



WATER QUALITY MONITORING PROJECT FOR THE FLORIDA KEYS NATIONAL MARINE SANCTUARY.

Marathon Government Center, 03/02/2016

Team

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<http://casgroup.fiu.edu/serc>

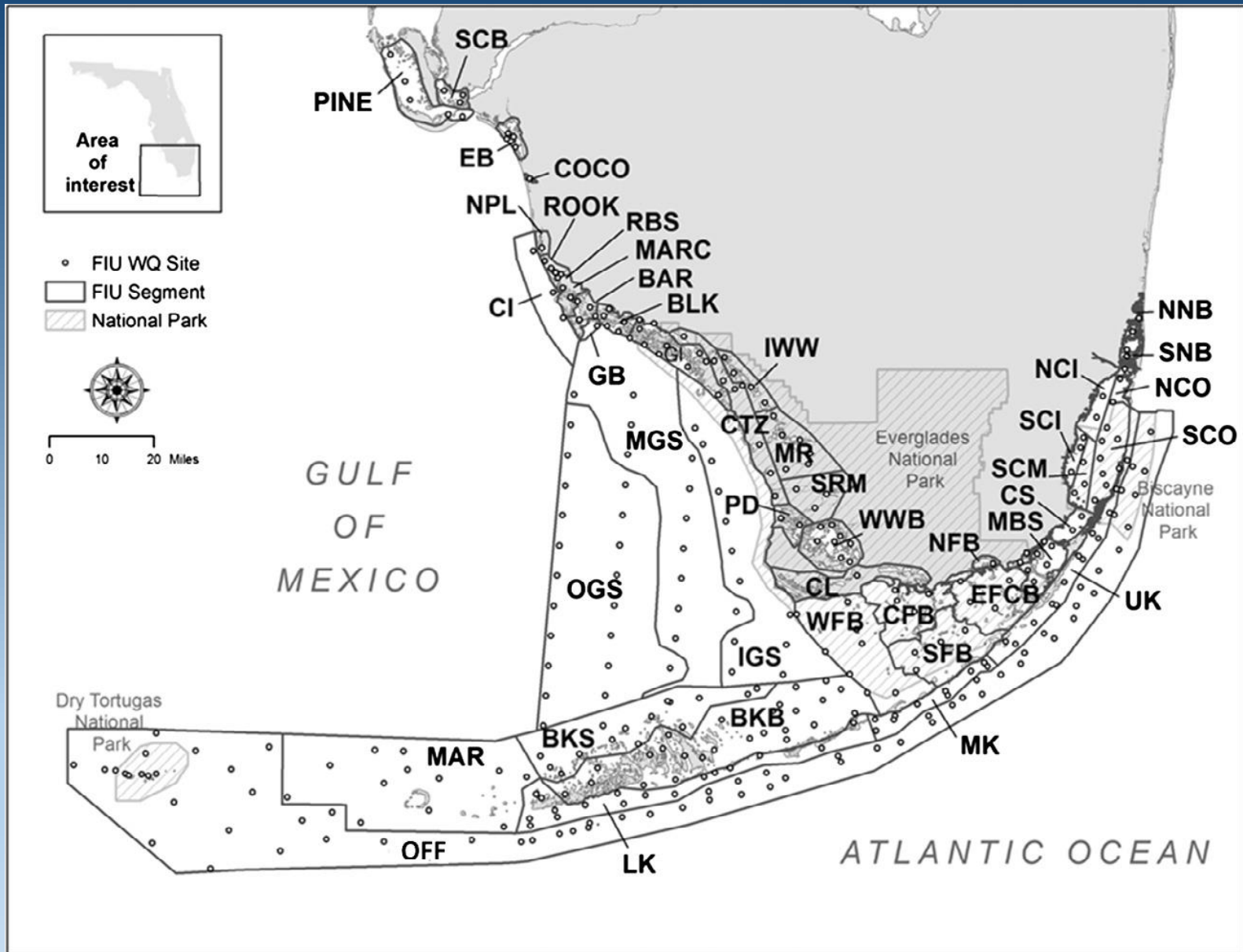
<http://serc.fiu.edu/wqmnetwork/>

Photography: James Duquesnel

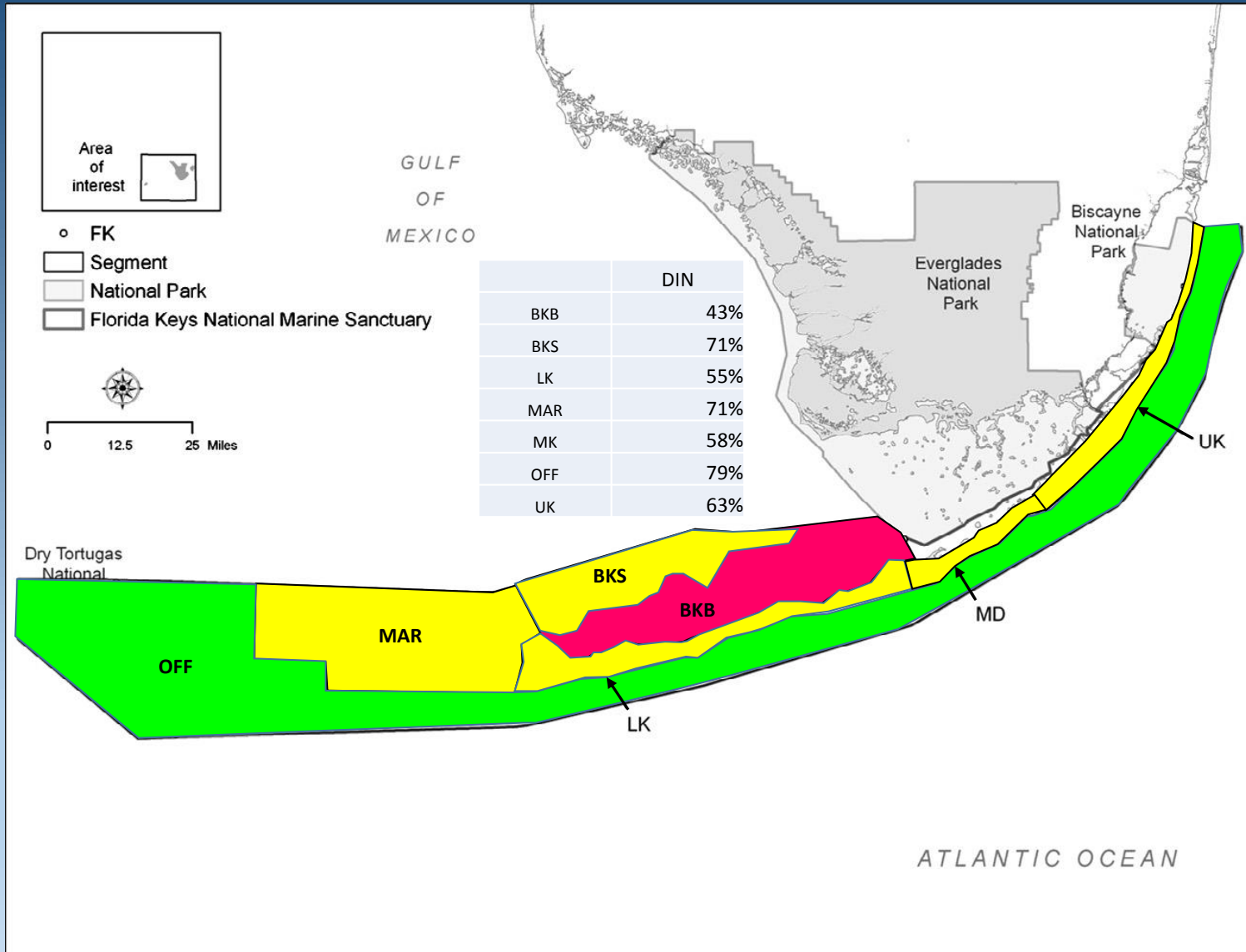
Compliance with EPA WQ Targets

EPA WQPP Water Quality Targets				
	REEF Stations		All Stations (excluding SHORE sites)	
Year	CHLA $\leq 0.35 \mu\text{g l}^{-1}$	$K_d \leq 0.20 \text{ m}^{-1}$	DIN $\leq 0.75 \mu\text{M}$	TP $\leq 0.25 \mu\text{M}$
			(0.010 ppm)	(0.0077 ppm)
1995-05	1778 of 2367 (75.1%)	1042 of 1597 (65.2%)	7826 of 10254 (76.3%)	7810 of 10267 (76.1%)
2006	196 of 225 (87.1%)	199 of 225 (88.4%)	432 of 990 (43.6%)	316 of 995 (31.8%)
2007	198 of 226 (87.6%)	202 of 222 (91.0%)	549 of 993 (55.3%)	635 of 972 (65.3%)
2008	177 of 228 (77.6%)	181 of 218 (83.0%)	836 of 1,000 (83.6%)	697 of 1,004 (69.4%)
2009	208 of 228 (91.2%)	189 of 219 (86.3%)	858 of 1,003 (85.5%)	869 of 1,004 (86.6%)
2010	170 of 227 (74.9%)	176 of 206 (85.4%)	843 of 1000 (84.3%)	738 of 1,003 (73.6%)
2011	146 of 215 (67.9%)	156 of 213 (73.2%)	813 of 1012 (80.3%)	911 of 1013 (89.9%)
2012	142 of 168 (84.5%)	135 of 168 (80.4%)	489 of 683 (71.6%)	634 of 684 (92.7%)
2013	148 of 172 (86.0%)	150 of 172 (87.2%)	496 of 688 (72.1%)	603 of 688 (87.6%)
2014	141 of 172 (82.0%)	133 of 172 (77.3%)	426 of 690 (61.7%)	540 of 690 (78.3%)
2015	122 of 172 (70.9%)	135 of 172 (78.5%)	487 of 688 (70.8%)	613 of 688 (89.1%)

