St. John, USVI Mission Report

NOAA/NOS/NCCOS/CCMA/Biogeography Branch

July 5 – July 18, 2010

A strategy to inventory, characterize, and monitor the marine region within and around the National Park and Monument boundaries of St. John, USVI

A cooperative investigation between NOAA, National Park Service, US Geological Survey, Virgin Islands Department of Planning and Natural Resources, University of Hawaii, and the Oceanic Institute

NOAA
National Ocean Service
National Centers for Coastal Ocean Science
Center for Coastal Monitoring and Assessment
Biogeography Branch
Silver Spring, MD 20910

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Funding provided by NOAA's CRCP and CCMA, and the National Park Service

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Mission Purpose:

The intent of this field mission was to continue ongoing efforts: (1) to spatially characterize and monitor the distribution, abundance and size of both reef fishes and conch within and around the waters of the Virgin Islands National Park (VIIS) and newly established Virgin Islands Coral Reef National Monument (VICR), (2) to correlate this information to *in-situ* data collected on associated habitat parameters, (3) to use this information to establish the knowledge base necessary for enacting management decisions in a spatial setting and to establish the efficacy of those management decisions. This work is supported by the National Park Service and NOAA's Coral Reef Conservation Program's Caribbean Coral Reef Ecosystem Monitoring Project.

Information collected thus far is being extensively utilized by NOAA, NPS, DPNR, University of the Virgin Islands (UVI) and others. Examples include UVI's use of NOAA-produced habitat maps for site selection to evaluate coral bleaching effects on coral communities, NOAA/University of Hawaii's use of habitat maps and fish data for analysis on the "wedge" between VICR boundaries, NOAA's use of data collection methodology for the design of NPS protocols, and NOAA's use of habitat characterizations from sites in the mid-shelf reef (MSR) for groundtruthed multi-beam habitat classification.

Another use of the fish survey data has been confirming the absence of the invasive Indo-Pacific lionfish. The lionfish was discovered in USVI waters in 2008, and since then, divers have maintained vigilant lookout for this exotic fish. The July 2010 mission marks the first time in the ten-year history of this project that a lionfish was seen on a transect. The fish was seen in the eastern side of Fish Bay in 10-15 feet of water, within Virgin Islands National Park. The 15 cm lionfish was captured, killed and stored with NPS until further analysis. It is the fourth capture and kill of a lionfish in VINP.

Operational Accomplishments:

- For the 2010 mission, 170 sites were surveyed within the study area (Figure 1), and information on fish distribution, abundance and size (Table 1 and 2), benthic habitat composition (Table 3 and 4), bleaching, conch abundance and distribution (Table 5), *Diadema* and lobster abundance and distribution, and marine debris (Table 6) was collected. The project team consisted of three NPS, one USGS, one University of Hawaii, one FIT/Nancy Foster Scholar, and nine NOAA scientific divers. NPS and NOAA dive logs were maintained.
- Both air and Nitrox (32% O_2) tanks were used.
- Three NPS boats were used each day of the mission, with approximately 3-4 divers per boat.
- Divers were able to conduct surveys on all days required.

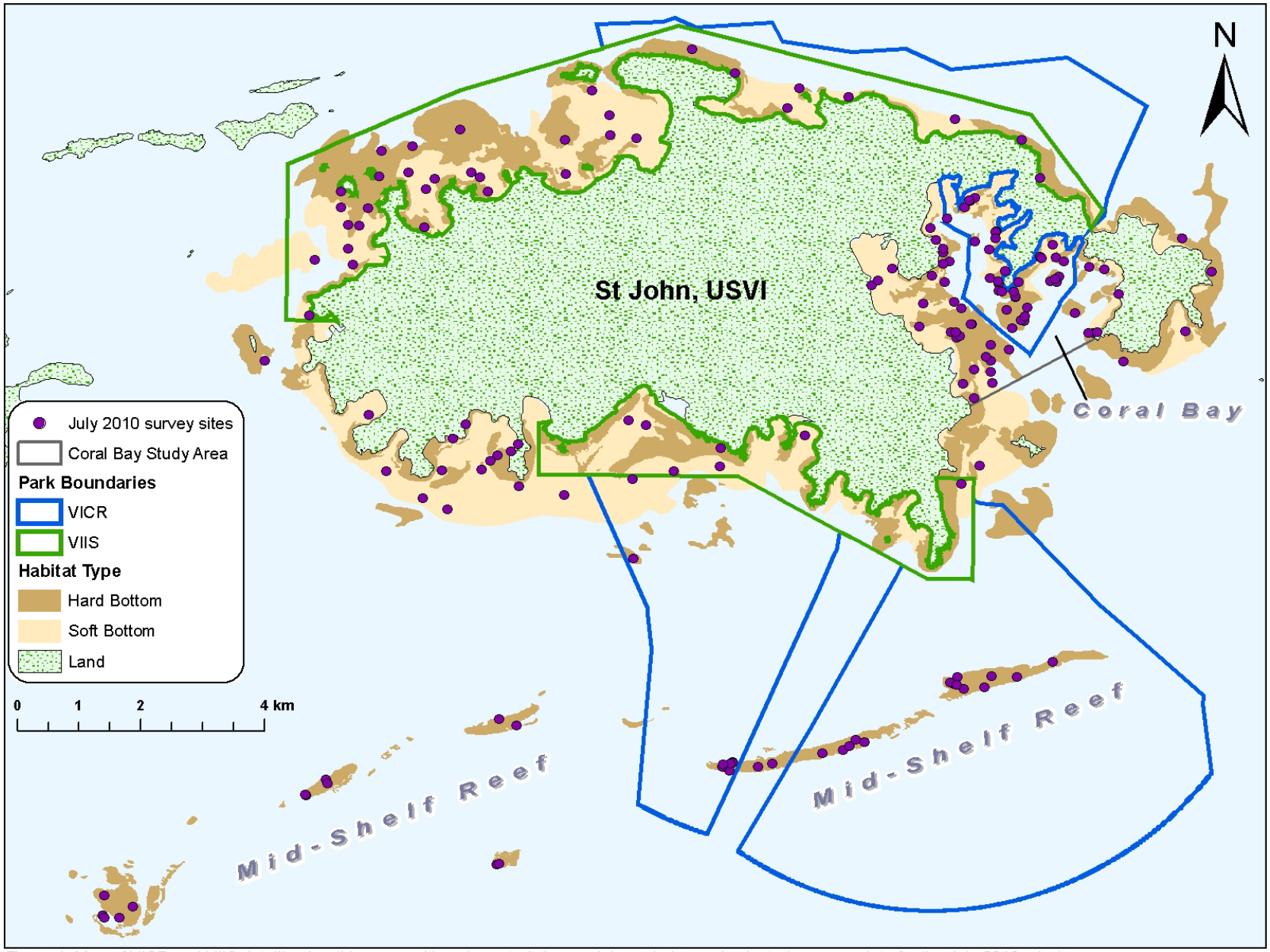


Figure 1. Map of VICR and VIIS detailing benthic composition characteristics, park boundaries and selected survey points for the July 2010 mission

