2003 US Virgin Islands Reef Check Surveys

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October 2003

Introduction

As part of a grant to assess benthic habitats in the US Virgin Islands the Division of Fish and Wildlife (DFW) employed the Reef Check protocol to survey habitat, invertebrate cover, and fish assemblages at two sites around St. Thomas. The Reef Check program is a global volunteer program designed to provide public education and raise awareness of the status of the world's reefs through the biological monitoring of key reef species. The Reef Check program provides a broad assessment of reefs which may be repeated annually for monitoring purposes. For more information of the Reef Check program see Hodgson, *et al.* (2003) or the Reef Check website at http://www.reefcheck.org.

Methods and Site Selection

Great Bay- On 20 September 2003 two transects were surveyed in Great Bay, St. Thomas. The transects in Great Bay were previously surveyed by Volson (2001). Volson (2001) however, used a slightly different survey method. This site was selected not only because it had been surveyed in the past but also because it is a nearshore reef that may be influenced by anthropogenic impacts. The site is also within a marine reserve. Transects 19 and 20 ran parallel to a linear reef. The transects were found by using coordinates reported in Volson (2001) and finding the concrete blocks with PVC pipes left by that study. Transect 19 was at a depth of 6.5 m and transect 20 was at a depth of 8.5 m. Appendix 1 is the site description and coordinates for transects 19 and 20 as provided for Reef Check.

Savana Island- On 27 September 2003 two transects were completed at one site at Savana Island, to the southwest of St. Thomas. This is an offshore cay that has no population and is probably little affected by development and industry on St. Thomas. There is however, commercial fishing and recreational diving around the island (see Appendix 2 for the site description and coordinates). The reef at Savana Island is a linear reef that lies in a semi-protected bay in the lee of the island. The deep transect was at a depth of 13 m while the shallow transect ran at a depth of 7 m. Both transects followed a contour parallel to shore.

Survey methods

At both sites the Reef Check protocol was used (see Hodgson, *et al.*, 2003 for Reef Check methods). This protocol was slightly modified to better fit the US Virgin Islands needs. Modifications included a higher species resolution in the substrate surveys and the addition of key species of fish and invertebrates that are important to the USVI. Additional key fishes included; angelfishes, queen triggerfish, hamlets, and species level identification of all grouper with size estimates for grouper. Conch were also added as a key species in the invertebrate transect. Although conch are not necessarily a reef organism, in the USVI they are often found near and among reefs and their presence may be an indication of healthy conch populations. Two transects were conducted at each site.

Results and Discussion

Great Bay- Tables 1 and 2 list the results of the substrate surveys conducted in Great Bay at transects 19 and 20. In addition, coral bleaching occurred in 10% of the corals in

three of the four 20m transect segments along transect 19. Only one colony was damaged by means other than bleaching, however, the mode of damage was not obvious. No bleaching or damage was observed along transect 20.

Transect 20 was miss-placed and did not actually follow the original transect path. The transect should have run along a slope (following a contour) that was dominated more by hard corals. Instead it ran shoreward of the reef slope and spanned habitat more similar to colonized hard bottom than coral reef. This may explain the high percent of sand, rubble, and macroalgae in the substrate count as presented in Table 2.

The densities of key indicator species are presented in Table 3 for fish and invertebrates. The most abundant fish were parrotfish across both transects. In Transect 20 parrotfish counts included wrasse and also included fish of all size classes rather than just parrotfish >20cm as specified in the Reef Check protocol. There were two grouper observed in the belt transect, both were red hind approximately 30-35 cm TL. Gorgonians dominated most of invertebrate counts across both transects.

Savana Island- The results of the substrate transects at Savana are presented in Tables 4 and 5. The shallow transect had a considerable amount of live coral cover with *Montastraea annularis* being the most prominent. Hard coral accounted for a mean of 21 $\pm$ 4.32 of the possible 160 counts for the transect. The deeper transect had less coral cover (mean of 9.25 $\pm$ 1.5 out of 160 possible counts). No bleaching was observed in the shallow transect and less than 5% and 10% of the colonies were bleached in the last two 20 m survey segments of the deeper transect. Black band disease was observed on two colonies (one in each of the two transects). The diseased corals had damaged tissue on 5% of the colony in the deeper transect and 30% of the colony in the shallower transect. Anchor damage was apparent on two colonies (one in each transect). This area has one mooring and experiences moderate use by recreational divers and dive operations. The site has a potential to be damaged by anchors over time.

The results of key indicator species surveys for fish and invertebrates are presented in Table 6. The most abundant fish across both transects were parrotfish. Grouper were observed in both transects. Ten grouper (coney n= 7, and red hind, n= 3) were encountered in the shallow transect. Sizes for the coney were 10, 15, 10, 30, 10 20, and 20 cm TL. The red hind sizes were 15, 20, and 40 cm TL.

Literature Cited

Hodgson G; L Maun; C Shuman. 2003. Reef Check Survey Manual for Coral Reefs of the Indo Pacific, Hawaii, Atlantic/Caribbean, Red Sea and Arabian Gulf. Reef Check, Institute of the Environment, University of California Los Angeles, CA. 33p.

