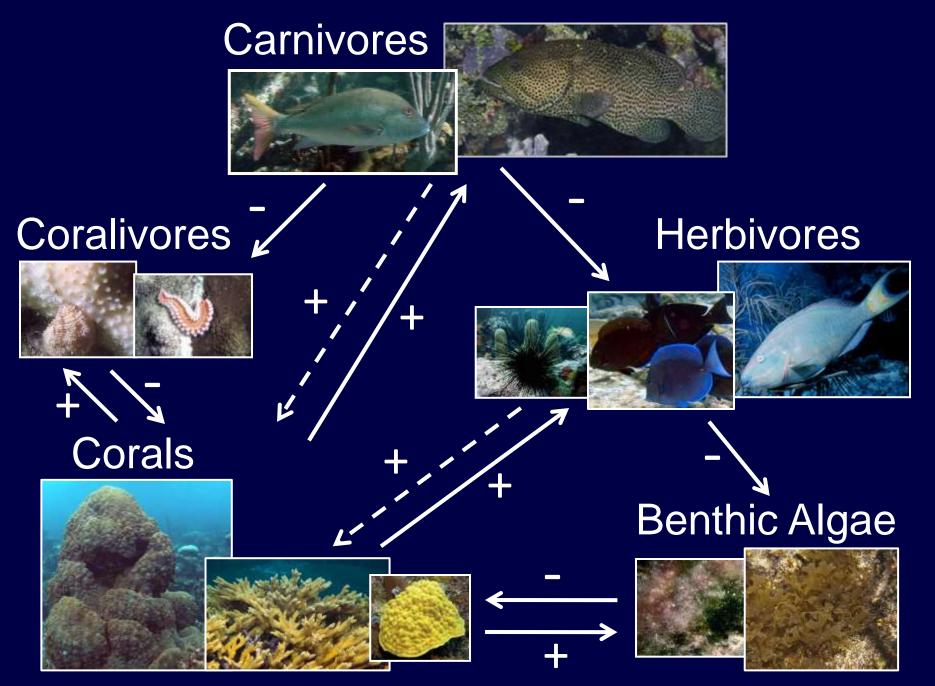


Atlantic and Gulf Rapid Reef Assessment Program

# Monitoring for Management: the AGRRA network ICRI Workshops: Community based monitoring & management Belize, October 15, 2013

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Modified from P.R. Kramer; © photos: A. Bruckner, R. Ken, J. Lang, K. Marks, M. Moe, J. Schulke, R. Steneck

# V5 Protocols

### **Benthos**



Cover: major groups of sedentary organisms Density: coral recruits (< 2 cm) & small (2 - <4 cm) corals *Diadema,* other echinoids, spiny lobster, queen conch

### **Corals** (≥ 4cm)

Density, size & condition (e.g., disease, bleaching, mortality)

### Fish

Density & size of major predators and herbivores



Drysdale

# V5 Protocols



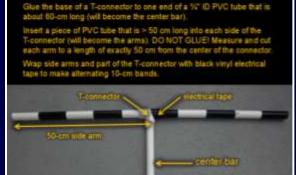
Each protocol is available at two levels: **Basic**: managers and students

**Detailed**: researchers

Posted online:

protocols, training materials, coral IDs, coral & fish flash cards, memory aids, UW data cards, data entry spreadsheets, *etc.* Access Database for processed data.

#### Fish T-Bar Construction





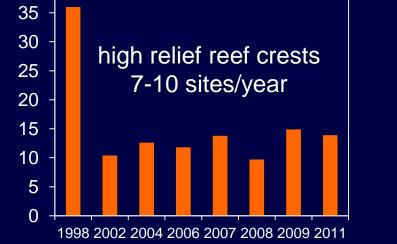


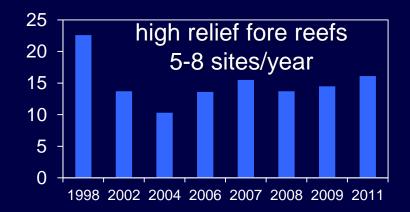
# Sampling Design



**Representative** (stratified random) sampling can be augmented by surveys of **strategically** located sites. Sites can be **repetitively** sampled for trend analyses.