Summary of Survey Results:
Fish

- Fish species abundance, size and distribution were characterized using the belt transect survey method (http://ccma.nos.noaa.gov/ecosystems/coralreef/reef_fish/protocols.html) at 170 sites. The fish data are separated and weighted according to habitat strata (MSR, Coral Bay [CB]) and location (inside or outside; Tables 1 and 2). See Appendix A for weighted data calculations.

Table 1. Fish abundance, richness, biomass and diversity (all per 100m^2) from MSR and Coral Bay (CB) around St. John using the belt transect method. Data are from the July 2010 St. John mission.

Habitat Location	Habitat Strata	# of Surveys	# indiv / 100m^2		biomass (g) /100m^2		# species / 100m^2		Diversity*	
			Mean	(± SE)	Mean	(± SE)	Mean	(± SE)	Mean	(± SE)
Mid Shelf Reef	Inside	20	294.6	39.4	5046.52	858.19	23.0	1.1	2.14	0.07
	Outside	15	392.8	74.0	7059.06	1629.12	24.5	1.8	2.01	0.08
	OVERALL	**35**	**352.1**	**32.1**	**6224.56**	**705.75**	**23.9**	**0.8**	**2.06**	**0.04**
Coral Bay	Inside	30	313.9	73.0	3795.77	530.73	21.6	1.0	1.99	0.12
	Outside	25	302.1	73.3	3360.44	591.59	21.6	1.1	1.97	0.14
	OVERALL	**55**	**306.1**	**40.6**	**3506.02**	**321.43**	**21.6**	**0.6**	**1.97**	**0.07**
Both	Inside	50	303.2	26.6	4488.14	368.76	22.4	0.5	2.07	0.05
	Outside	40	344.6	37.0	5091.14	524.19	23.0	0.7	1.99	0.06
	OVERALL	**90**	**329.1**	**18.2**	**4865.30**	**256.80**	**22.7**	**0.3**	**2.02**	**0.03**

*Shannon Diversity Index

Table 2. Fish abundance, richness, biomass and diversity (all per 100m^2) from hard and soft bottom sites around the Virgin Islands National Park using the belt transect method. Data are from the July 2010 St. John mission.

Habitat Location	Habitat Strata	# of Surveys	# indiv / 100m^2		biomass (g) /100m^2		# species / 100m^2		Diversity*	
			Mean	(± SE)	Mean	(± SE)	Mean	(± SE)	Mean	(± SE)
Other	Hard	30	254.53	86.27	4771.76	942.36	21.33	1.08	2.13	0.11
	Soft	50	72.86	23.34	976.03	277.06	7.16	0.69	1.23	0.09
	OVERALL	**80**	**150.34**	**23.37**	**2594.89**	**262.54**	**13.20**	**0.42**	**1.62**	**0.05**

*Shannon Diversity Index

L-R: Southern stingray (*Dasyatis americana*), juvenile spotted scorpionfish (*Scorpaena plumieri*), herring, Nassau grouper (*Epinephelus striatus*)

Great barracuda (*Sphyraena barracuda*)

Habitat

- Data were collected at 170 sites for benthic composition characterization. Surveys at 90 sites were conducted within and around the waters of VICR in CB and MSR locations using the RHA method. Below is a summary of RHA data weighted based on area sampled (Table 3). Methodology of RHA collection can be found at http://ccma.nos.noaa.gov/ecosystems/coralreef/reef_fish/protocols.html. See Appendix A for weighted data calculations.

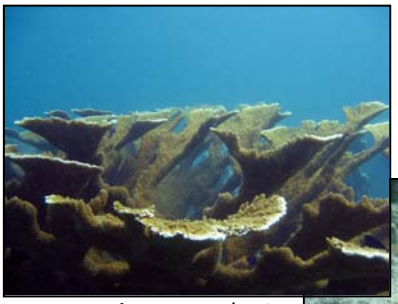
Table 3. Average percent cover for 90 hardbottom sites in and around MSR and CB for the July 2010 St. John mission.

Habitat Location	Strata Type	# of Surveys	% Coral		% Macroalgae		% Turf-Uncol		% Gorgonian		% Sponge	
			Mean	(± SE)	Mean	(± SE)	Mean	(± SE)	Mean	(± SE)	Mean	(± SE)
Mid Shelf Reef	Inside	30	4.2	0.6	33.3	4.4	49.2	4.1	10.3	2.0	3.0	0.4
	Outside	25	3.6	1.1	21.8	3.8	64.6	5.2	8.5	1.9	1.4	0.2
	OVERALL	**55**	**3.9**	**0.49**	**26.6**	**2.07**	**58.3**	**2.50**	**9.2**	**0.99**	**2.0**	**0.15**
Coral Bay	Inside	20	4.4	1.1	39.8	4.8	31.6	5.4	16.1	3.1	8.2	1.1
	Outside	15	9.1	2.0	32.5	3.7	32.4	6.1	11.2	2.4	14.8	1.9
	OVERALL	**35**	**7.5**	**1.00**	**34.9**	**2.18**	**32.1**	**3.31**	**12.8**	**1.38**	**12.6**	**0.94**
Both	Inside	50	4.3	0.4	36.2	2.3	41.4	2.4	12.9	1.2	5.3	0.3
	Outside	40	6.5	0.8	27.5	1.9	47.5	2.9	9.9	1.1	8.5	0.6
	OVERALL	**90**	**5.7**	**0.4**	**30.8**	**1.1**	**45.2**	**1.5**	**11.0**	**0.6**	**7.3**	**0.3**

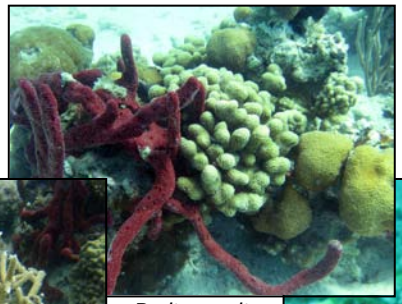
- Full-scale surveys at 80 sites were conducted on hard- and softbottom sites within and around the waters of the VIIS. The weighted habitat data are summarized in Table 4. Methodology on full-scale benthic composition data collection can be found using the methodology link (mentioned above).

