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1998 ReefCheck Florida Keys Report

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Florida Keys Reefs Continue to Show Signs of Stress

Introduction

As part of the worldwide 1998 ReefCheck, ReefKeeper volunteers surveyed a total of 18 reefs in the Florida Keys between May and September 1998. ReefCheck is an annual international event involving recreational divers and marine scientists from around the world. The major goal of ReefCheck is to raise awareness about the value of coral reefs as well as anthropogenic threats to their health. Volunteers conduct surveys of several reefs around their area and then send the data to ReefCheck headquarters at the Institute for Environment and Sustainable Development at the Hong Kong University of Science and Technology, Research Centre. ReefCheck then compiled all the data and held a press conference in November that focused on the worldwide status of coral reefs.

Similar to last year's results, the reefs in the Florida Keys still showed signs of stress and degradation. Algae bottom cover still exceeded hard coral bottom cover. Targeted invertebrate species were extremely rare and fish numbers were alarmingly low, especially among the Nassau grouper populations. There was a positive correlation, however, between the Florida Keys National Marine Sanctuary no-take zones in the Middle Keys and fish populations. In areas where fishing is not allowed, the number of many species of fish exceeded the number found at the Florida Keys National Marine Sanctuary multiple-use control sites.

Data Collected and Why

The data collected at the 18 sites consisted of percent bottom cover by hard corals, soft corals, algae, sponges, abiotics, etc. This data is important in order to acquire a reliable estimate of the abundance of hard coral per reef versus the abundance of space-competing species like algae and sponges. Surveys were also conducted for invertebrates such as Diadema and pencil urchins as well as for fish populations like the Nassau grouper and snappers. These served as abundance indicators of important commercial, recreational, and ecological species inhabiting the reefs.

For ReefCheck bottom cover data, "algae" refers only to fleshy algae that may be indicators of nutrient rich waters. Bottom cover by Halimeda, a calcareous species of reef cementing algae common to many of the Florida Keys reefs was reported under the 'other biotic' bottom cover category. Not surprisingly, there existed a correlation between a low algae percentage reported with a high 'other biotic' percentage reported. This is because we not only see fleshy algae in our reefs, but Halimeda algae as well.

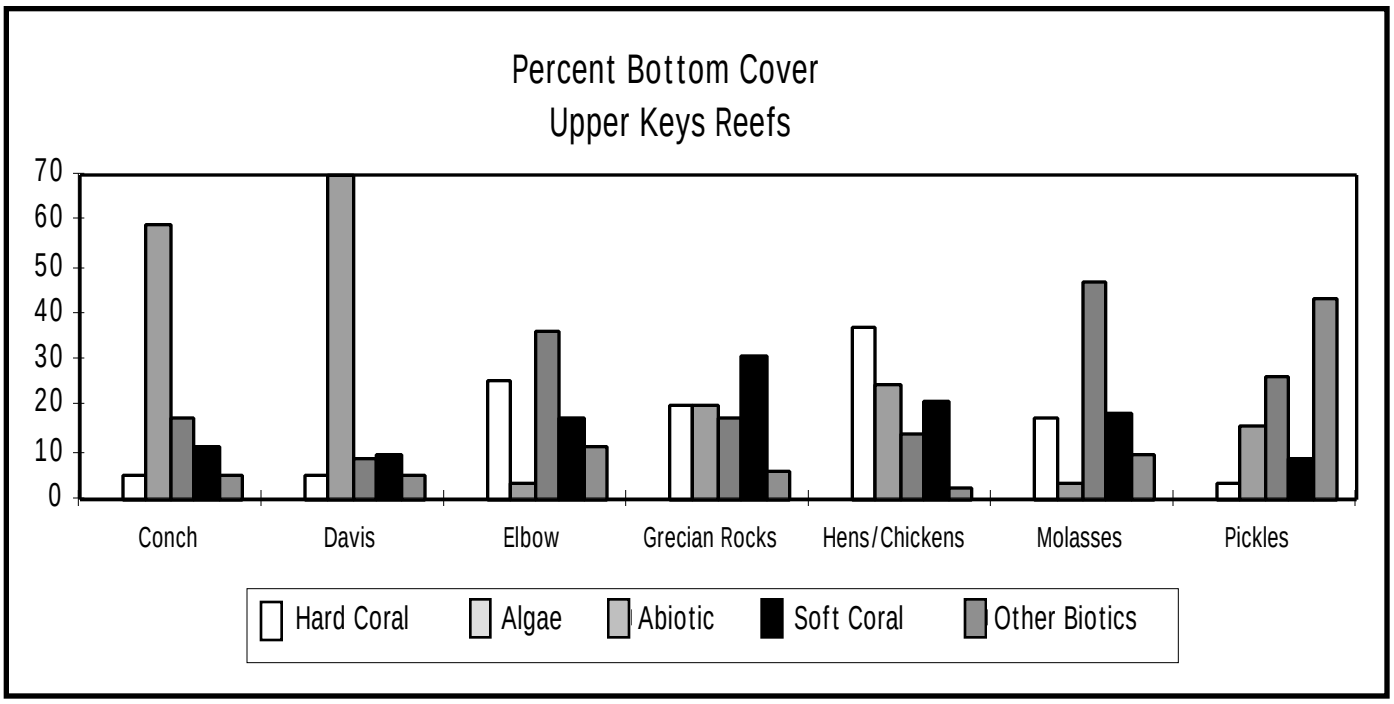
ReefCheck's reef monitoring protocol uses 2 or more separate 50-meter transects laid out at each reef site studied using factory-marked fiberglass transect tape that follows the depth contour of the reef site. Point-intercept bottom cover data is noted at half-meter intervals along the transect beginning with 0 m up to and including 20 m. A 5.5 m interval is skipped and bottom cover data is noted again at the 25.5 m mark up to and including 45 m, for a total of 80 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.