South Florida WQ Types



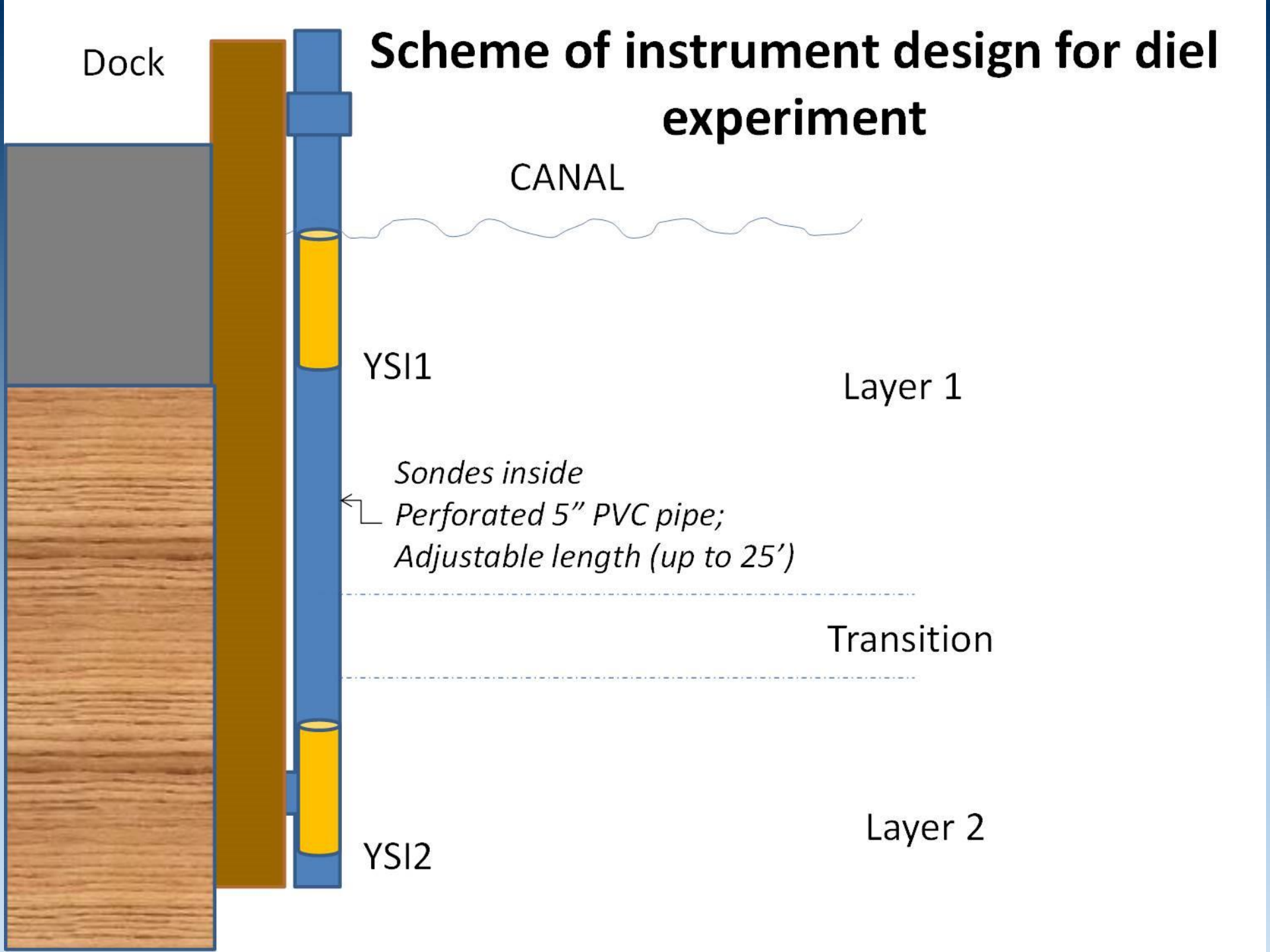
Stop-light Card for FKNMS water types



Canal Monitoring



Scheme of instrument design for diel experiment



**WATER QUALITY MONITORING PROJECT FOR
DEMONSTRATION OF CANAL REMEDIATION
METHODS FLORIDA KEYS**

Report #1: Canal Water Characterization



Henry O. Briceño & Alexandra Serna

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**WATER QUALITY MONITORING PROJECT FOR
DEMONSTRATION OF CANAL REMEDIATION
METHODS FLORIDA KEYS**

**Report #2: Canal Water Characterization Before
Remediation and Monitoring After Remediation**



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SELECTED CANALS FOR REMEDIATION AND CONTROL

Control canals highlighted in yellow

Weed Barrier		Organic Removal	Weed Barrier & Organic Removal	Pumping	Culvert Installation		Backfilling	
#137 Plantation Key Treasure Harbor	#148 Lower Matecumbe Key Mate-Lido Beach	#287 Big Pine Hollerich Subdivision	#290 Big Pine Between Ave I & J	#266 Big Pine. Dr Arm Subdivision	#278 Big Pine. Eden