Example of Monitoring for Management with AGRRA P.R. Kramer (in prep.)





% Live Coral Cover, Central Andros, The Bahamas. Full surveys only needed every 5-10 years.

## Data Plans



### Online data-entry in prep.

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	e cana Di	cn cc	4 DEC/3	STY/2 TA	CCA DIC/I	DIC/8 DIC/4	HALIS OCA PEYS	TA TA		
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	ean Di Min Di Kon I Kon Mi Kon Mi Kon GC	C/1 CC C/3 CC TA PAC 4.C DIC CA DIC 39G T/	//3         DIC/3           A         DIC/3           A         DIC/3           A         TA           T         DIC/3           G         TA	TA TA CCA CCA CCA CCA CCA	CCA DIC/I DIC/IHAL/2 HAL/2 HAL/2 CCA CCA	DIC/3 DIC/4 DIC/3 DIC/2 TA HAU3 TA CCA	HALS OCA PEYS CCA CCA TA TA CCA	TA TA DIC/2 CCA CCA		



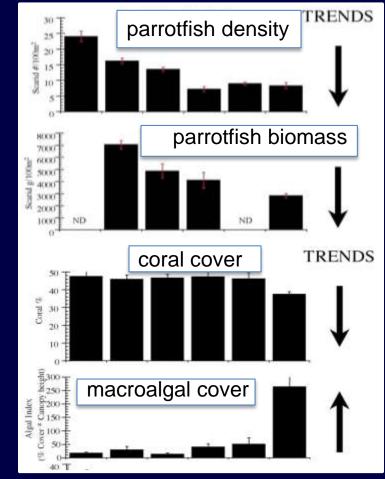
### Add graphics to PORT

Currently a simple, web-based interface to quickly generate individually customized reports using the early AGRRA data.



# **Graphics for Managers**

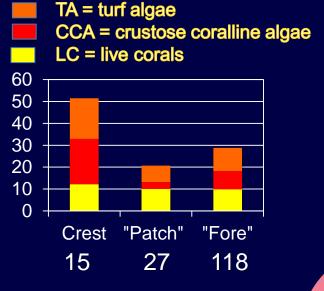


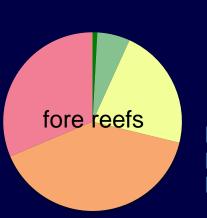


Steneck *et al.* (2011), 10 sites, 4-6 survey periods, 1999 - 2011

# Simpler Graphics for Public

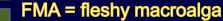
# *e.g., working with managers,* Benthic Cover, The Bahamas

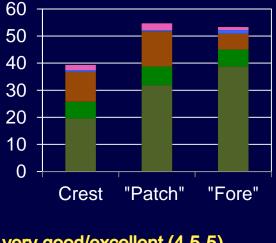




AINV = "aggressive" invertebrate
CYAN = cyanobacteria
TAS = turf algal sediment mat

CMA = calcareous macroalga





very good/excellent (4.5-5) good (3.5-4) fair (2.5-3) poor (1.5-2) very poor (1)



### **Education Plans**





### Formalize "train the trainer"



**Adaptation for Fishers** 



# of Education & Protocols

# (learning together)

© J. Caamal, Comunidad y Biodiversidad, A.C.