Results

Our results are more easily compared if we divide the Florida Keys into three areas; Upper, Middle and Lower Keys. In this way, we hope to be able to find some correlations between the sites that might possibly be explained by location. Among the sites surveyed, some of them are no-take zones (SPAs), one of them (Tennessee) is a Research Only Area (ROA), another (Western Sambos) is an Ecological Reserve (ER) and others are multiple-use sites (C), as designated by the Florida Keys National Marine Sanctuary Management Plan. These multiple-use sites, all located within the Florida Keys National Marine Sanctuary, serve as controls to evaluate the effects from removing fishing pressure.

Upper Keys

The highest amount of hard coral bottom cover was generally found at the sites off the Upper Keys. The sites surveyed for ReefCheck 1998 in this area were Conch Reef (SPA), Davis Reef (C), Elbow Reef (SPA), Grecian Rocks (SPA), Hens and Chickens Reef (SPA), Molasses Reef (SPA), and Pickles Reef (SPA). The reefs with the



highest percent bottom cover of hard coral were Hens and Chickens with 36.9%, followed in order by Elbow Reef with 25.6%, Grecian Rocks with 20.6%, and Molasses with 18.1%. Conch (5.6%), Davis (5.6%), and Pickles (3.8%) reefs had much lower percentages of hard coral bottom cover.

Algae bottom cover was high among the sites where hard coral bottom cover was low. Davis had an algae bottom cover of 70%, and Conch had an algae bottom cover of 59.4%. The lowest algae bottom cover (3.8%) was found at both Elbow and Molasses. The algae bottom cover for the other sites were 25% for Hens and Chickens, 20.6% for Grecian Rocks, and 16.3% for Pickles.

Not surprisingly, the sites with the lowest levels of algae bottom cover reported were also the ones with the highest levels of abiotic bottom cover reported. Molasses had the highest percentage (46.9%) followed by Elbow Reef (36.3%).

Pickles reported a high percentage (43.8%) for 'other biotics'. Most of that was Halimeda algae.
Soft coral was most prevalent at Grecian Rocks with a bottom cover percentage of 31.3%, followed in order by Hens and Chickens at 21.3%, Molasses at 18.8%, and Elbow at 17.5%. And even though the percent soft coral bottom cover found at Conch (11.9%), Davis (10.0%), and Pickles (8.8%) was low, there was more soft coral than hard coral at those sites.