Pines Colony Subdivision	#277 Big Pine. Tropical Bay Subdivision	#459 Geiger. Boca Chica Ocean Shores Subdivision	#29 Key Largo Sexton Cove Estates Subdivision
							#472 Geiger. Geiger Mobile Homes Subdivision	
#132 Plantation Key	#147 Matecumbe K	#293 Big Pine		#282 Big Pine		#458 Geiger	# 28 Key Largo	

Additional

#470

#460

Remediation completed

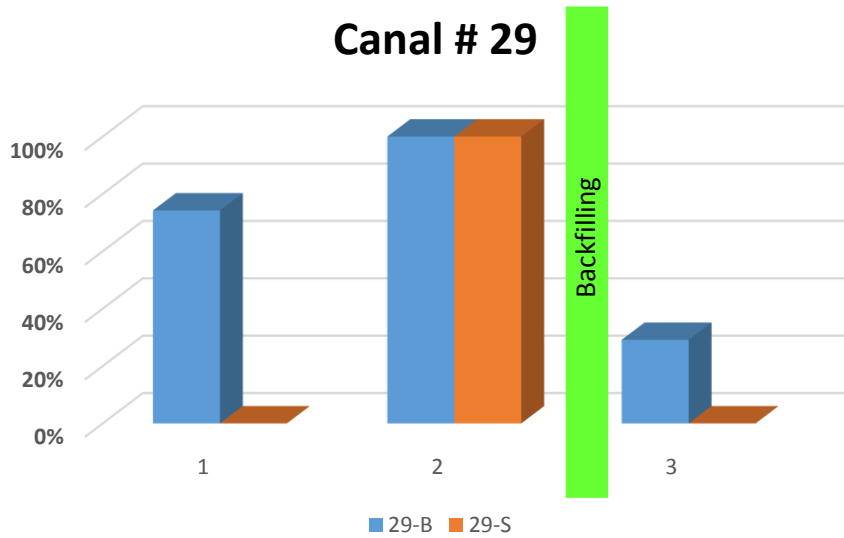
Project	Canal #	BEFORE 1	BEFORE 2 (4-mo)	Date remediated	AFTER n (6-mo)			Comments
		FKC-01	FKC-02		FKC-03	FKC-04	FKC-05	
Backfilling	29	31-Mar-14	16-Oct-14	3-Jul-15			4-Feb-16	
CONTROL	28	27-Mar-14	16-Oct-14				4-Feb-16	
Weed Barrier	137	7-May-14	16-Oct-14	4-Nov-14		20-Jul-15	19-Feb-16	
CONTROL	132	7-May-14	16-Oct-14			20-Jul-15	19-Feb-16	
Culvert installation	472	9-May-14	15-Oct-14	22-Apr-15	29-Apr-15	30-Jun-15		Culvert closed
Connection to 472-NEW	470					30-Jun-15		
CONTROL	458	9-May-14	15-Oct-14		29-Apr-15	30-Jun-15	17-Feb-16	
Weed Barrier / organic removal	266	7-May-14	14-Oct-14	16-Jan-16				Remediation in progress (293 control)

