FIU Arts, Sciences & Education
Florida International University

Florida Keys National Marine Sanctuary

Steering Committee Meeting
April 18, 2019
Marathon, Florida

24 years of Water Quality Monitoring

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

Content

- History of Monitoring Water Quality
- Long-Term Trends
- Compliance with EPA Targets
- Future Monitoring
  - AI, Robotics and Remote Sensing
  - Directional WQ

Photo: Hakai Magazine

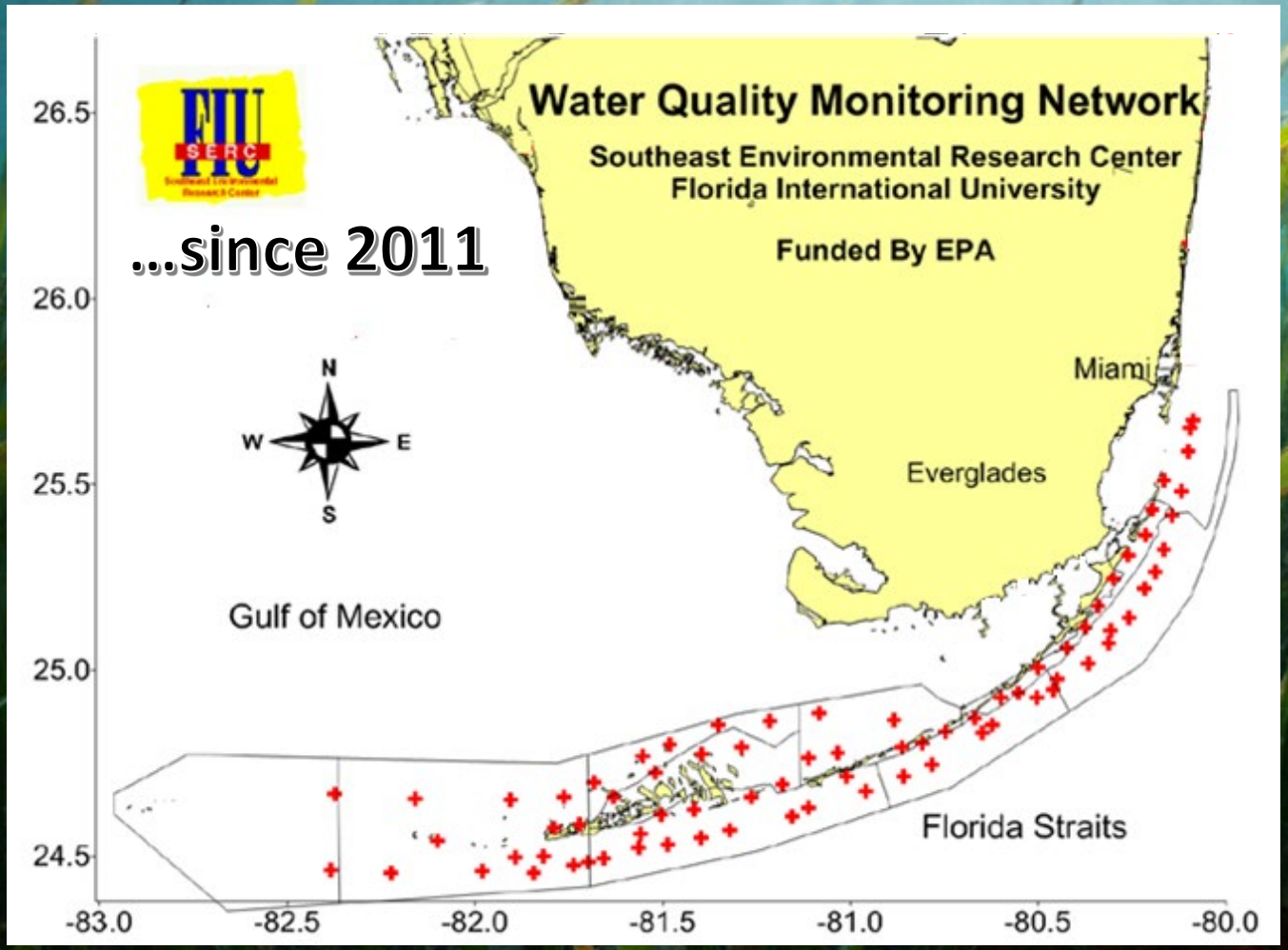
Landmark events

1950s	The initial environmental concerns: John Pennekamp Park designated
1960s	The lost decade
1970s	First Institutional steps Marine Protection, Research and Sanctuaries Act signed. Key Largo National Marine Sanctuary designated
1980s	Decade of Environmental crisis and threats: algal blooms, sponge, sea urchin and seagrass die-offs, coral bleaching
	DOI releases a five-year plan to open Florida's coastal areas to oil and gas development
	At last, Florida Keys National Marine Sanctuary Act is introduced

1990s Decade of institutional consolidation, resource assessment and monitoring.
Florida Keys National Marine Sanctuary and Protection Act signed into Law
U.S. EPA and Florida implement the Water Quality Protection Program
Water Quality Monitoring Program begins with water quality (FIU), seagrass (FIU) and coral reef (FWC) monitoring projects
Bill Kruczynski Report

2000s The decade of initial intensive monitoring and initial remediation. Quest for WQ improvement
FDEP RAD Program. EPA water quality targets

2010s Decade of Resilience Consolidation


Water Quality Monitoring Network
Southeast Environmental Research Center
Florida International University
Funded By EPA
…since 2011
Miami
Everglades
Gulf of Mexico
Florida Straits
N
W
E
S
26.5
26.0
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-83.0
-82.5
-82.0
-81.5
-81.0
-80.5
-80.0