Table 4. Average percent cover (all per 100m^2) for 80 full-scale sites for the July 2010 St. John mission.

Strata Type	# of Surveys	% Coral		% Hydrocorals		% Algae/ Seagrass		% Turf/ Crustose		% Gorgonian		% Sponge	
		Mean	(±SE)	Mean	(±SE)	Mean	(±SE)	Mean	(±SE)	Mean	(±SE)	Mean	(±SE)
Hard	30	3.0	0.6	0.4	0.1	12.4	2.7	48.5	4.4	3.6	0.7	2.7	0.4
Soft	50	0.62	0.31	0.21	0.17	22.0	3.2	13.4	3.7	1.4	1.0	0.8	0.2
Both	**80**	**1.6**	**0.21**	**0.3**	**0.08**	**17.9**	**1.55**	**28.4**	**2.01**	**2.4**	**0.46**	**1.6**	**0.15**



Acropora palmata



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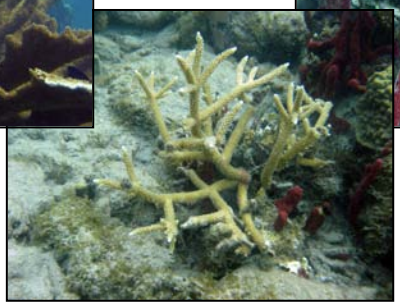
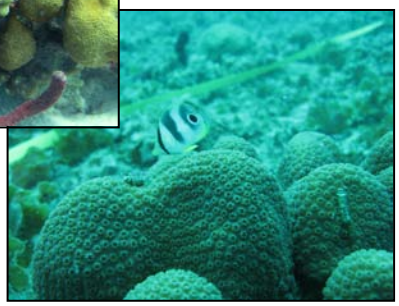


Acropora cervicornis



Montastraea annularis complex

Macroinvertebrates

Conch

- The number of Queen conch (*Strombas gigas*) observed within transects during full-scale surveys at 79 sites on hard and softbottom sites is summarized by benthic composition type in Table 5.

Table 5. The abundance of conch collected during the July 2010 mission.

Habitat	# surveys	Immature	Mature	Total
Hard	1	3	0	3
Soft	18	22	42	64
Both	**19**	**25**	**42**	**67**

Lobster

- Three Caribbean spiny lobsters, *Panulirus argus*, were observed on two hardbottom transects during full-scale surveys at 80 sites on this mission.

Sea urchins

- A total of 143 long-spined sea urchins, *Diadema antillarum*, were observed during full-scale surveys at 80 sites on this mission. Fifty-six individuals were recorded on two softbottom sites, and 87 urchins were recorded on seven hardbottom sites.

Marine Debris:

- Marine debris data were recorded to meet the management needs of NPS. The marine debris observed within transects are summarized in Table 6.

Table 6. The type and area of debris, area affected by the debris, and what the debris was colonized by during the July 2010 St. John mission.

Debris Type	Debris Area (cm^2)	Colonized By	Area Affected (cm^2)
glass bottle	150	nothing	150
plastic cups	125	turf algae	125
1 beer bottle	2000	algae turf, one anemone	2000
glass champagne bottle	3000	turf	3000
glass champagne bottle	3000	turf, encrusting sponge	3000
glass beer bottle	1000	nothing	1000
bottle	40	crustose algae	40
motor water pump	400	none	0

L-R: Stack of plastic cups, plastic and metal cans and bottles in rock pile, active fishing pot, and glass bottle.

Events of Note:

- Divers identified and killed a sub-adult lionfish (*Pterois volitans*) in Fish Bay. The invasive fish was first spotted July 15, 2010 and captured the following day within 10 meters of the original sighting.

- The dwarf sand perch *(Diplectrum bivittatum*) was the only fish recorded for the first time in St. John during this mission.
- Several nurse sharks (*Ginglymostoma cirratum*) were observed during this mission.

- Several white margates (*Haemulon album*) and red hind (*Epinephelus guttatus*) were also observed during this mission.

Logistics of Note:

- This was the 10th year CCMA has sampled in St. John for the Caribbean Coral Reef Ecosystem project.
- We continued the RHA comparison between cylinder and transect data collection methodologies (Appendix 2).
- Fish and coral data were collected in Fish Bay to develop a baseline of the coral reef community there. The data were collected as part of an ARRA-funded project and will be used to evaluate the impact drainage improvement projects in the catchment area of the bay.

Mission Participants:

Laurie Bauer (CCMA BB)
Chris Caldow (CCMA BB)
Bryan Costa (CCMA BB)
Andy Davis (NPS / SFCN)
Alan Friedlander (UofHawaii)
James Herlan (USGS)
Sarah Hile (CCMA BB)
Susie Holst (NOAA CRCP)
Thomas Kelley (NPS / VIIS)
Charles Menza (CCMA BB)
Jeff Miller (NPS / SFCN)
Erinn Muller (FIT/NF Scholar)
Mark Monaco (CCMA BB)
Simon Pittman (CCMA BB)
Kimberly Roberson (CCMA BB)
Jenny Waddell (NOAA CRCP)

Appendix A - Equations

- Overall habitat and fish mean values for each stratum (locations and substrate type) and combined strata were calculated using the following equations (Menza et al., 2006):

Mean density for the stratified survey domain is obtained by summing the weighted averages of sample strata means,

$$\bar{y}_{st} = \sum_{h=1}^{L} W_h \bar{y}_h \tag{4.6}$$

where *L* is the number of strata, and strata weighting factors (W_h) are given by

$$W_h = \frac{N_h}{\sum_{h=1}^{L} N_h} = \frac{N_h}{N} \tag{4.7}$$

where N is the total number of possible sample units in all strata. The weighting factor W_h represents the proportion of the overall survey domain (or sampling frame) contained within stratum *h*.