Lobsters were found at four of the seven sites with average values as follows: Conch (3.5), Grecian Rocks (3), Davis (2.5), and Elbow (.5). Urchins were only observed at Conch and Pickles no-take zones, with average values of 3 and 2 respectively. The majority of the urchins are pencil urchins, although one Diadema urchin was reported.

There were 'spotty' abundances of snappers observed at the no-take zones. Surprisingly, the highest number of snappers was seen at Davis, a multiple-use control site. The highest numbers of parrotfishes were reported at no-take zones. The average number reported at Davis, the control site, was 12, while at Elbow, a no-take zone, the average was 23.5. The highest amounts of groupers observed were at no-take zones. The average number of groupers seen at Grecian Rocks was five, half of the average composed of Nassau groupers. The average number of groupers for Molasses was 2.5, 80% of this average was made up by Nassau groupers. There were no Nassau groupers observed at Davis, the multiple-use control site.

ReefCheck's fish monitoring protocol uses two 50-meter transects laid out at each reef site studied. Four 5 m wide (centered on the transect line) by 20 m long transects are sampled for fish species typically targeted by fishermen, aquarium collectors and others. The survey started at the 0 m mark, 15 minutes after the divers had started in order to allow the fish to come out. The survey area was a box, 5 m in length, 5 m in width, and 5 m in height. About four minutes were spent at each box. After the 0 m mark the diver moved on to the 5 m mark, then the 10 m mark, and so on. At the 20 m mark, a 5 m interval is skipped and the survey is resumed at the 25 m mark up to the 45 m mark. This procedure was repeated on the second transect line.

UPPER KEYS REEF DATA

% Bottom Cover	Conch	Davis	Elbow	Grecian Rocks	Hens/Chickens	Molasses	Pickles
Hard Coral	5.6	5.6	25.6	20.6	36.9	18.1	3.8
Algae	59.4	70.0	3.8	20.6	25.0	3.8	16.3
Abiotic	18.1	8.8	36.3	18.1	13.8	46.9	26.3
Soft Coral	11.9	10.0	17.5	31.3	21.3	18.8	8.8
Other Biotics	5.0	5.6	11.9	6.3	3.1	9.4	43.8
Fish and Invertebrate Counts*							
Lobsters	3.5	2.5	0.5	3	0	0	0
Urchins	3	0	0	0	0	0	2
Groupers	0	0.5	0	5	0	2.5	0
Snappers	0	306	4.5	0	140.5	13.5	21
Parrot Fish	8	12	23.5	8.5	10.5	18	0

* From 40m long belt transects (6m wide).

Middle Keys

The ReefCheck 1998 survey sites in the Middle Keys were Alligator (SPA), Coffins (SPA), Crocker (C), Delta (C), Doughnut (SPA), Pleasure (C), Sombrero (SPA), and Tennessee (Research Only Area =ROA).