Remediation pending

Project	Canal #	BEFORE 1	BEFORE 2 (4-mo)	BEFORE 3 (6-mo)	BEFORE 4 (6-mo)	BEFORE 5 (6-mo)	Date programed	
		FKC-01	FKC-02					
Weed Barrier	148	7-May-14	16-Oct-14		30-Jun-15	18-Feb-16		ON HOLD
CONTROL	147	7-May-14	16-Oct-14		30-Jun-15	18-Feb-16		
Pumping	278	9-May-14	15-Oct-14		24-Jun-15	17-Feb-16		ON HOLD
Culvert installation	277	7-May-14	14-Oct-14		24-Jun-15	18-Feb-16	31-May-16	Approved
CONTROL	282	7-May-14	14-Oct-14		24-Jun-15	18-Feb-16		
Culvert installation	459	9-May-14	15-Oct-14	29-Apr-15	30-Jun-15	17-Feb-16		ON HOLD
Connection to 459-NEW	460				30-Jun-15	17-Feb-16		
Weed Barrier	287	7-May-14	14-Oct-14		24-Jun-15	11-Feb-16	1-Mar-16	ON HOLD
Organic removal	290	7-May-14	15-Oct-14		24-Jun-15		1-Mar-16	Remediation in progress
CONTROL	293	7-May-14	14-Oct-14		24-Jun-15	18-Feb-16		