Two examples of calculations are provided below:

- For one stratum type (e.g. MSR strata),

$$y_{MSRI} = \left(\text{mean \# indiv inside MSR} \times \frac{\text{area inside MSR}}{\text{total MSR area strata}}\right) + \left(\text{mean \# indiv outside MSR} \times \frac{\text{area outside MSR}}{\text{total MSR strata area}}\right)$$

- All strata types combined (e.g. MSR, Coral Bay and Other),

$$\left(\text{Mean \# indiv inside MSR} \times \frac{\text{area inside MSR}}{\text{total area}}\right) + \left(\text{mean \# indiv outside MSR} \times \frac{\text{area outside MSR}}{\text{total area}}\right) + \left(\text{mean \# indiv inside CB} \times \frac{\text{area inside CB}}{\text{total area}}\right) + \left(\text{mean \# indiv outside CB} \times \frac{\text{area outside CB}}{\text{total area}}\right)$$

$$+ \left(\text{mean \# indiv OTHER hard} \times \frac{\text{Area OTHER hard}}{\text{total area}}\right) + \left(\text{mean \# indiv OTHER soft} \times \frac{\text{area OTHER soft}}{\text{total area}}\right)$$

- The overall and combined standard error values for fish and habitat data were calculated using the estimated variance of the mean (Menza et al., 2006). The variance of $\bar{y}_{st}$ is estimated as

$$\text{var}\left[\bar{y}_{st}\right] = \sum_{h=1}^{L} W_h^2 \,\text{var}\left[\bar{y}_h\right] \tag{4.8}$$

References

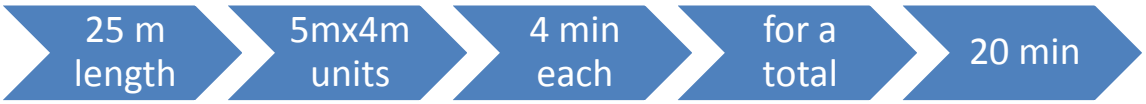
Menza, C., J. Ault, J. Beets, J. Bohnsack, C. Caldow, J. Christensen, A. Friedlander, C. Jeffrey, M. Kendall, J. Luo, M. Monaco, S. Smith and K. Woody. 2006. A Guide to Monitoring Reef Fish in the

National Park Service's South Florida / Caribbean Network. NOAA Technical Memorandum NOS NCCOS 39. 166 pp.

Appendix B – Rapid Habitat Assessment (RHA) data collection protocol for Coral Bay and Mid-Shelf Reef, St. John USVI

NOAA/ NOS/ NCCOS
Center for Coastal Monitoring and Assessment
Biogeography Branch

Along the 25x4m belt transect, habitat diver collects data along the fish transect in 5 rectangular segments, each measuring 5m long by 4m wide (same area as transect). Each segment should take no more than 4 minutes (4 min x 5 segments = 20 min), allowing the habitat diver to finish closely behind the fish transect diver – continuing to meet the physiological parameters of repeatedly diving at Mid Shelf Reef depths.



Data to be collected include the same data that were estimated within the 7.5m radius cylinder for the traditional (old protocol) RHA data collection. See data sheet below.

NOS Biogeography Program Rapid Habitat Assessment Data Sheet

1	Fish transect diver	
	Fish point count diver	
	Habitat diver	

2	Station	
	Date	
	Start time	

Assessment Type	
C cylinder	T transect

	Habitat structure (select one; hierarchy from benthic map)	
3	*Colonized hardbottom*	*Uncolonized hardbottom*
	Linear reef	Reef rubble
	Spur & groove	Uncol pav
	Patch reef	Uncolonized bedrock
	Agg. patch reef	Uncol pav & sand chan
	Scat coral & rock in sand	
	Colonized pav	
	Colonized bedrock	
	Col pav & sand chan	

Acropora presence (mark if YES)			
A. palmata		*A. cervicornis*	
Transect	Site	Transect	Site

	Depth (m -use depth gauge)					
4	*Depth*	Q1	Q2	Q3	Q4	Q5
	Minimum*					
	Maximum*					

*Min = depth to highest point of sea floor

*Max = depth to lowest point of sea floor

	Max Rugosity (at site level)	
5	Low (tallest hard structure < 0.5m)	1
	Medium (tallest hard structure is 0.5-1.5m)	2
	High (tallest hard strucure > 1.5m)	3

	Abiotic footprint (estimate cover to nearest 5%)					
6	*Substrate*	*% cover*				
		Q1	Q2	Q3	Q4	Q5
	Hardbottom					
	Sand					
	Rubble					

	Biotic footprint and canopy height (ht) *(cover to nearest 1%)*					
7	*Biotic group*	*% cover*				
		Q1	Q2	Q3	Q4	Q5
	Live coral (A)					
	Gorgonians (B)					
	Sponges (C)					
	Macro algae (D)					
	Bare / turf / uncolonized by A-D					

NOTES

Appendix C – RHA Benthic Comparison Report (Randy Clark, March 2010)

St John RHA Benthic Habitat Method Comparison
Cylinder estimation vs. Transect

In spring 2009 we met and discussed problems associated with different data collection "styles" for benthic divers on RHA sites in St. John. During the July 2009 mission we implemented a RHA like transect data collection, in addition to the cylinder collection, where divers were to estimate the percent cover of benthic parameters in 5x4 m2 portions of the 25x4 m2 transect. The idea was to compare both sets of data to see if there were differences in percent cover estimation.

Data

Overall 91 RHA sites were visited, 35 on the MSR and 56 in Coral Bay. Four benthic habitat divers collected data (Kim Woody, Mark Monaco, Jeff Miller & Randy Clark). Clark (16 sites) collected data at Coral Bay exclusively while Miller (18 sites), Woody (28 sites) and Monaco (29 sites) collected data at both MSR and Coral Bay.

Mean values for percent cover of coral, macroalgae, sponges, and gorgonians were calculated for each transect and compared to the cylinder estimate at each site.