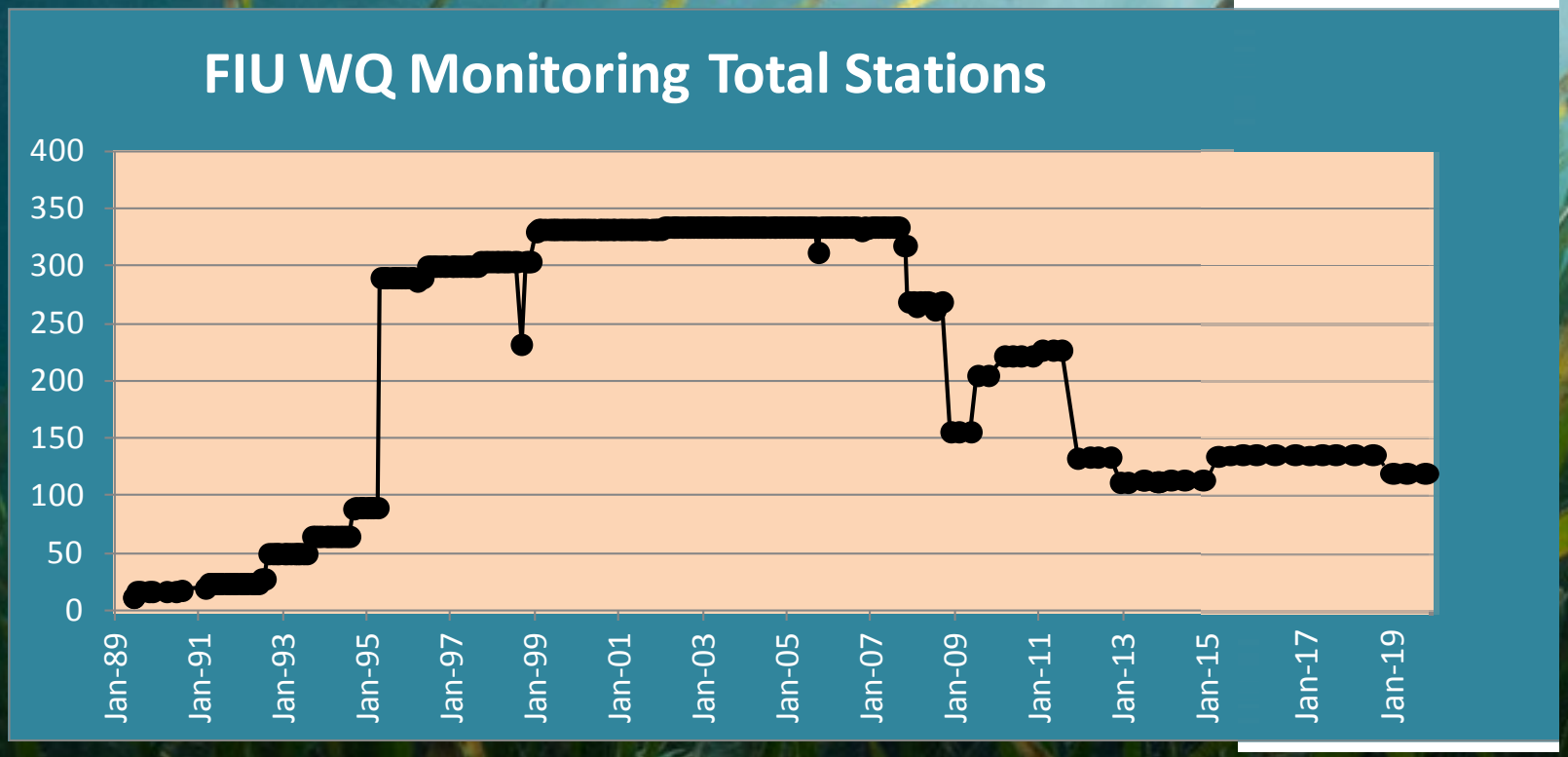