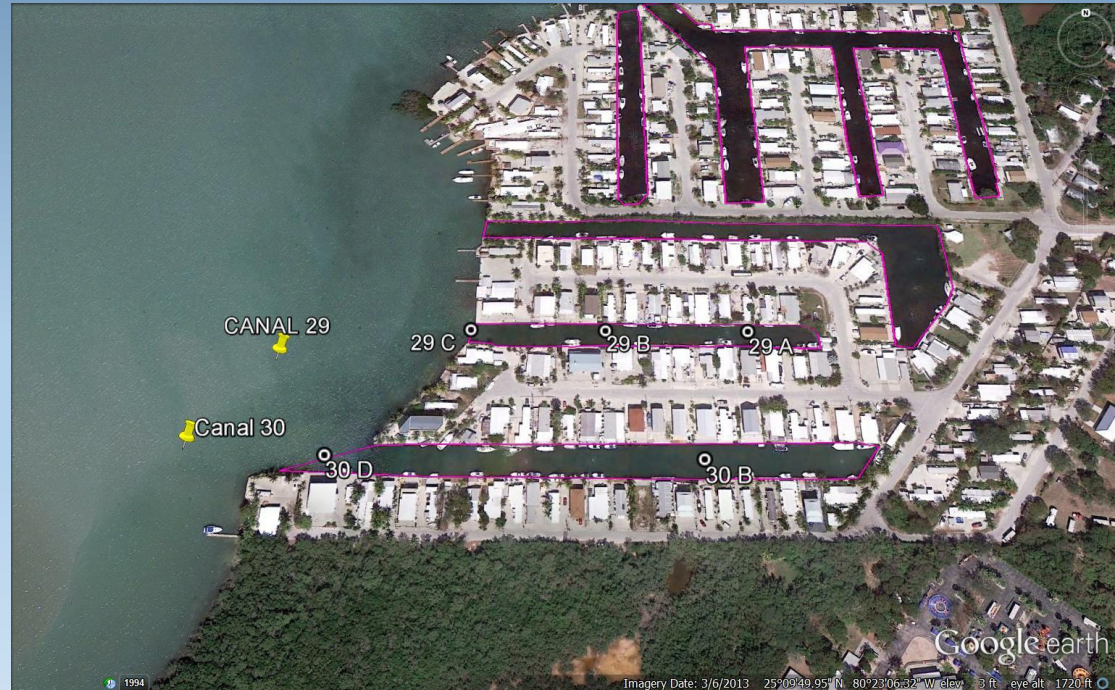
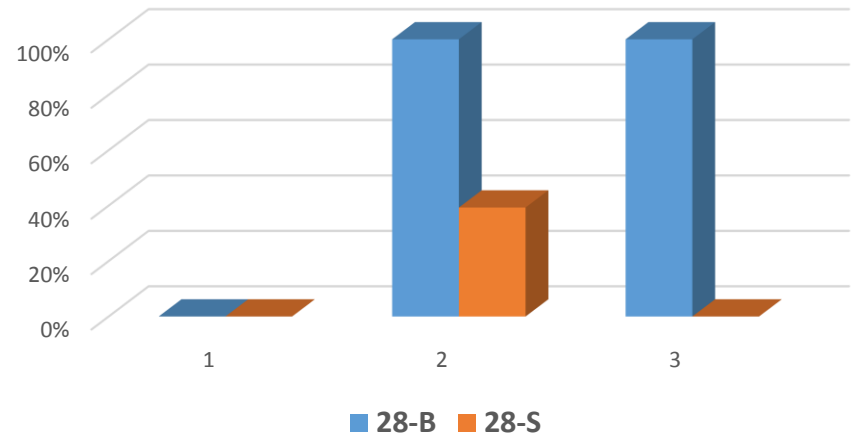
Remediated