Analysis

Initially, transect and cylinder percent cover data were used to create a Bray-Curtis similarity matrix among sites to identify any potential differences in percent cover estimates. The similarities among surveys sites were then plotted in two-dimensional ordination space using non-metric multidimensional scaling (MDS) using Primer-E v 6.1.8. Three matrices were developed to examine Coral Bay sites, MSR sites, and all RHA sites combined.

Secondly, linear regression was used to examine the relationship between cover estimates between the two methods. Regressions were conducted for all data combined and grouped by diver and location to visualize potential areas of variability.

Lastly, I put together some tables to help compare the two methods and determine if one should be selected over the other and sources of variability. The tables examine the amount of difference between the two methods and examines differences on several arbitrary classifications: the percentage of sites that varied in coral cover by +/- 2% (that's percent cover not percent), +/- 5%, and the percentage of sites that were greater than 10% for cylinder and transect estimates. For example, in the coral table the difference in coral cover estimated from the two methods was equal to or less than 2% (percent cover, not percent) at 64.84 of sites. The percentage jumped to 90.1% of sites that had differences less than 5% cover. And only 1% of sites had a percent cover difference greater than 10%, which occurred in the cylinder method. You could also say that 99% of sites had cover differences less than 10. A difference of 10 in percent cover may or may not be a critical threshold, maybe it is for coral, and the others could be elevated to something else, but for now 10 was chosen as the benchmark.

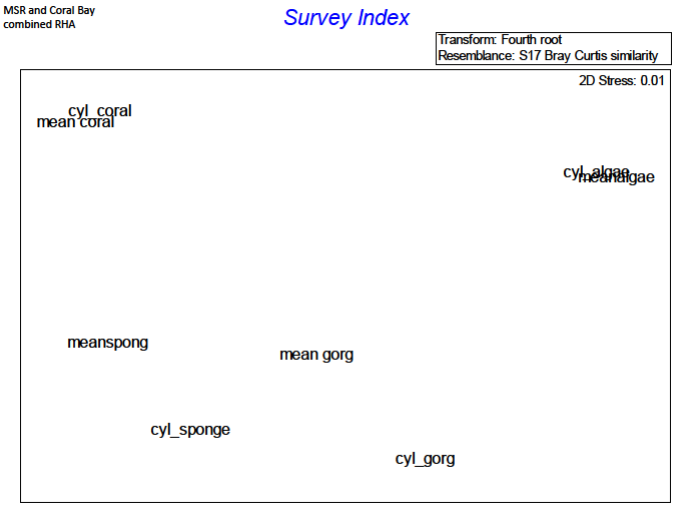
Results

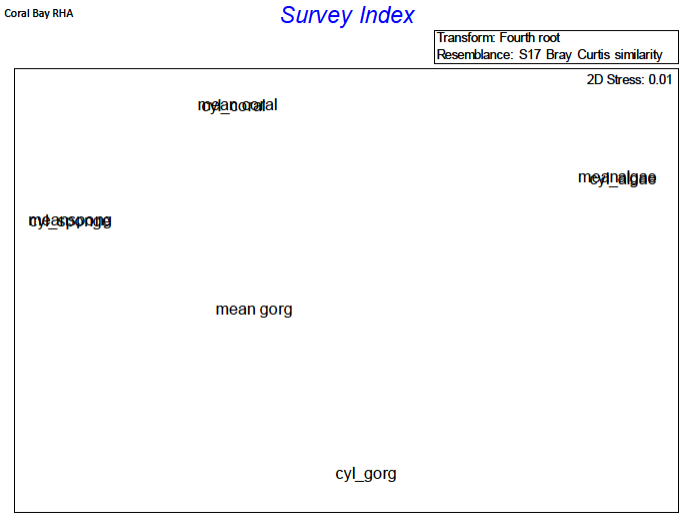
Similarity

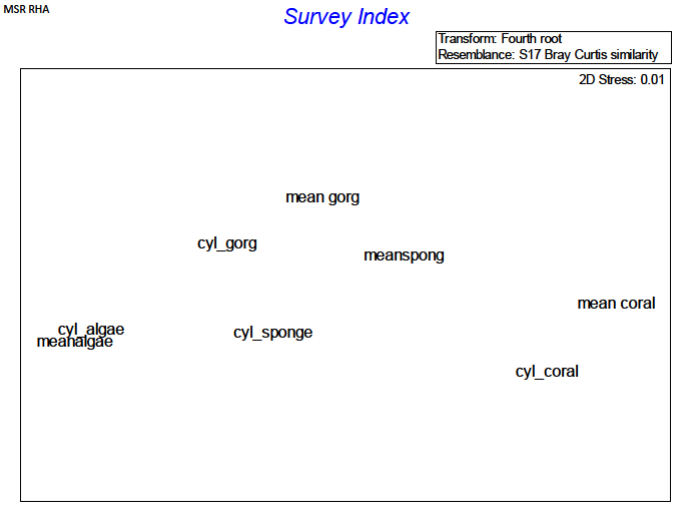
Similarity results showed that there were no obvious differences for sponge, coral, or macroalgae cover at Coral Bay sites; however, there appeared to be differences for gorgonian estimates.

Benthic cover similarity at MSR sites was different than that observed at Coral Bay, where macroalgae was the only parameter that appeared to show similar estimates for the two techniques. Cover estimates for coral and gorgonians appeared to be less similar than at Coral Bay, while sponge displayed the greatest disparity at the MSR.

Similarity for benthic cover estimates for all data combined showed similar values for coral and macroalgae while some differences were apparent for gorgonians and sponges.