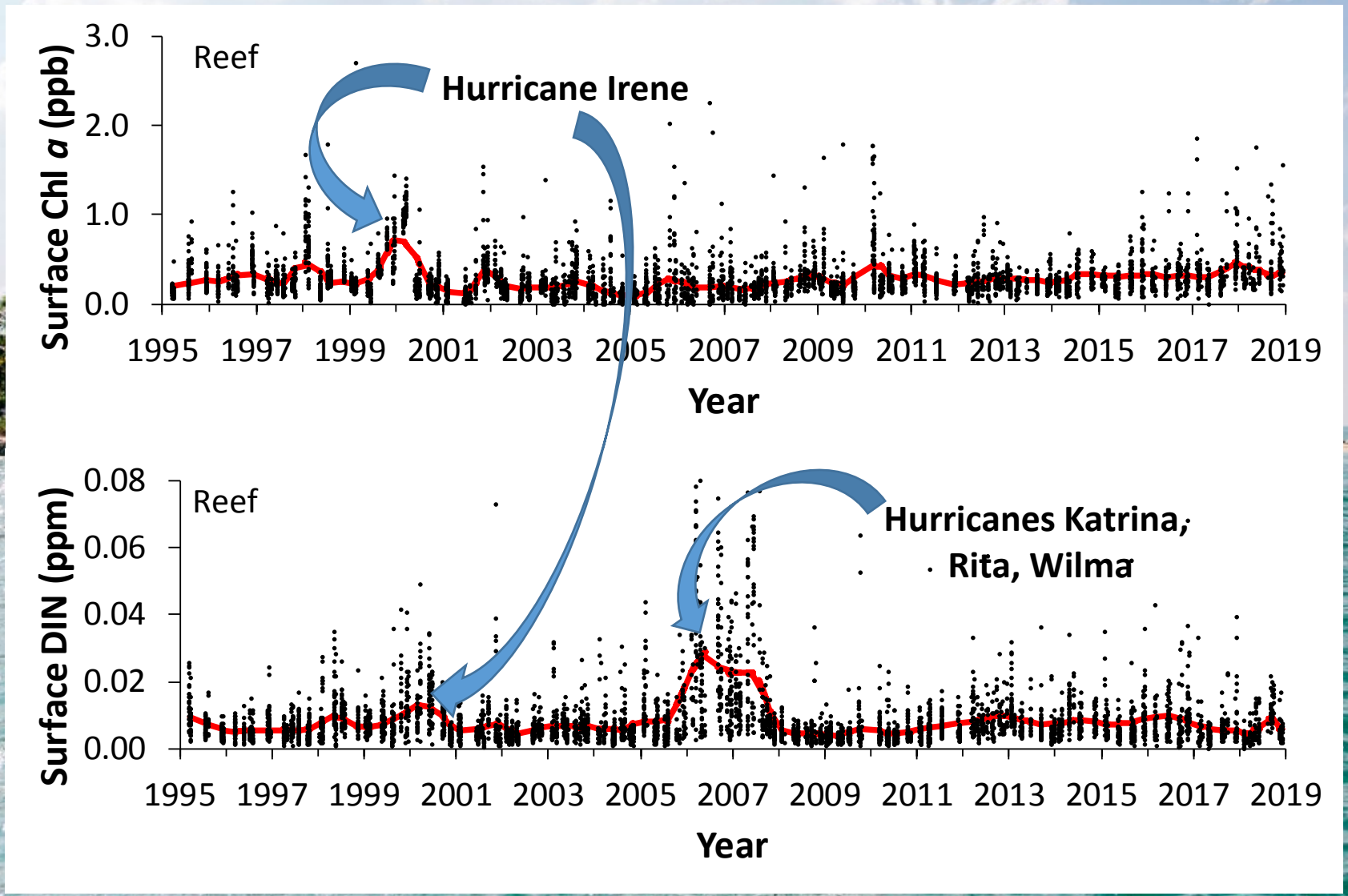


