyra cylindricus*, *Diploria strigosa*, *D. labyrinthiformis*, *Isophyllia rigida*, *Leptoseris cucullata*, *Manicina areolata*, *Montastrea faveolata*, *M. franksi*, *Mycetophyllia spp* and *Siderastrea siderea*

Conch

- Information on the population of conch, *Strombus gigas* on Saba Bank is scant. Anecdotal evidence from Saba fishermen report high densities of conch being seen in the more sandy areas of the bank.
- Meesters and colleagues (1996) reported no conch sightings on their seven dive sites where Saba fishermen indicated previous high concentrations. Hoetjes and his colleagues (1999) reported seeing a few conch on one dive site with a sand bottom. No live conch were seen, but a few small dead individuals were noted on a sandy stretch next to a coral reef at another dive site.

- During this survey, fifty mature conch were observed on Small Bank South (N 17° 26.933; W 63° 54.044) by the Littlers. Coral on pavement characterized the bottom type of this habitat. McKenna observed two Conch individuals on sandy stretches of reef habitats. These sightings included one mature conch on Grouper Bank (N 17° 33.087; W 63° 28.744) while another individual was seen on the Southern Outer Reef site (N 17° 14.083; W 63° 26.947)

Fish

- Coral reef areas on Saba Bank have a very highly diverse fish fauna, with all five species of the shallow water butterflyfishes observed during one dive at one locality, Butterfly reef (N 17 14.083 W 63 27.000).
- A surprisingly diverse array of habitats on the bank led to high diversity of fish species. Forty-two fish species had been previously scientifically documented from Saba Bank. This survey has increased the number to 200 fish species.
- *Pycnomma roosevelti* goby is an extremely rare fish and only four specimens are known to exist. Four more specimens were obtained during the survey that doubles the scientific holdings for this species.
- Two possibly un-described species of goby were found. These specimens are under scientific scrutiny for verification.

Charismatic Marine Fauna

- A loggerhead turtle *Caretta caretta* with ~24" carapace length was observed by Etnoyer, resting under a coral head in an exceptionally rich coral landscape in 85' of water on Overall Bank, January 6, 2006.
- A female humpback whale, *Megaptera novaeangliae* with a calf was sighted on Moonfish Bank (N 17° 34.081, W 63° 17.278) on 10 January 2006. A spout from a whale was sighted earlier that same day, also on Moonfish Bank (N 17° 33.675, W 63° 17.230), this may well have been the same female.
- A small nurse shark (5 ft) was observed at the Small Bank South site (N 17° 26.933, W 63° 54.044).

Preliminary Recommendations

- Prior to this survey, consultations with Saba Island's government and other organizations led to the conclusion that the best general approach to management of the Bank would be to develop a zoning plan. In particular, is deemed desirable to establish a Particularly Sensitive Sea Area (PSSA) invoking measures to ensure areas with high biodiversity and fragile habitats are avoided by ships en route and are no-anchor zones. In order to develop an effective zoning plan for Saba Bank, key pieces of information on species and habitats is needed. Findings from this survey begin to fill in some of this required data.
- Based on preliminary findings, all/the majority of sites surveyed are in need of protective measures. Particularly noteworthy sites include Brain Coral Reef, Brown Fields, Butterfly Reef, Coral Gardens, Field of Greens, Redman Bulge 3, Seaweed City, and all sites sampled on Moonfish Bank.
- More *in situ* field surveys are needed to cover other areas on Saba Bank. These surveys should be conducted in both shallow (<40m) and deeper depths (>50m).

For deeper depths, *in situ* field surveys will require the use of remotely operated vehicles (ROVs) and submersibles.

- Information from *in situ* field surveys needs to be combined and mapped with data to be obtained from the hydrographic study (scheduled for April 2006). In turn, data from the hydrographic study can be used to pinpoint key sites in need of further *in situ* surveys and to identify key sensitive areas on the bank for protective measures.

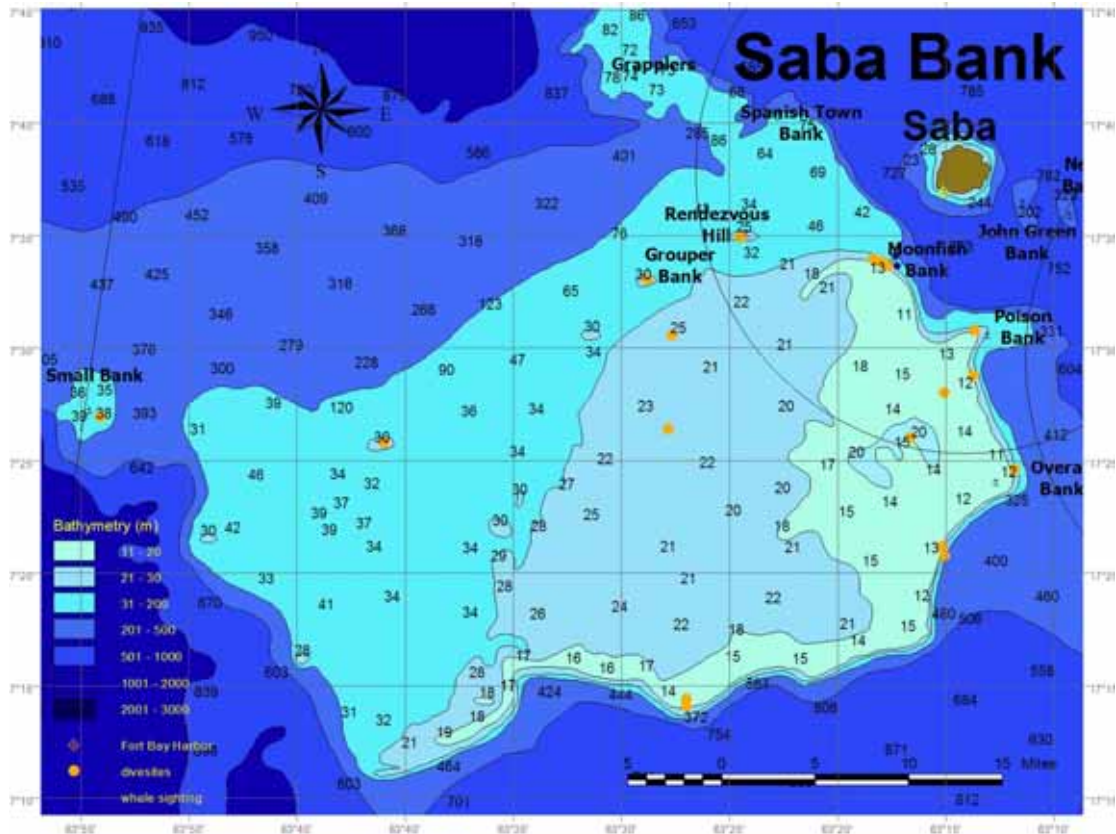


Figure 3. Map depicting sites surveyed. Map by Paul Hoetjes