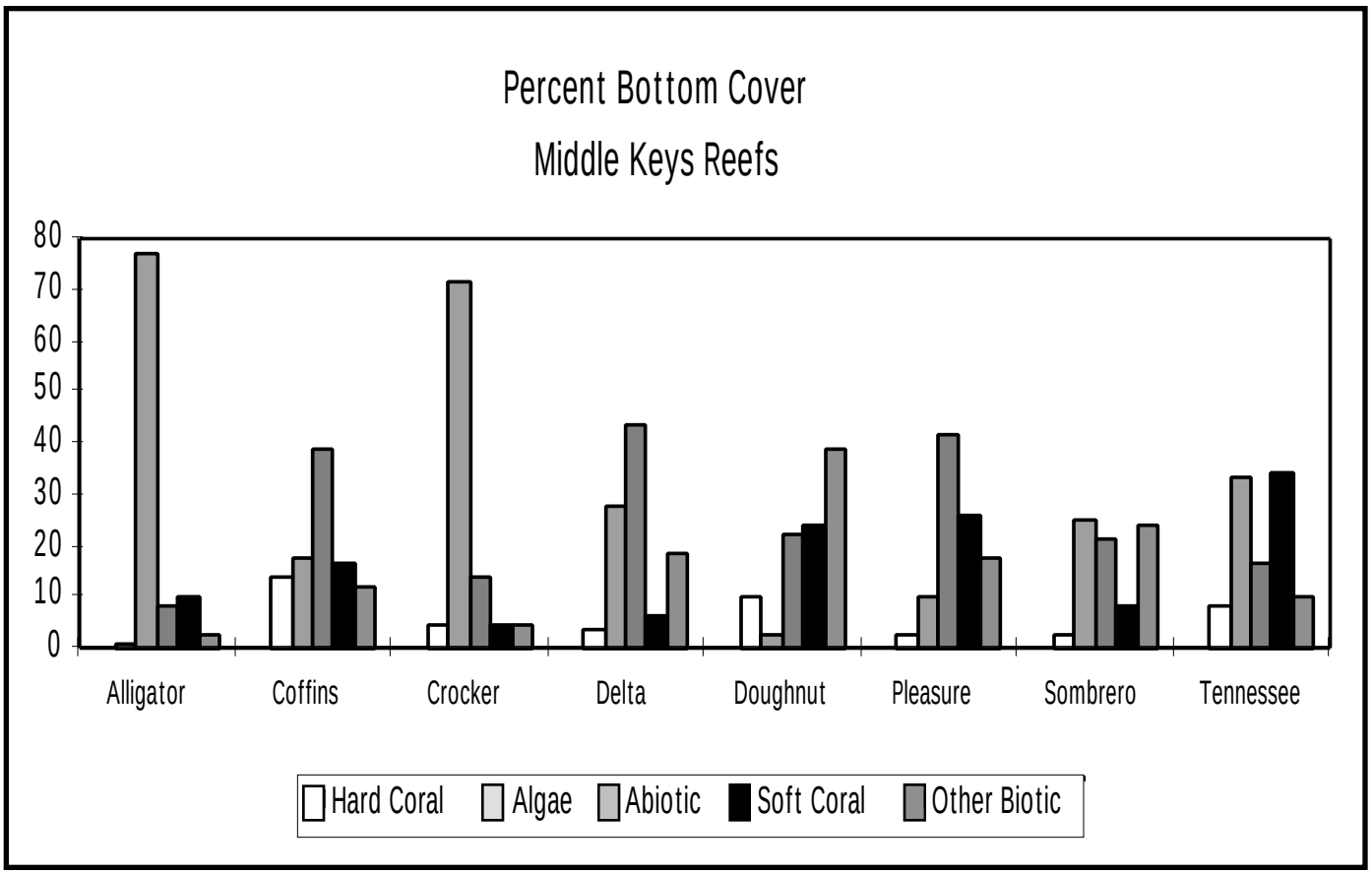
The highest amount of hard coral was observed at Coffins with 14.4% bottom cover, followed in order by Doughnut with 10%, Tennessee with 8.1%, Crocker with 5%, Delta with 3.8%, Pleasure with 3.1%, Sombrero with 2.5% and finally Alligator with a low of 1.3%.

Again, where hard coral bottom cover was low, there was a high level of algae bottom cover. In fact, for seven of the eight sites, algae cover was higher than hard coral cover. Alligator had the highest amount of algae bottom cover with 76.9%, followed by Crocker with 71.3%, Tennessee with 33.8%, Delta with 27.5%, Sombrero with 25%, Coffins with 17.5%, Pleasure with 10.6%, and finally Doughnut with 3.1%.

Other biotics' covered 39.4% of the site at Doughnut Reef, with little over half of these points being Halimeda algae, and most of the rest being the false coral Palythoa (sp.). At Sombrero Reef, the 36.9% 'other biotics' reported were predominantly Palythoa (sp.). Abiotic bottom cover was highest at Delta with 43.8%, followed in order by Pleasure at 41.9%, Coffins at 39.4%, Doughnut at 21.9%, and Sombrero at 21.2%. Tennessee (16.3%), Crocker (13.8%), and Alligator (8.8%) all had values under 20% for abiotic bottom cover.

The most interesting and worthwhile correlation at the sites studied in the Middle Keys was the difference in the amount of lobsters, urchins, groupers, and snappers found between the multiple-use control sites and the no-take zones. There were no lobsters, no urchins, and no groupers found at the control sites. The average number of lobsters observed at no-take zones were: Alligator 3.5, Coffins 3, and Sombrero 1. The only urchin found was reported at Tennessee, a Research Only Area. There was only one nassau grouper found between all of these sites and it was found at Alligator, a no-take zone. The number of snappers found at the no-take zones exceeded the number found at the control sites. Parrotfishes, however, had a higher average (7.5) at Pleasure, a multiple-use control site, than at any no-take zone. The highest average of parrotfish in a no-take zone occurred at Alligator (3).