Canal # 29



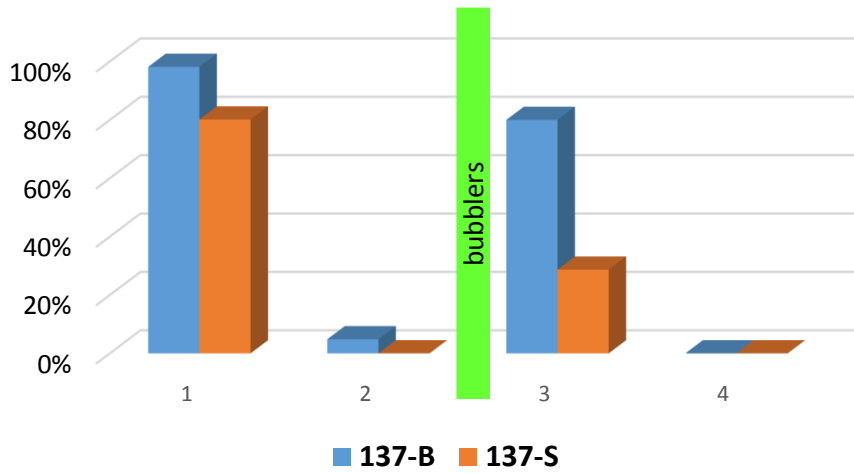
Control

Canal #28



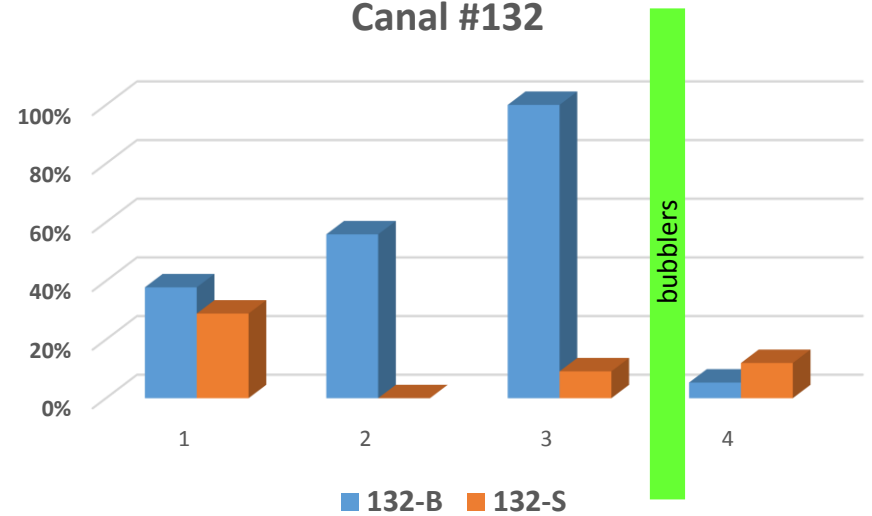
Remediated

Canal #137



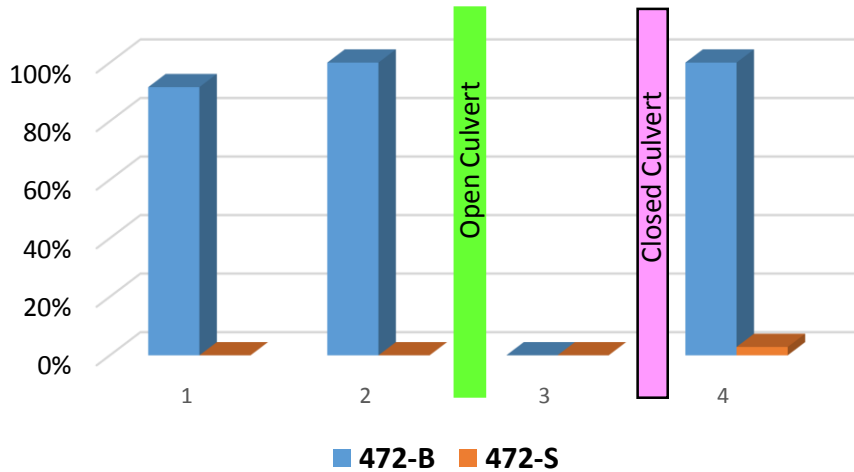
Control

Canal #132



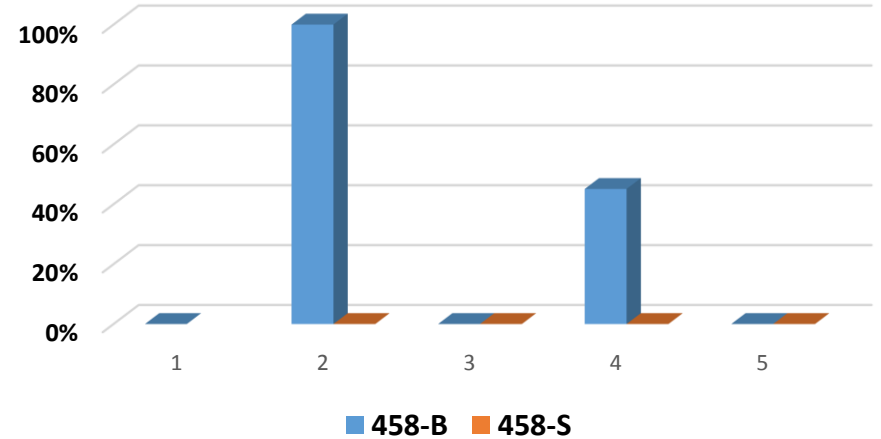
Remediated

Canal #472



Control

Canal #458



Field Work

- Five campaigns
- A total of 100,000+ physical-chemical field measurements
- Including 21,038 DO determinations
- 117 diel (24 hour) observations

Summary

- Canal waters are extremely variable, vertically, geographically, but mostly temporally
- Dissolved Oxygen is very sensitive to changing conditions, including daylight, tides, currents, boat traffic, rain, wind, etc
- Characterization requires accounting for this variability
- Best results are obtained with diel measurements

FUTURE WORK

- Workload Increase
- Requests for out-of-scheduled monitoring from Monroe Co (ACME) and FDEP
- Request for additional sampling sites from Monroe Co (ACME) and FDEP
- Budget constraints
- How to cope with remediation asymmetry
- Biannual Surveys
- More Diels and less Nutrient analysis
- Short-term monitoring after remediation