Volson, B. 2001. Benthic Habitat Assessment Project. Division of Fish and Wildlife, Department of Planning and Natural Resources, USVI. Final Report F-7. 115 pp.

Table 1. Substrate composition for Great Bay transects 19 and 20 2003 using Reef Check categories (mean of each category over four 20 m segments ± std. dev.).

Transect 19		Transect 20	
Hard coral	5.75 ± 2.75	Hard coral	4 ± 1.63
Soft coral	1.25 ± 1.26	Soft coral	0.25 ± 0.5
Recently killed coral	0 ± 0.0	Recently killed coral	0 ± 0.0
Nutrient indicator algae	9.25 ± 4.57	Nutrient indicator algae	9.5 ± 2.65
Sponges	3.5 ± 1.73	Sponges	3.75 ± 0.96
Rock (dead coral)	6.5 ± 1.29	Rock (dead coral)	3.5 ± 2.65
Rubble	4.25 ± 2.87	Rubble	8.5 ± 3.42
Sand	9.5 ± 6.24	Sand	10.5 ± 4.65
Silt/clay	0 ± 0.0	Silt/clay	0 ± 0.0
Other	0 ± 0.0	Other	0 ± 0.0

Table 2. Substrate composition to species level for Great Bay in transects 19 and 20 (based on four 20 m segments).

Transect 19			Transect 20*		
Category	**Count**	**Percent of transect**	**Category**	**Count**	**Percent of transect**
Sand	39	24	Sand	42	26
Rubble	16	10	Rubble	34	21
Rock	1	1	Rock	14	9
Dead coral w/ algae	20	13	Macroalgae	38	24
Macroalgae	3	2	Sponges	15	9
Lobophora variegata	5	3	*Gorgonia ventalina*	1	1
Dictyota spp.	29	18	*Porites porites*	5	3
Halimeda spp.	5	3	*Montastraea annularis*	10	6
Encrusting sponge	9	6	*Siderastrea radians*	1	1
Tube sponge	1	1			
Rope sponge	2	1			
Ircinia strobilina	2	1			
Erythropodium sp.	3	2			
Pseudopterogorgia sp.	1	1			
Eunicea sp.	1	1			
Siderastrea siderea	2	1			
Siderastrea radians	4	3			
Montastraea annularis	2	1			
Agaricia agaricites	1	1			
Diploria strigosa	1	1			
*Dichocoenia stokes*ii	1	1			
Madracis mirabilis	1	1			
Porites porites	2	1			
Porites astreoides	4	3			
Millepora spp.	5	3			

* Transect 20 was not completed with the same level of resolution as transect 19.

Table 3. Density of key species at Great Bay transects 19 and 20

Transect 19		Transect 20	
Fish	**Mean no./m^2 ± SD**	**Fish**	**Mean no./m^2 ± SD**
Butterfly fish	0.03 ± 0.008	Butterfly fish	0 ± 0.0
Grunts and Margates	0 ± 0.0	Grunts and Margates	0.003 ± 0.005
Snapper	0 ± 0.0	Snapper	0.003 ± 0.005
Nassau grouper	0 ± 0.0	Nassau grouper	0 ± 0.0
Grouper	0.005 ± 0.006†	Grouper	0 ± 0.0
Hamlets	0.01 ± 0.008	Hamlets	0.085 ± 0.047
Parrotfish	0.015 ± 0.024	Parrotfish	0.35 ± 0.148*
Angelfish	0.008 ± 0.015	Angelfish	0 ± 0.0
Moray eel	0 ± 0.	Moray eel	0 ± 0.0
Invertebrates		**Invertebrates**	
Banded coral shrimp	0.0075 ± 0.0096	Banded coral shrimp	0 ± 0.0
Diadema urchin	0.005 ± 0.006	Diadema urchin	0 ± 0.0
Pencil urchin	0.008 ± 0.0096	Pencil urchin	0 ± 0.0
Triton shell	0 ± 0.0	Triton shell	0 ± 0.0
Flamingo tongue	0.02 ± 0.022	Flamingo tongue	0.003 ± .005
Gorgonian	0.32 ± 0.124	Gorgonian	0.048 ± 0.021
Sea egg (Tripnustes)	0.05 ± 0.010	Sea egg (Tripnustes)	0.005 ± 0.01
Lobster	0 ± 0.0	Lobster	0 ± 0.0
Conch	0.003 ± 0.005	Conch	0 ± 0.0

† Grouper were *Epinephelus guttatus*

* this count included parrotfish and wrasses of all sizes

Table 4. Substrate composition for Savana Island shallow and deep transects 2003 using Reef Check categories (mean of each category over four 20 m segments ± std. dev.).

