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# St. Maarten ReefMonitor Update

A joint effort of ReefKeeper International  
and The Nature Foundation of St. Maarten  
to monitor St. Maarten's coral reefs



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## St. Maarten Reefs Walking a Tightrope

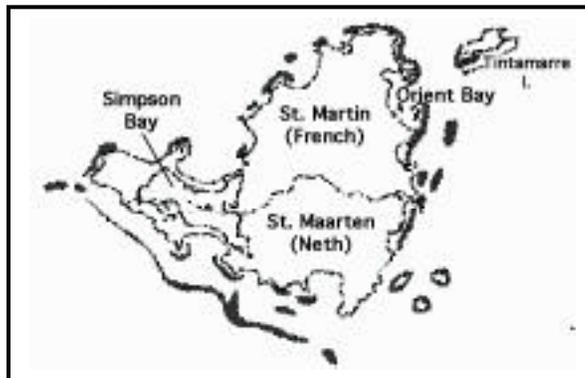
### Executive Summary

Coral reef monitoring took place at the reefs in the waters around St. Maarten, Netherlands Antilles throughout 1999. This quarterly monitoring was a joint effort of ReefKeeper International and The Nature Foundation of St. Maarten. The purpose of the monitoring was to establish baseline parameters for the health of these coral reefs. Any significant changes that the reefs undergo can then be quantified, and hopefully the cause for the changes can be identified. All three of the reefs monitored are situated off the southern and eastern coasts of the Dutch part of the island, within the boundaries of the St. Maarten Marine Park. The fact that a marine park is already in place should be useful when working to protect these fragile ecosystems.

The monitoring results showed the overall average percent hard coral cover for all three reefs at 29.8%, and percent algal cover at 27.1%. Percent bottom cover by soft corals was 22.9%. Percent bottom cover by *Palythoa sp.* (8.4%), abiotics (5.6%), and other biotics (anemones, sponges, etc.) (6.2%) were significantly lower.

These reefs, when taken together, barely score an average percent hard coral bottom cover higher than that of algae -- and that is not true for each of the reefs individually. It is important to prevent the degradation of these reefs into algal domination by reducing the negative anthropogenic influences that are affecting them.

### Introduction



The three reefs monitored were Molly Beday Reef, Hens & Chickens Reef and Mike's Maze Reef. The data collected at these sites included percent bottom cover composition, hard coral species identification and hard coral health. The overall averages from all three reefs were combined to give an idea of the reef conditions of

the area overall. The results from the individual reef monitorings are also compared. This is to see how the reefs' conditions compare to one another and whether those conditions relate to their locations relative to shore.

### Survey Locations

The three reefs monitored are located in the Caribbean Sea off the coast of St. Maarten, in the St. Maarten Marine Park. Molly Beday Reef

ReefMonitor Update is one of the publications issued by ReefKeeper International, a tax-exempt, nonprofit membership organization exclusively dedicated to the protection of coral reefs and their marine life. Working from Miami (FL), Boqueron (PR), and Cozumel (Mex), ReefKeeper International conducts an integrated program of field survey investigations, reef monitoring, policy analysis, grassroots organization, technical assistance, advocacy and public awareness. ReefKeeper activities are partially supported by Jamee & Marshall Field Fndn, Goldman Fund, Henry Fndn, Homeland Fndn, Curtis & Edith Munson Fndn, Elizabeth Ordway Dunn Fndn, Orchard Fndn, Patagonia Fndn, Pew Charitable Trusts, Rockefeller Brothers Fund and Turner Fndn. Memberships start at \$25 per year.

(18°01.361 N / 62°00.040 W) is the northernmost reef monitored, lying off Geneve Bay. This reef is the deepest survey location at 45-50 feet. Hens & Chickens (18°00.638 N / 63°00.475 W) lies off the southeastern coast of Point Blanche Bay. This reef is the shallowest of the three, with a depth range of 15-21 feet. Mike's Maze (17°59.35 N / 63°03.20W) lies in an area far from the other two reef sites, south of Great Bay Harbor. This reef is characterized by the classical spur and groove system and has a depth of approximately 35 feet.