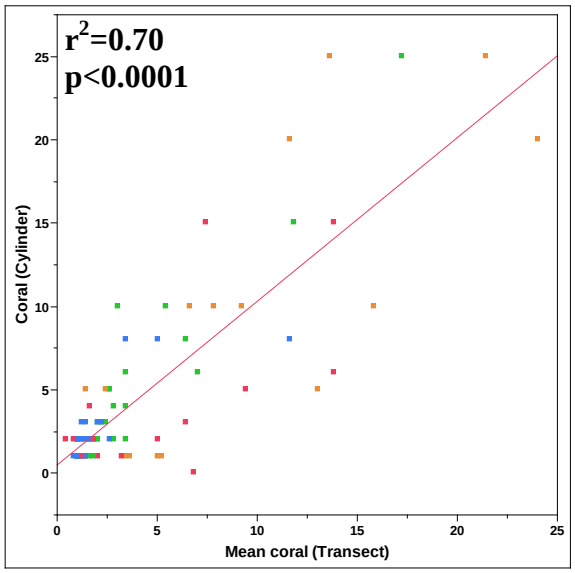


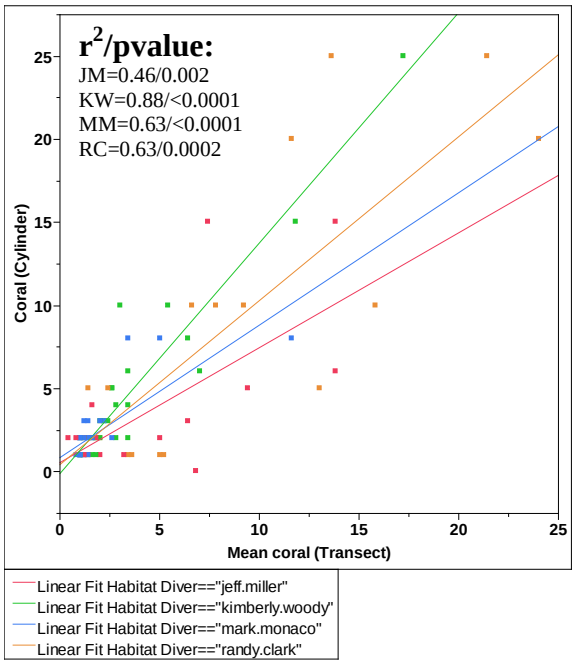
Regressions
Coral cover

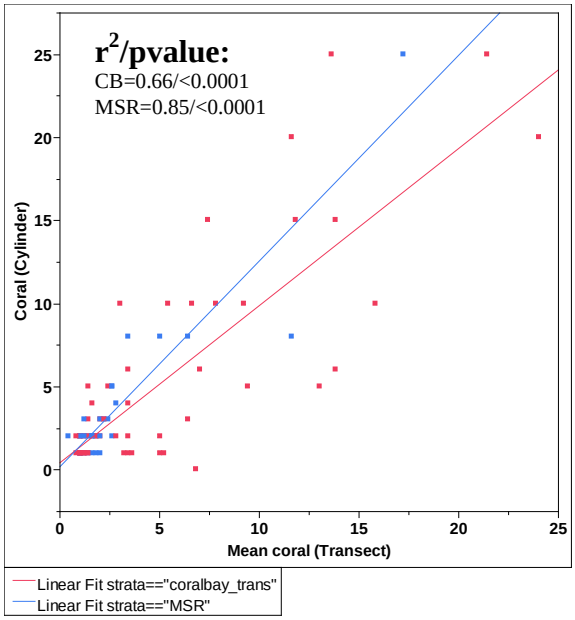
Overall, a fairly strong positive relationship exists for coral cover estimated from the two methods. The same applies when looking at estimates grouped by location (CB and MSR). Also, it appears that the methods were comparable when looking at specific diver estimates.

As previously mentioned, most sites exhibited very little difference in coral cover estimates between the two methods (See Table). Only 1 site had a percent cover difference greater than 10. Most of KW and MMs coral estimates differed in percent cover by 2 or less, while all divers had estimates differing +/- 5 for all sites but one.

When looking at coral estimates by habitat type, we see pretty much the same pattern except for patch reef. The greatest difference between coral estimates on patch reefs was less than 10 but resided somewhere between 5 and 10. This may reflect the cylinder data collection where the collector is centered or perhaps a large portion of the cylinder is off the patch reef.







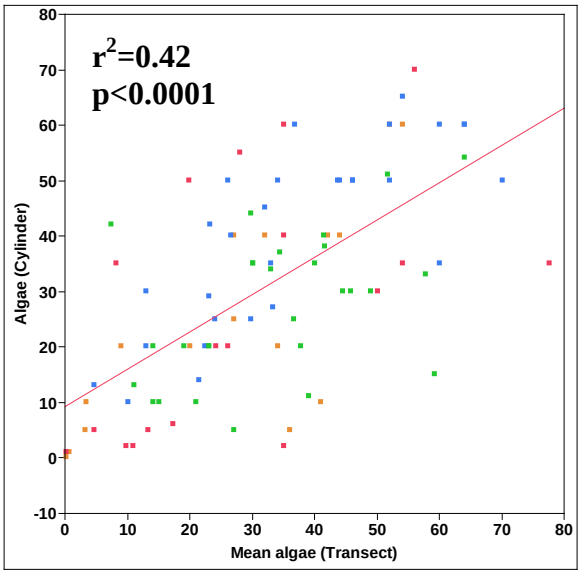
Coral	+/- 2	+/- 5	Cylinder >10	Transect > 10
Total	64.84	90.11	1	0
By Diver				
JM	55.56	83.33	0	0
KW	75	92.86	0	0
MM	89.66	100	0	0
RC	12.50	75	6	0
By Habitat				
Col Pav	87.50	100	0	0
Col Bed	33.33	100	0	0
Linear Reef	72.50	95	3	0
Patch reef	31.58	68.42	0	0
Reef rubble	0	100	0	0
Scattered coral	80	80	0	0
Spur/groove	83.33	100	0	0

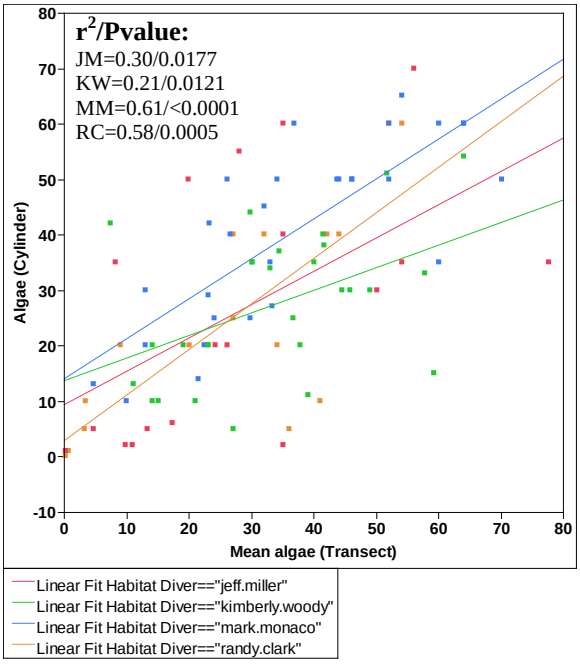
Macroalgae	+/- 2	+/- 5	Cylinder >10	Transect >10
Total	19.78	39.56	18.68	23.08
By Diver				
JM	11.11	22.22	27.78	27.78
KW	17.86	50	7.14	39.29
MM	17.24	37.93	27.59	6.90
RC	37.50	43.75	12.50	18.75
By Habitat				
Col Pav	6.25	37.50	6.25	25.00
Col Bed	100.00	100.00	0.00	0.00
Linear Reef	17.50	37.50	10.00	25.00
Patch reef	26.32	36.84	5.26	21.05
Reef rubble	0.00	0.00	100.00	50.00
Scattered coral	20.00	60.00	40.00	0.00
Spur/groove	16.67	33.33	0.00	33.33