Photo: Hakai Magazine

Long-term trends in coral reefs waters



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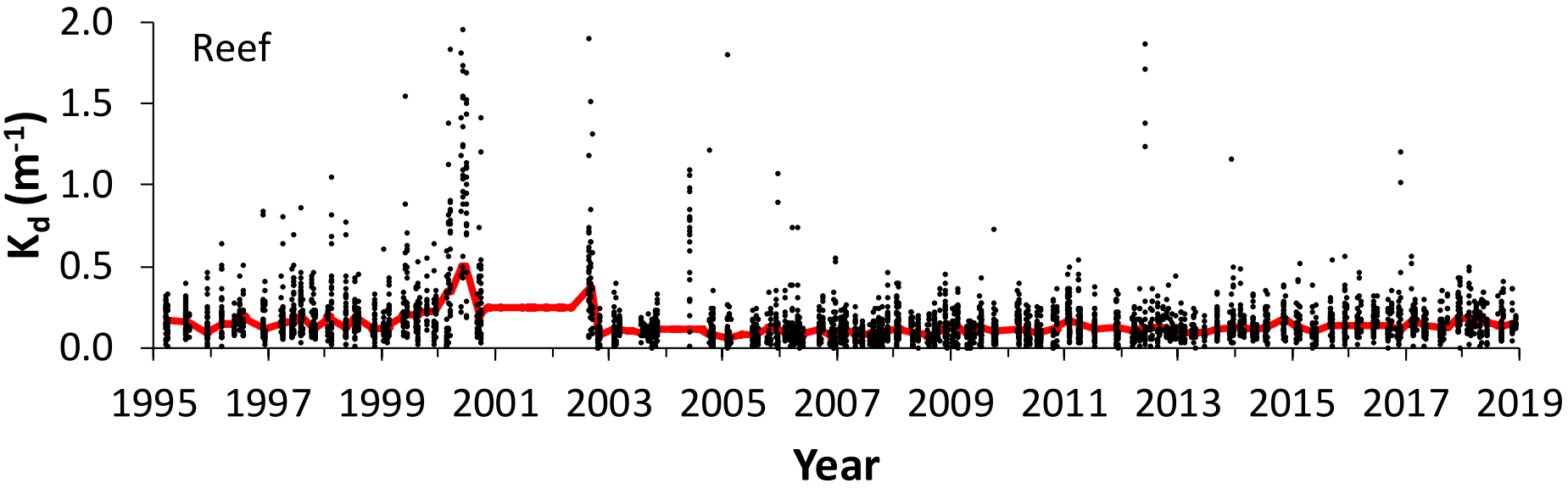
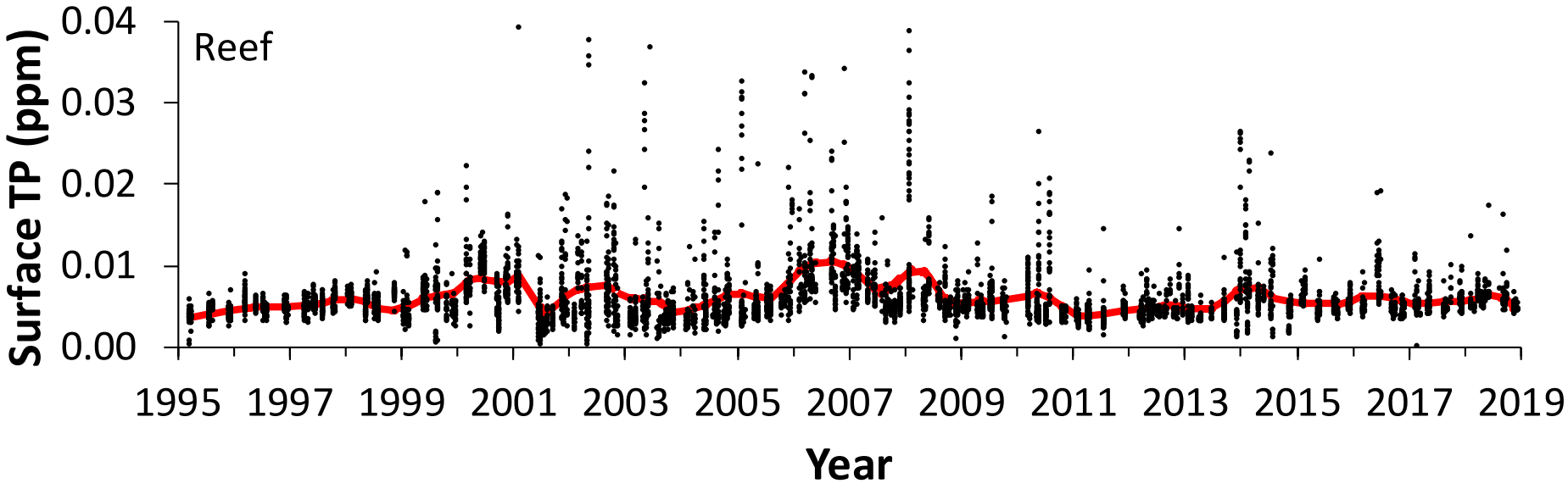
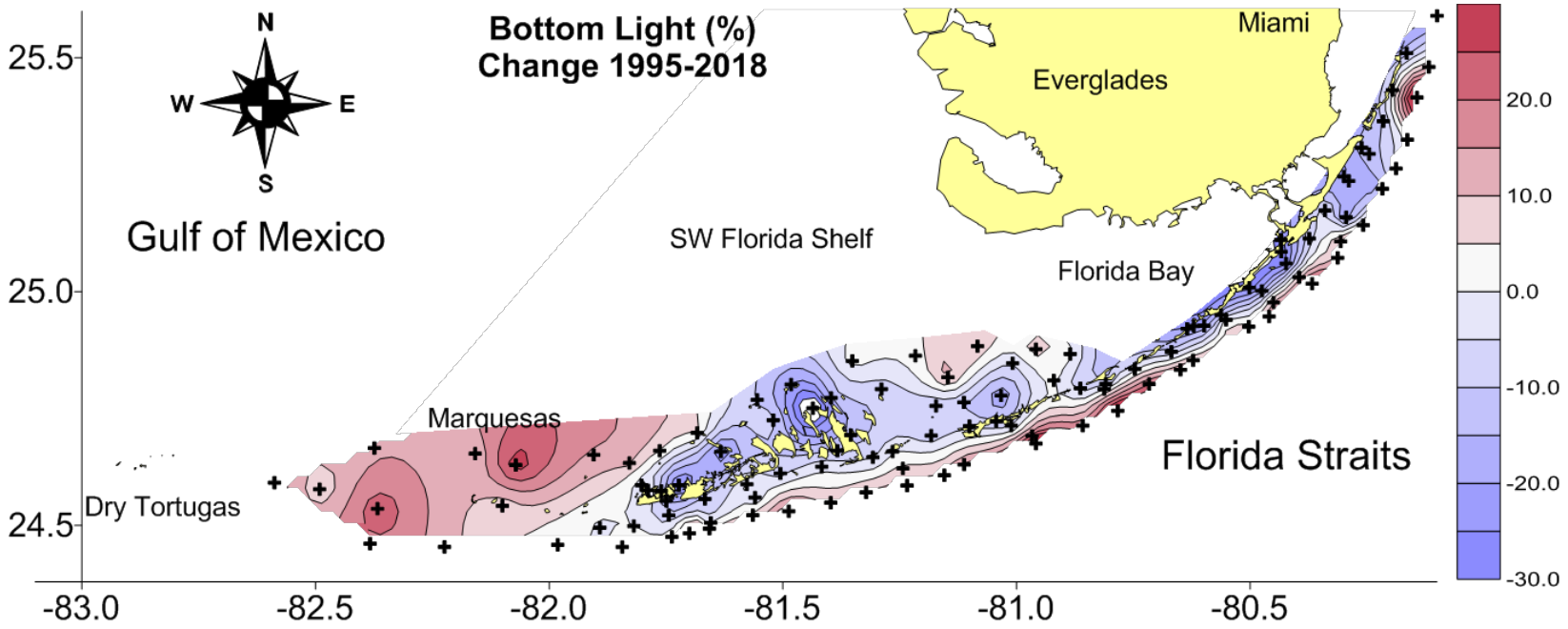