Monitoring was conducted at all three reef sites in January and March of 1999, and at Molly Beday Reef and Mike's Maze Reef in July of 1999.

### Bottom Cover

#### Overall Average

The monitoring results showed the overall average percent hard coral cover for all three reefs at 29.8%, and percent algal cover at 27.1%. Percent bottom cover by soft corals was 22.9%. Percent bottom cover by *Palythoa sp.* (8.4%), abiotics (5.6%), and other biotics (anemones, sponges, etc.) (6.2%) were significantly lower.

#### Molly Beday Reef

This reef had the highest reported value for percent bottom cover by hard corals at 33.7%. Percent bottom cover by algae was 23.7%, giving this site the largest percent difference between hard coral and algal cover. Soft coral cover at this site was 17.2%, quite close to the percent bottom cover by *Palythoa sp.*, which was reported as 15.7%. Abiotics constituted 8.8% of the total bottom cover and other biotics were only 1%.

### Hens & Chickens

At this reef site, the average percent bottom cover by hard corals was 29.7%, which was the middle value for the three reefs. However, average percent bottom cover by algae at this site was the highest (34.6%). This was also the only reef where percent bottom cover by algae was higher than percent bottom cover by hard coral. Soft coral constituted 20.6% of the average bottom cover. The other three parameters show bottom cover composition at much lower values. Other biotics was the highest of the

three, at 6.4%; abiotic bottom cover was 4.5% and *Palythoa sp.* cover was 4% of the total bottom cover.

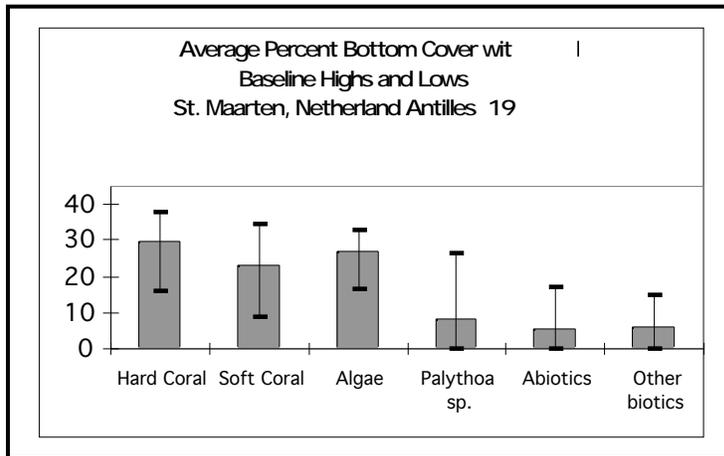
#### Mike's Maze

Soft corals dominated this reef site, composing 30.6% of the total bottom cover. Percent bottom cover by hard corals was

lowest at this site (25.9%), as was percent bottom cover by algae (23.1%). Although hard corals outcompeted algae for space, it was not by much. Other biotics made up 11.2% of the total bottom cover. Both *Palythoa sp.* and abiotic cover were much lower, at 5.5% and 3.6%, respectively.

### Hard Coral Health

The reef with the highest amount of healthy hard corals was Mike's Maze, which reported 99.6% healthy. At this site, there was only bleaching, which made up the other 0.4% of the total. Both Hens & Chickens Reef and Molly Beday Reef also had high amounts of healthy hard corals, at 97.2% and 96.4%, respectively. The 3.6% of hard corals that were not healthy at Molly Beday Reef were bleached. The 2.8% of hard corals not healthy at Hen & Chicken Reef were split evenly: 1.4% bleached and 1.4% sick.



ReefKeeper's reef monitoring protocol uses 2 or more separate 50-meter transects laid out at each reef site studied using factory-marked fiberglass transect tape that follows the depth contour of the reef site. Point-intercept bottom cover data are noted at half-meter intervals along the 50 meters, producing 100 bottom cover data points for each transect. For hard coral colonies at data collection points, health condition is noted and species are identified when possible. If feasible, a visual record of each transect is made with photos taken every four meters along each transect and/or with a continuous video of each transect. This monitoring procedure is repeated every three months.