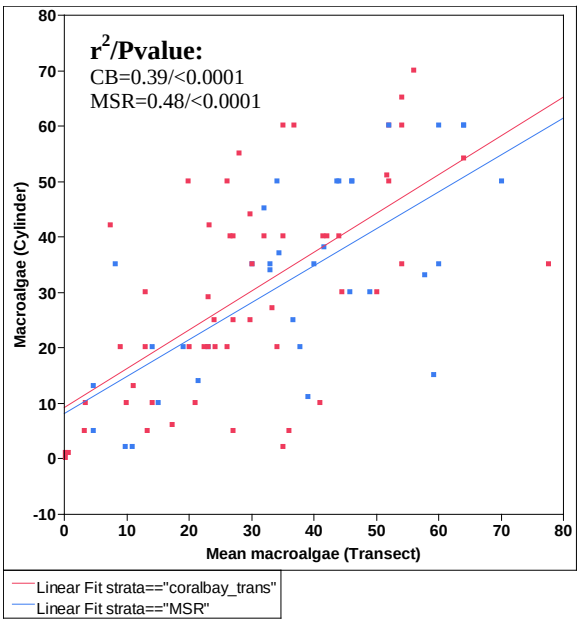
Macroalgal cover

Macroalgal estimates were positive and statistically significant, but variance explained was moderate. The same pattern was observed regardless of location. MM and RC estimates were stronger than those for JM and KW but all were statistically significant. There was considerably more variability among macroalgae estimates compared to coral estimates, and the Table (prior page) provides more evidence of the sources.

40% of the sites had cover estimates greater than 10, some sites had cover differences greater than 40. We see considerable variability associated with divers and habitat types. All divers had 30% of their sites with cover differences greater than 10. Similar patterns were observed by examining habitat type.



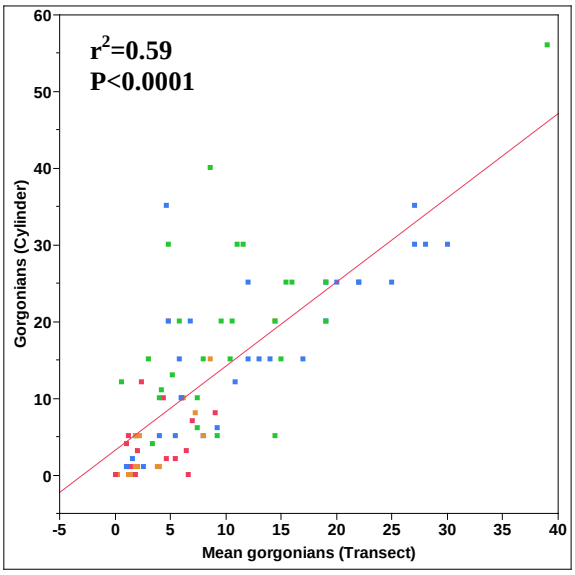


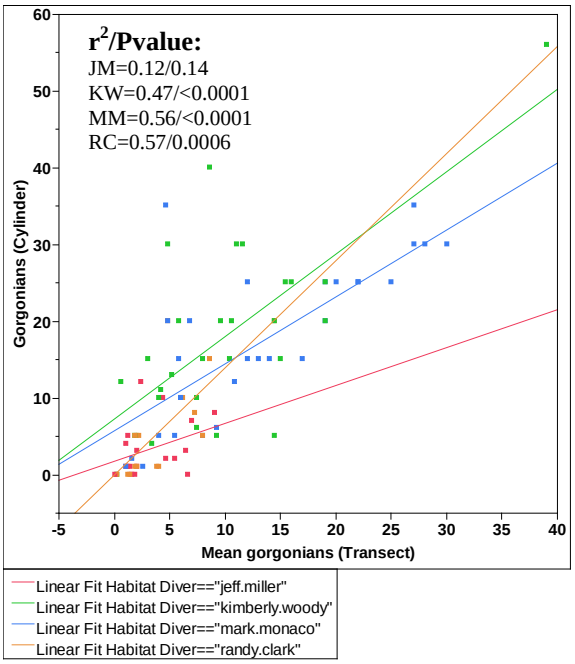


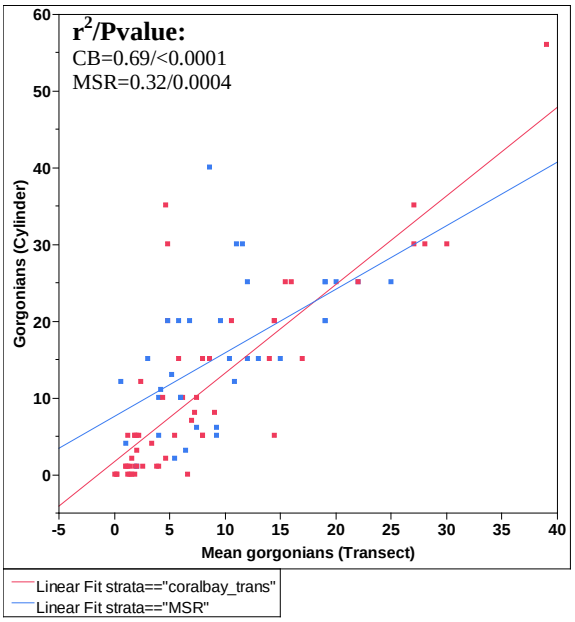
Gorgonians

Comparison of the estimates of gorgonian cover via the two methods were positive and statistically significant. The data cloud appears to be tightest around 10% cover then variability increases for higher cover. More variability was observed at the MSR compared to Coral Bay. Regression by divers show that three divers had moderate variability explained while JMs regression was not significant.