Shallow (Depth = 7m)		Deep (Depth = 13m)	
Hard coral	21 ± 4.32	Hard coral	9.25 ± 1.50
Soft coral	4.5 ± 1.00	Soft coral	3 ± 2.16
Recently killed coral	0 ± 0.0	Recently killed coral	0 ± 0.0
Nutrient indicator algae	4.5 ± 0.58	Nutrient indicator algae	9.25 ± 5.12
Sponges	1 ± 1.41	Sponges	3.75 ± 0.96
Rock (dead coral)	4.5 ± 1.73	Rock (dead coral)	6 ± 1.15
Rubble	1.25 ± 1.26	Rubble	1.5 ±1.29
Sand	3 ± 2.94	Sand	7 ± 4.55
Silt/clay	0 ± 0.0	Silt/clay	0 ± 0.0
Other	0.25 ± 0.50	Other	0.5 ± 0.58

Table 5. Substrate composition to species level for Savana Island shallow and deep transects (based on four 20 m segments).

Shallow transect			Deep Transect		
Category	**Count**	**Percent of transect**	**Category**	**Count**	**Percent of transect**
Acropora cervicornis	1	0.6	*Agaricia agaricites*	1	0.6
Agaricia agaricites	5	3.1	*Agaricia lamarcki*	2	1.3
Dead coral w/ alga*e*	16	10	*Agelas conifera*	3	1.9
Dichocoenia stokesii	2	1.3	*Amphimedon compressa*	1	0.6
Dictyota sp	6	3.8	*Aplysina fistularis*	1	0.6
Diploria sp	5	3.1	*Aplysina sp*	4	2.5
Diploria strigosa	8	5	*Briareum asbestinum*	1	0.6
encrust sponge	2	1.3	Dead coral w/ algae	23	14.4
Erythropodium	2	1.3	*Dichocoenia stokesii*	1	0.6
Eunicea sp	6	3.8	*Dictyota* sp	21	13.1
Lobophora variegata	12	7.5	encrust sponge	4	2.5
Millepora alcicornis	1	0.6	*Eunicea* sp	6	3.8
Montastraea annularis	30	18.8	*Eusmilia fastigiana*	2	1.3
Montastraea cavernosa	10	6.3	*Lobophora variegata*	16	10
Plexaura homomalla	3	1.9	*Madracis* sp	1	0.6
porites astreoides	10	6.3	*Meandrina meandrites*	1	0.6
porites porites	7	4.4	*Millepora* sp	1	0.6
Pseudoplexaura sp	8	5	*Montastraea annularis*	6	3.8
Rubble	5	3.1	*Montastraea cavernosa*	5	3.1
Rock	2	1.3	*Plexaura homomalla*	3	1.9
Sand	12	7.5	*Porites astreoides*	10	6.3
Siderastrea siderea	3	1.9	*Porites porites*	1	0.6
Solenastrea sp	1	0.6	*Pseudoplexaura* sp	3	1.9
tube sponge	2	1.3	Rubble	6	3.8
unknown	1	0.6	Rock	1	0.6
			Sand	28	17.5
			Siderastrea radians	2	1.3
			Siderastrea siderea	3	1.9
			unknown	3	1.9

Table 6. Density of key species at Savana Island transects

Shallow transect		Deep transect	
Fish	**Mean no./m^2 ± SD**	**Fish**	**Mean no./m^2 ± SD**
Butterfly fish	0.008 ± 0.010	Butterfly fish	0.005 ± 0.006
Grunts and Margates	0.005 ± 0.010	Grunts and Margates	0 ± 0.0
Snapper	0.008 ± 0.02	Snapper	0 ± 0.0
Nassau grouper	0 ± 0.0	Nassau grouper	0 ± 0.0
Grouper	0.03 ± 0.021†	Grouper	0.005 ± 0.006*
Hamlets	0.02 ± 0.010	Hamlets	0.003 ± 0.005
Parrotfish	0.04 ± 0.018	Parrotfish	0.018 ± 0.017
Queen Triggerfish	0 ± 0.0	Queen Triggerfish	0 ± 0.0
Angelfish	0 ± 0.0	Angelfish	0 ± 0.0
Moray eel	0 ± 0.	Moray eel	0 ± 0.0
Invertebrates		**Invertebrates**	
Banded coral shrimp	0 ± 0.0	Banded coral shrimp	0.005 ± 0.010
Diadema urchin	0.003 ± 0.005	Diadema urchin	0 ± 0.0
Pencil urchin	0 ± 0.0	Pencil urchin	0 ± 0.0
Triton shell	0.003 ± 0.005	Triton shell	0 ± 0.0
Flamingo tongue	0.023 ± 0.017	Flamingo tongue	0.018 ± 0.024
Gorgonian	1.26 ± 0.437	Gorgonian	1.79 ± 0.495
Sea egg (Tripnustes)	0 ± 0.0	Sea egg (Tripnustes)	0 ± 0.0
Lobster	0.005 ± 0.010	Lobster	0 ± 0.0
Conch	0 ± 0.0	Conch	0 ± 0.0

† Grouper were *Epinephelus guttatus* and *Cephalopholis fulva*

* Grouper were *Epinephelus guttatus* and *Cephalopholis fulva*