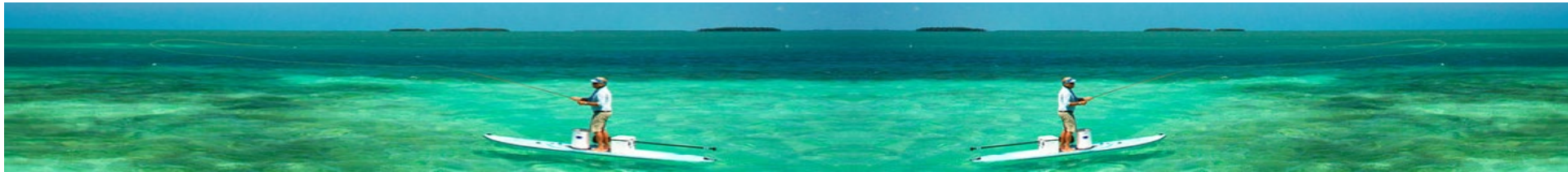


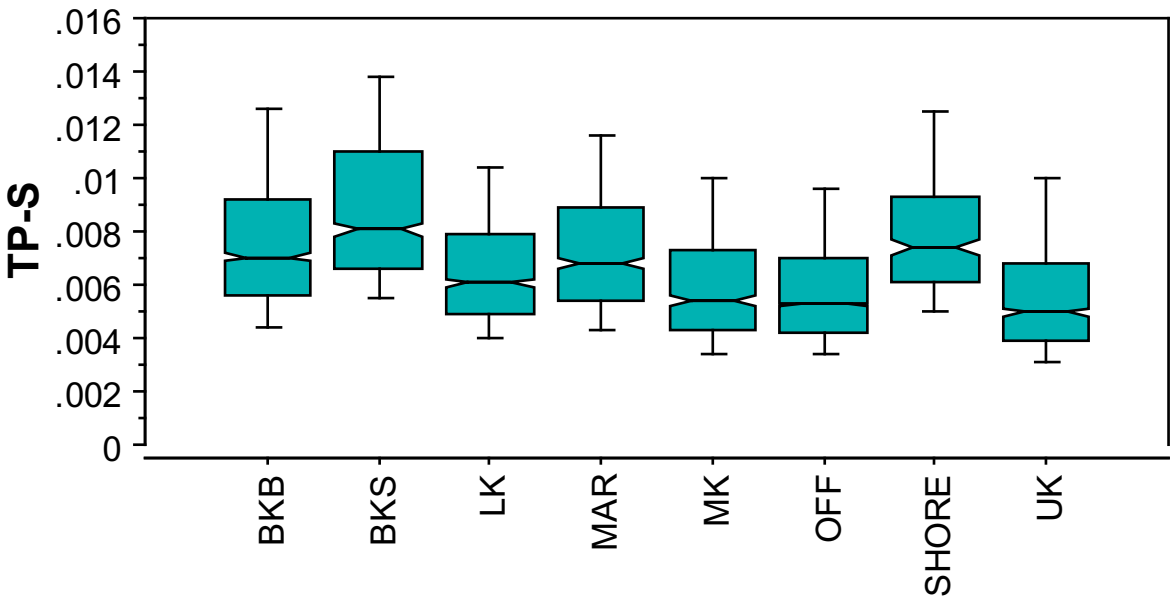
Compliance with EPA Targets

Year	EPA WQPP Water Quality Targets			
	REEF Stations		All Stations (excluding SHORE sites)	
	CHLA ≤ 0.35 µg l^{-1}	K_d ≤ 0.20 m^{-1}	DIN ≤ 0.75 µM (0.010 mg l^{-1})	TP ≤ 0.25 µM (0.008 mg l^{-1})
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 1,000 (84.3%)	738 of 1,003 (73.6%)
2011	146 of 215 (67.9%)	156 of 213 (73.2%)	813 of 1,012 (80.3 %)	911 of 1,013 (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%)
2016	131 of 172 (76.2%)	129 of 170 (75.9%)	427 of 687 (62.2%)	549 of 688 (79.8%)
2017	106 of 172 (61.6%)	120 of 170 (70.6%)	440 of 575 (76.5 %)	581 of 683 (85.1 %)
2018	92 of 170 (54.1%)	108 of 152 (71.7%)	558 of 689 (81.0 %)	573 of 689 (82.3 %)