In the gorgonian table (next page) we see considerable variability among divers, but not as much as seen with macroalgae. Only 15% of the sites had cover estimates that differed by greater than 10. Most divers were within +/- 5 in estimating gorgonian cover. All sites that differed by more than 10 in percent cover occurred in the cylinder.





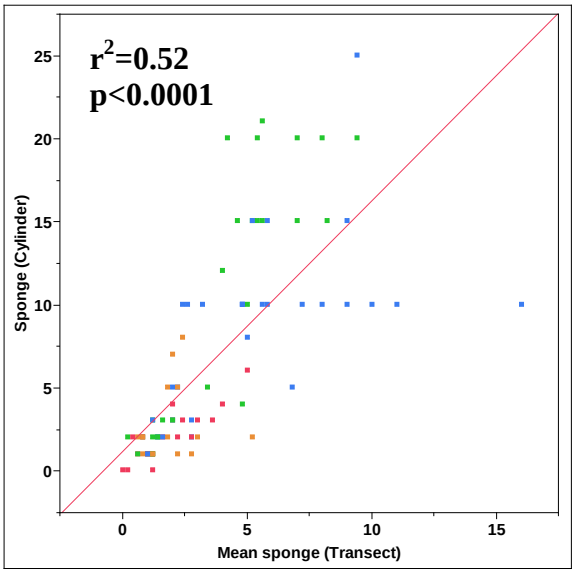


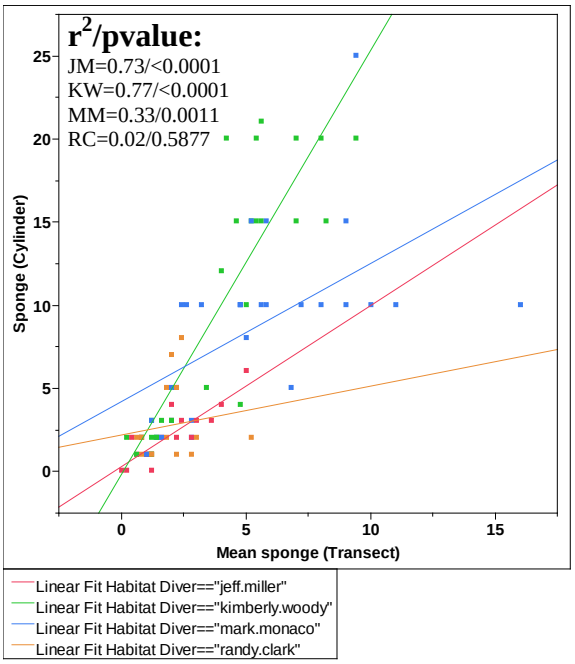
Gorgonians	+/- 2	+/- 5	Cylinder >10	Transect > 10
Total	37.36	64.84	15.38	0
By Diver				
JM	55.56	83.33	0	0
KW	17.86	32.14	32.14	0
MM	44.83	75.86	13.79	0
RC	37.50	81.25	6.25	0
By Habitat				
Col Pav	31.25	56.25	25	0
Col Bed	33.33	33.33	0	0
Linear Reef	35	67.50	17.50	0
Patch reef	36.84	73.68	0	0
Reef rubble	100	100	0	0
Scattered coral	60	60	20	0
Spur/groove	33.33	50	33.33	0

Sponge	+/- 2	+/- 5	Cylinder >10	Transect >10
Total	60.43956044	72.52747253	8.791208791	0
By Diver				
JM	100	100	0	0
KW	50	53.57	25	0
MM	41.38	62.07	3.45	0
RC	68.75	93.75	0	0
By Habitat				
Col Pav	12.50	18.75	37.50	0
Col Bed	66.67	100	0	0
Linear Reef	55	75	5	0
Patch reef	89.47	94.74	0	0
Reef rubble	100	100	0	0
Scattered coral	100	100	0	0
Spur/groove	83.33	83.33	0	0

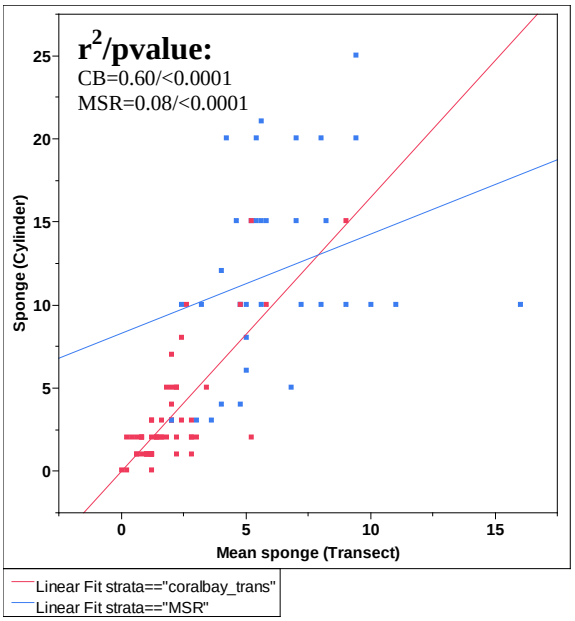
Sponges

The combined sponge regression shows a statistically significant positive relationship with moderate variability explained. Although significant, the regression by location shows considerable variability at the MSR compared to Coral Bay. I think the sponge communities at these sites are vastly different with the big barrel sponges out on the MSR and very few at CB. There's considerable variability in the diver regression as well. RCs was not statistically significant, MMs had low r^2 and JM and KW showed strong relationships. Most of the divers estimates from the two methods differed by less than 10; 25% of KWs sites differed by 10 or greater, all within the cylinder. Overall, however, only 8% of sites differed by 10 or more in percent cover.





Conclusions

If you go by the comprehensive totals, most of the cover estimates differed by less than 10, except for macroalgae. Where differences greater than 10 did occur, they occurred primarily in the cylinder. I don't know if we think this is conclusive or not, I would suggest we repeat this again this year and have more data to play with.

If I were making the decision, I'd go with the transect method, knowing that the data are better linked to the fish transect data and there's no enormous differences seen thus far between the two methods.