ReefCheck's invertebrate monitoring protocol uses two 50-meter transects laid out at each reef site studied. Four 5 m wide (centered on the transect line) by 20 m long transects are sampled for invertebrate species typically targeted as food species or collected as curious. The survey starts at the 0 m mark where the diver surveys a square area on the ground 5 m in width and 5 m in length. The diver meanders around the area looking for the targeted species for about four minutes. Afterward the diver movs to the 5 m mark and repeats the procedure. At the 20 m mark, a 5 m interval is skipped and the survey is resumed at the 25 m mark up to the 45 m mark. This procedure was repeated on the second transect line.



% Bottom Cover	Alligator	Coffins	Crocker	Delta	Doughnut	Pleasure	Sombrero	Tennessee
Hard Coral	1.3	14.4	5.0	3.8	10.0	3.1	2.5	8.1
Algae	76.9	17.5	71.3	27.5	3.1	10.6	25.0	33.8
Abiotic	8.8	39.4	13.8	43.8	21.9	41.9	21.2	16.3
Soft Coral	10.0	16.3	4.4	6.3	24.4	26.3	8.8	34.0
Other Biotic	3.1	12.5	5.0	18.8	39.4	18.1	24.4	10.0
Fish and Invertebrate Counts*								
Lobsters	3.5	3	0	**	0	**	1	0
Urchins	0	0.5	0	**	0	**	0	1
Groupers	2	0	0	0	0	0	0.5	**
Snappers	88	19	0	6	33	19	28.5	**
Parrotfish	3	0.5	1	1	0	7.5	1	**

* From 40m long belt transects (6m wide).