Compositional contour maps






TP-S
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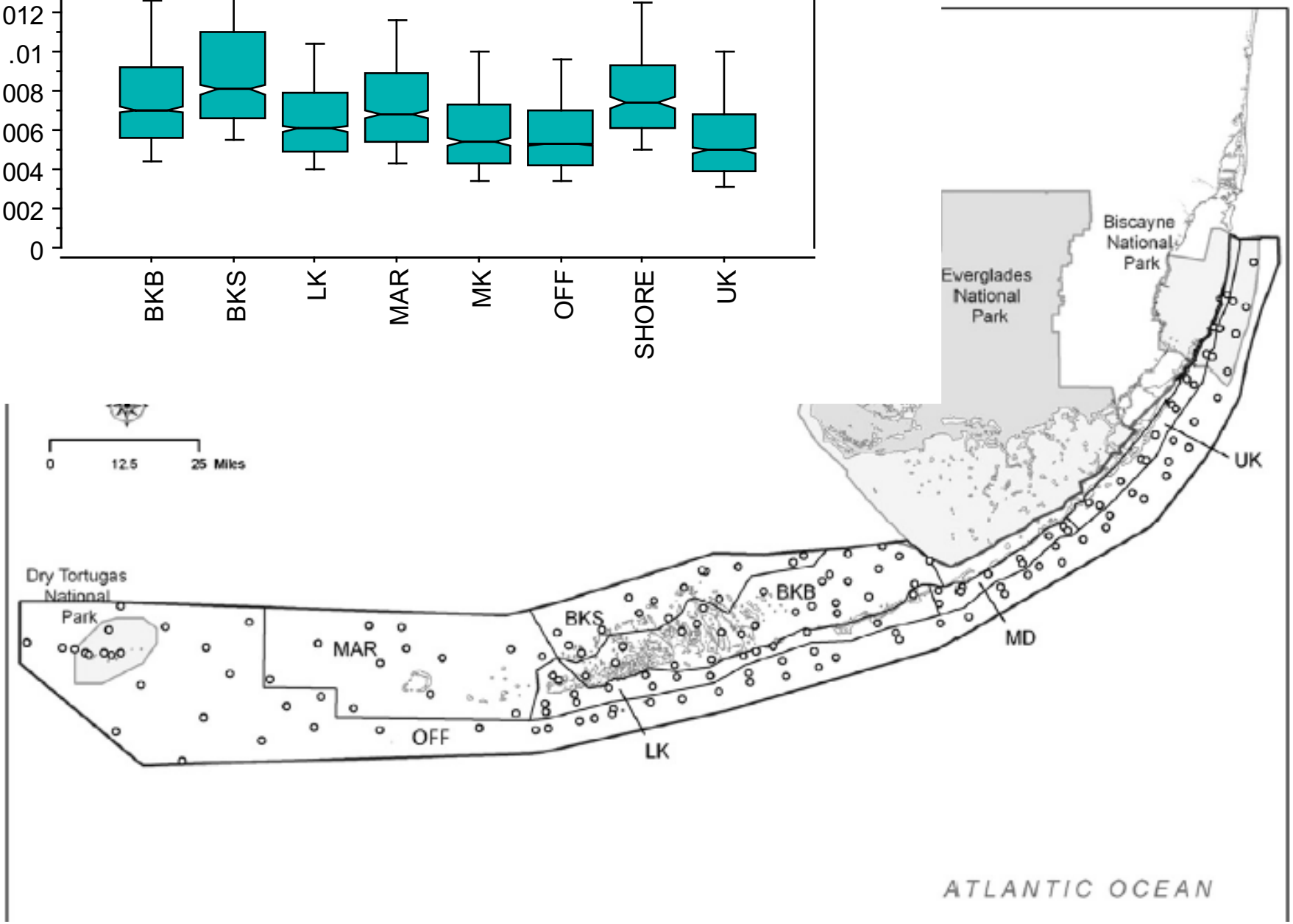
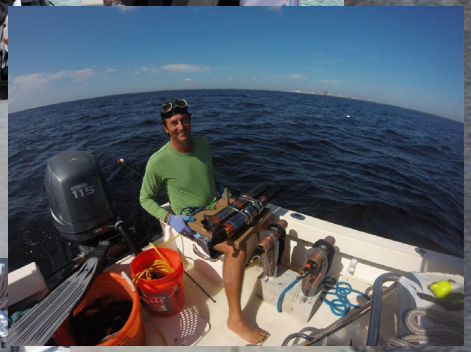
SHORE
UK


Everglades National Park
Biscayne National Park
0
12.5
25 Miles
Dry Tortugas National Park
MAR
BKS
BKB
MD
UK
OFF
LK
ATLANTIC OCEAN

…new horizons….

...a new approach...

The use of underwater robot systems, including Autonomous Underwater Vehicles (AUVs), Remotely Operated Vehicles (ROVs), and autonomous gliders
Combination of robotics, AI, satellites and directional WQ



Thank you

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