#### Canal Restoration in Monroe County Benthic Monitoring Report



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#### Made possible by



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#### Made possible by





Townships Homeowner Organizations Individuals



Seagrass Ecosystems Research Lab Florida International University



#### About Us



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Quantifying species of seagrass, algae, sponges, corals

#### Benthic Monitoring for Water Quality

#### Eutrophication model



## Explicit model of ecosystem behavior #1

Nutrient pollution will lead to changes in relative abundances of primary producers in a predictable way.

#### Using Seagrasses Tissue

# **C:N:P** $^{13}C/^{12}C$ $^{15}N/^{14}N$





#### Benthic Monitoring for Water Quality



## Explicit model of ecosystem behavior #2

Nutrient pollution will shift N:P ratios of primary producers towards a taxonspecific "Redfield ratio"

#### Benthic Monitoring for Water Quality



#### Original 30 sites (1995)

- 17 sites in Dry Tortugas (2011)
- 10 sites for nearshore emphasis (2012)

5 sites for Everglades LTER (2000)



#### Animal surveys

#### Sediment Characteristics





25cm x 25cm randomly placed for benthic coverage

25cm x 25cm set sites for benthic coverage

10cm x 10cm randomly placed for canal wall coverage

#### Monitoring Canals



#### Monitoring Canals





#### Effect on Seagrasses

Canal		Distance from Canal Mouth (m)					Distance from Canal Mouth (m)				
	0	10	50	100	250		0	10	50	100	250
The lassia testu	dinum	10		100	200	Halodule wrig	ntii				nanananan saidi Pederanan sanan Ped
Thalassia testa	unum					- 28	2	2	2	0	0
28	0	4	2	4	1	20	0	0	0	0	2
29	2	4	5	4	0	122	0	0	0	0	2
132	0	0	1	0	1		0	U	U	U	U
137	0	0	2	0	5	137	0	0	0	1	0
147	0	0	0	2	2	147	1	0	4	3	3
147	0		0	2	2	148	2	0	0	0	0
148	0	0	0	5	U	263	0	0	0	0	0
263	0	0	5	5	0	266	0	3	0	0	0
266	0	3	4	4	0	200	0	3	0	U	0
277	1	2	2	0	3	2//	2	3	2	4	0
278	1	0	0.5	0	3	278	5	3	5	4	0
282	0	0	0	5	5	282	0	0	3	2	0
287	0	0	0	0	1	287	0	0	0	0	0
207	0	0	0	0	-	288	0	0	0	0	0
288	U	0	0	U	5	290	0	0	0	0	0
290	0	0	3	4	1	200	0	0	0	0	0
293	0	0	0	0	4	293	U	U	U	U	U
472	0	0	2	1	4	472	0	2	2	1	0
476	0	0	1	5	2	476	0	0	1	0	0



#### Effect on Seagrasses

# N:P



#### Effect on Seagrasses

#### 

	$\delta^{15}N$			
	South			
	FL	Canals		
Mean	2.0	2.1		
n	78.0	45.0		
SE	0.2	0.3		
Median	1.8	2.4		
Minimum	-2.2	-2.6		
Maximum	5.4	7.2		

#### Sediment Density



0

0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0 2.2

Density (g cm<sup>-3</sup>)

0

0

0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

Density (g cm<sup>-3</sup>)

#### Sediment Organic Carbon



#### Sediment Depth





#### Canal 29 – Key Largo



















#### )ne year after Opening

#### Canal 266 – Big Pine



#### Canal 266- Before Dredging





#### Canal 266- After Dredging





















#### Conclusions

-Most remediation Techniques are showing positive results on sediments -some on seagrass, algae and animals

-Care must be taken to preserve remediated canals

### -Canals are affecting adjacent waters

Further sampling required to assess the effects of remediation on adjacent waters



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