### Special Thanks to My Colleagues...



**Philip Kramer** 







Robert Ginsburg Patricia Kramer

### ...to Our Partners, and the Wonderful AGRRA Teams!



### Benthic Cover Index Assign Grades to ∑ "Desirable" Organisms

Grade	(LC+CCA+TA) %
5	≥ 80
4	60-79.9
3	40-59.9
2	20-39.9
1	<20





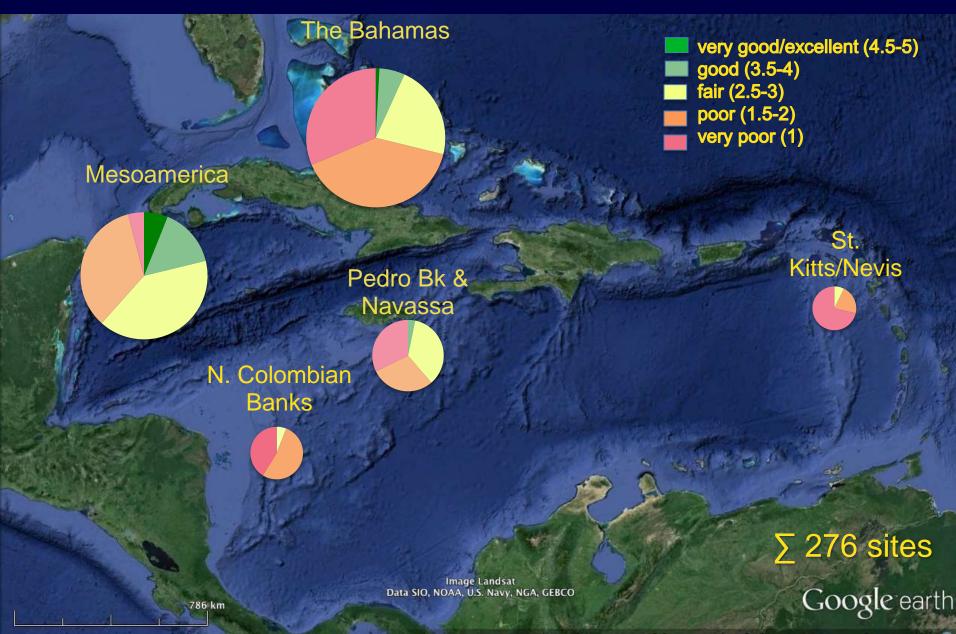
### Assign Grades to ∑ "Undesirable" Organisms

Grade	(FMA+CMA+TAS+CYAN+AINV) %
5	<12.5
4	12.5-24.9
3	25 - 37.4
2	37.5-49.9
1	≥ 50



Benthic Cover Index = ("Desirables" + "Undesirables") Grades/2

### **Benthic Cover Indices**—fore reefs



### Reef Types by Ecoregion

Wider Caribbean	Number								
Ecoregion	Surveys	Sites	Intertidal	Subtidal					
			Crest	"Back"	"Fore"	"Patch"			
Northern Gulf of Mexico	2	2			2				
Southern Gulf of Mexico	6	6			6				
Floridian	70	70	12		29	29			
Bahamian	483	300	56		199	45			
Western Caribbean	670	520	133	1	316	70			
Great Antilles	373	371	111		252	8			
Eastern Caribbean	117	113	12	2	92	7			
Southwestern Caribbean	130	129	53	1	56	19			
Southern Caribbean	1897	1941	383	4	9775	179			



**Proposing** Baseline Surveys each 5-10 years for a Coral Reef Report Card with a single-scale **Benthos Cover Index** Calcifiers &  $\sum$  live corals + crustose coralline algae + Space 4 Larvae turf algae (TA) Coral "Killers" 5 macroalgae (MA) + TA sediment mats + cyanobacteria + "aggressive" invertebrates + habitat-specific scales (in development) for **Reef Structural Index** Max. Relief, Substratum Type, Coral Height & Density Coral Index Composition, Size, Health, Partial Mortality, Recruits **Motile Animals Index**  $\Sigma$  fish + echinoids + conch + MA height? Herbivores Carnivores  $\Sigma$  spiny lobster + fish (including lionfish)

### Proposing Biannual survey and



Coral Reefs – selected AGRRA indicators of concern *e.g.,* macroalgae, herbivores, Nassau grouper, lionfish, sharks

+ new indicators in development

Proactive Reef Management Actions

*e.g.,* MPAs, management plans & implementation re 20/20 goal; fishing regulations & enforcement; lionfish markets; coral nurseries/outplantings; wetlands & seagrass protection

Other Proactive Coastal Actions e.g., controls on feral animals + infrastructure & port development

If a disease outbreak or mass bleaching event Perturbation-specific Surveys