## Hard Coral Species

The highest number of hard coral species were reported at Molly Beday Reef, which had 15 species present. The other two reef sites, Hens & Chickens and Mike's Maze both reported 12 species. *Millepora alcicornis* (Branching fire coral) was the dominant species at all three sites, making up between 32.9% and 43.4% of all species recorded at each site. Other species that were reported in relatively high numbers at all three sites were *Diplora strigosa* (Symmetrical brain coral) (11.8%-31.6%), *Porites astreoides* (Mustard hill coral) (9.2%-26.3%) and *Montastrea cavernosa* (Great mound coral) (5.3%-10.5%). At Hens & Chickens Reef, *Millepora squarrosa* (Box fire coral) composed 14.5% of all hard corals reported. It was not reported present at either of the other two reef sites.

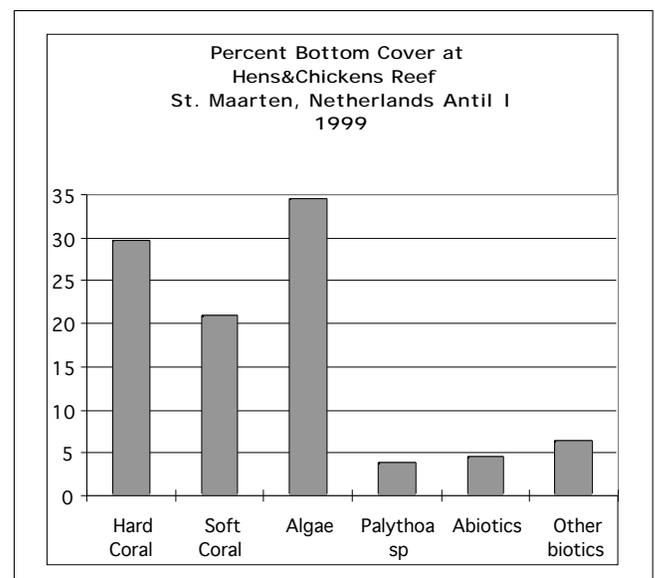
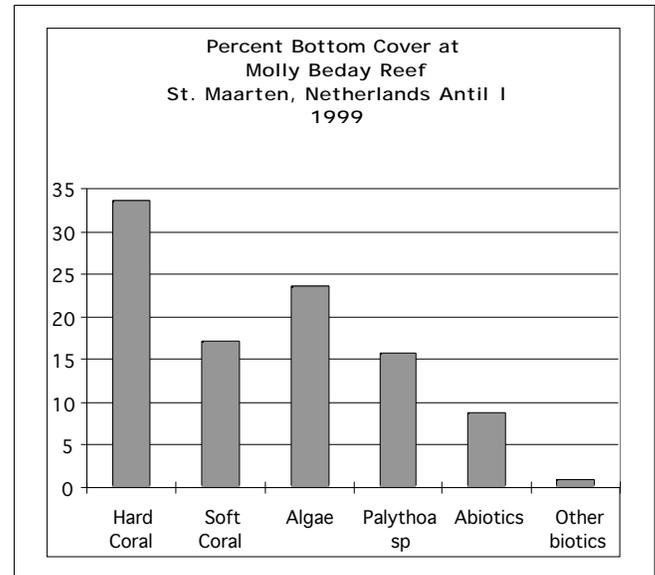
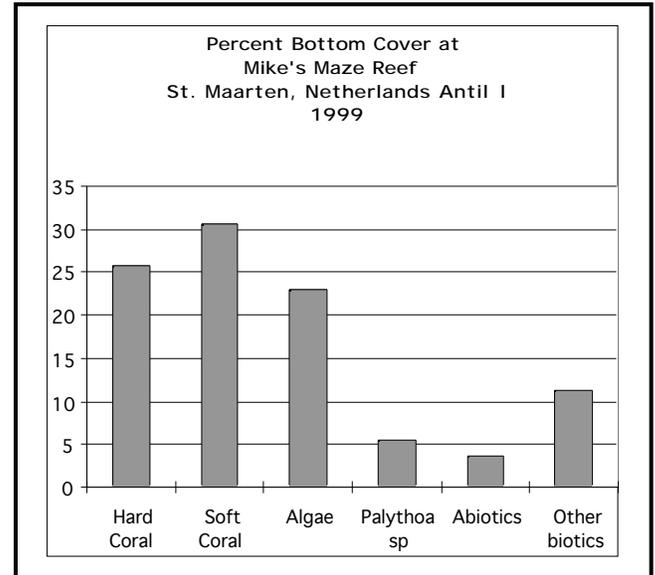
## Significance