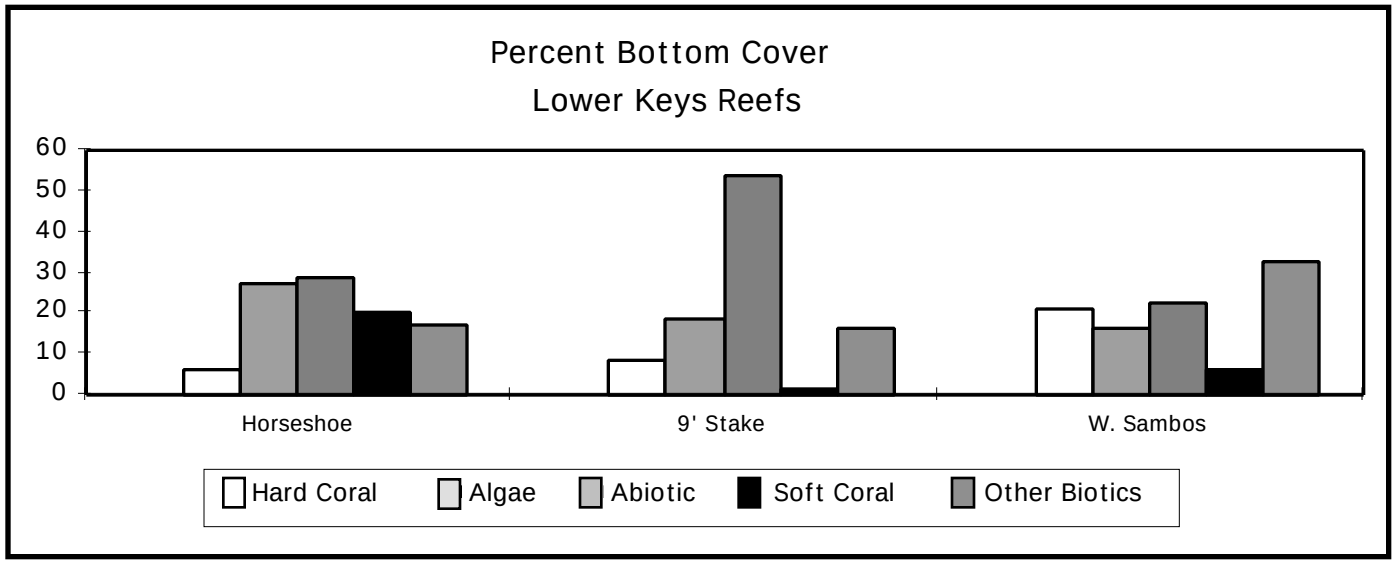
**No data was collected

Lower Keys

The three sites surveyed off the Lower Keys for ReefCheck 1998 were Horseshoe (C), Nine-Foot Stake (C), and Western Sambos (Ecological Reserve). There was a wide disparity in hard coral bottom cover between the multiple-use control sites and the no-take zone. Hard coral bottom cover percentages were 6.3% for Horseshoe (C), 8.8% for 9-Foot Stake (C), and 21.3% for Western Sambos (ER).

Nine-Foot Stake had a higher percentage of abiotic bottom cover (53.8%) than algae bottom cover (18.8%). Western Sambos had 16.3% algae bottom cover but had 32.5% 'other biotics' bottom cover, of which the majority was Halimeda algae. The largest percentage of soft coral (20.6%) was observed at Horseshoe. Nine-Foot Stake and Western Sambos had significantly lower percentages of soft coral (1.3% and 6.3% respectively).

Surprisingly enough, there were more lobsters, groupers, and snappers observed at the two control sites surveyed in the Lower Keys than at the single no-take zone assessed. In fact, no lobsters or groupers were observed at Western Sambos. At Horseshoe and 9-Foot Stake the average number of snappers observed were 20 and 30, respectively. At Western Sambos there were only 8 snappers reported. The average number of parrotfishes reported were also higher at Horseshoe (5) and Nine-Foot Stake (2) than at Western Sambos (1), the no-take zone. There were no urchins found at any of the sites surveyed in the Lower Keys area. However, no conclusion may be reached because further monitoring is required due to the low sample size.



LOWER KEYS REEF DATA

% Bottom Cover	Horseshoe	9' Stake	W. Sambos
Hard Coral	6.3	8.8	21.3
Algae	26.9	18.8	16.3
Abiotic	28.8	53.8	22.5
Soft Coral	20.6	1.3	6.3
Other Biotics	17.5	16.3	32.5
Fish and Invertebrate Counts*			
Lobsters	**	0.5	0
Urchins	**	0	0
Groupers	0.5	0	0
Snappers	20	30	8
Parrotfish	5	2	1

* From 40m long belt transects (6m wide).
**No data was collected.

Conclusions

Overall, the condition of the reefs in the Florida Keys still showed signs of stress and degradation. The results for the 1998 ReefCheck assessment show very similar results to last year's data. However, there is a positive outlook in the Middle Keys when we examine the fish observed at the no-take zones versus the control sites. We see an increasing population trend in those areas that have been protected. In the Upper Keys, Nassau groupers are only reported in those areas that are designated as no-take zones. However, further study and monitoring is vital to track this precious ecosystem's recovery under the Sanctuary's management plan.

GPS COORDINATES

UPPER KEYS

Site	GPS
Conch	24° 57.266' N 80° 27.534' W
Davis	24° 55.389' N 80° 30.310' W
Elbow	25° 8.504' N 80° 15.577' W
Grecian Rocks	25° 6.427' N 80° 18.171' W
Hens and Chickens	24° 56.043' N 80° 33.021' W
Molasses	25° .494' N 80° 22.669' W
Pickles	24° 58.903' N 80° 25.330' W

MIDDLE KEYS

Site	GPS
Alligator	24° 50.738' N 80° 37.429' W
Coffins	24° 40.906' N 80° 28.257' W
Crocker	24° 54.165' N 80° 31.839' W
Delta	24° 37.940' N 81° 5.414' W
Doughnut	24° 41.469' N 80° 56.874' W
Pleasure	24° 54.4' N 80° 30.7' W
Sombrero	24° 37.624' N 81° 6.538' W
Tennessee	24° 46.047' N 80° 45.069' W

LOWER KEYS

Site	GPS
Horseshoe	NOT RECORDED
Nine-Foot Stake	24° 28.351' N 81° 45.884' W
Western Sambos	21° 28.763' N 81° 43.041' W

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