These St. Maarten coral reefs show a negligible difference between average percent bottom cover by hard coral and by algae. While there are distinct differences between the three reefs, a possible swing to algal dominance is a threat to all three reefs.

Increases in nutrient and sediment runoff due to coastal development are harmful to the reefs. The higher concentration of particles in the water leads to increased turbidity and lower light availability for coral growth. The raised nutrient concentrations stimulate the growth of algae, which can outcompete hard corals for settlement space.

Hens & Chickens Reef is the shallowest and closest to shore of the three reefs. It also has the highest percent bottom cover by algae. This suggests that this reef is being affected the most by anthropogenic changes in water quality.

Continued monitoring will show if the percent bottom cover at these reefs is at a stable balance, or if algal cover is increasing due to human influence from coastal development.



**Percent Bottom Cover by Hard Coral Species  
St. Maarten, Netherlands Antilles**

	Hens & Chickens	Molly Beday	Mike's Maze
<i>Acropora palmata</i> (Elkhorn coral)	0.0	1.3	9.2
<i>Agaricia agaricites</i> (Lettuce coral)	2.6	6.6	3.9
<i>Agaricia humilis</i> (Lowrelief lettuce coral)	0.0	1.3	5.3
<i>Colpophyllia natans</i> (Boulder brain coral)	0.0	2.6	0.0
<i>Dichocoenia stokesii</i> (Elliptical star coral)	0.0	6.6	0.0
<i>Diplora labyrinthiformis</i> (Grooved brain coral)	1.3	0.0	6.6
<i>Diplora strigosa</i> (Symmetrical brain coral)	11.8	18.4	31.6
<i>Isophyllastrea rigida</i> (Rough star coral)	0.0	1.3	0.0
<i>Madracis decactis</i> (Ten-ray star coral)	0.0	1.3	0.0
<i>Meandrina meandrites</i> (Maze coral)	2.6	2.6	0.0
<i>Millepora alcicornis</i> (Branching fire coral)	32.9	43.4	38.2
<i>Millepora complanata</i> (Blade fire coral)	3.9	0.0	0.0
<i>Millepora squarrosa</i> (Box fire coral)	14.5	0.0	0.0
<i>Montastrea cavernosa</i> (Great star coral)	10.5	7.9	5.3
<i>Montastrea annularis</i> (Boulder star coral)	2.6	52.6	9.2
<i>Porites astreoides</i> (Mustard hill coral)	10.5	9.2	26.3
<i>Porites porites</i> (Finger coral)	2.6	0.0	0.0
<i>Siderastrea radians</i> (Lesser starlet coral)	3.9	1.3	5.3
<i>Solenastrea bournoni</i> (Smooth star coral)	0.0	3.9	1.3
Unidentified	0.0	14.5	0.0

**Thank You  
Volunteers!!**

**Paul Ellinger  
Brian Boekhout  
Andy Caballero**

**Boat Donor**

**St. Maarten  
Marine Park**

**Why Monitor Reefs?**

If you don't monitor the oil level in your car's engine, sooner or later you're going to be out of oil and out of an engine. The analogy strongly applies to coral reefs, and that's why ReefKeeper International sponsors reef monitoring by local volunteers. There's really no other way to catch problems before they become catastrophic – or even better yet, before they begin by having data to make a case against reef threatening human action. These volunteer reef monitors watchdog significant coral reef sites for changes in coral health, coral cover and other key early warning signs of environmental impact. The gathered data are sent to ReefKeeper, where they are analyzed for use in conservation efforts. Most significantly, these monitoring activities act as a deterrent, serve as a catalyst for other local conservation action, and focus attention on the value of these reef sites.