

Monitoring Water Quality Around Key West

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Background Information

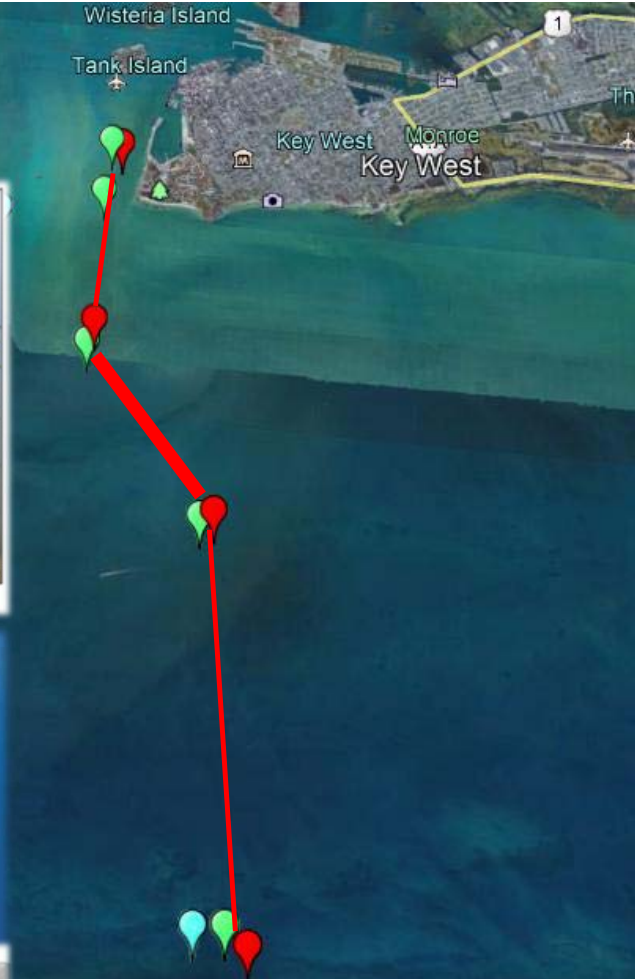
- COVID-19 Anthropause
- Need for baseline data
- Marine science classes at CFK
- FKNMS Advisory Committee
- WQPP and the EPA
- KWWQ project



- **Fall 2020**

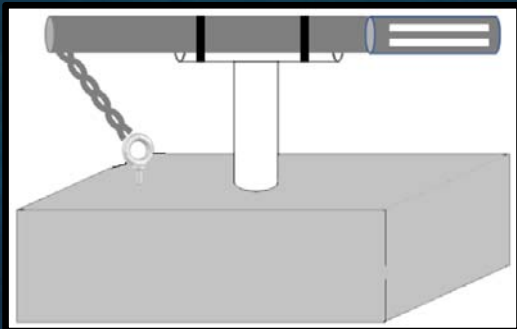
- **Basic water quality testing in KW Harbor and ship channel (red lines)**
- Temperature
- Salinity
- Dissolved oxygen (DO)
- Turbidity
- Ammonia
- pH
- Hydrogen sulfide

- **Spring 2021**



Google Earth

- Summer 2021
- Fall 2021



Western Dry
Rocks Reef
(Control)

- Continuous monitoring
- 15 - minute sample frequency
- Turbidity, salinity, temperature, and depth
- Service 15 – 30 days

Archer Key

Mule Key

Wisteria Island

Barracouta Keys Joe Ingram Key

Crawfish Key

KW Harbor

Wink Island

Key West, FL

KW Harbor
(Monitor 1)

Key West
Ship Channel

Eastern Dry
Rocks Reef
(Monitor 3)

Ship Channel
Entrance
(Monitor 2)

Eastern Dry Rocks Sanctuary
Preservation Area

Google Earth

Spring 2022

- Awarded KWWQ Project from EPA
- Partner w/ FIU Institute of Environment - CACHE Nutrient Analysis Core Facility
- National Environmental Laboratory Accreditation Program (NELAC) -accredited nutrient analysis laboratory to directly support research

Site	Latitude	Longitude
KW01	24°34'8.53" N	81°48'9.69" W
KW02	24°33'49.45" N	81°48'1.59" W
KW03	24°33'44.30" N	81°48'31.47" W
KW04	24°33'24.23" N	81°48'40.28" W
KW06	24°32'53.40" N	81°48'49.52" W
KW07	24°32'21.98" N	81°48'52.25" W
KW09	24°31'40.98" N	81°48'32.03" W
KW12	24°30'34.55" N	81°48'11.29" W
KW14	24°29'21.89" N	81°48'7.32" W
KW16	24°28'27.45" N	81°48'6.24" W
EDR	24°27'40.0" N	81°50'45.9" W
WDR	24°26'43.55"N	81°55'39.34"W

KW01-16 = Sites in Key West Harbor/ship channel

EDR = Eastern Dry Rocks, FL

WDR = Western Dry Rocks, FL

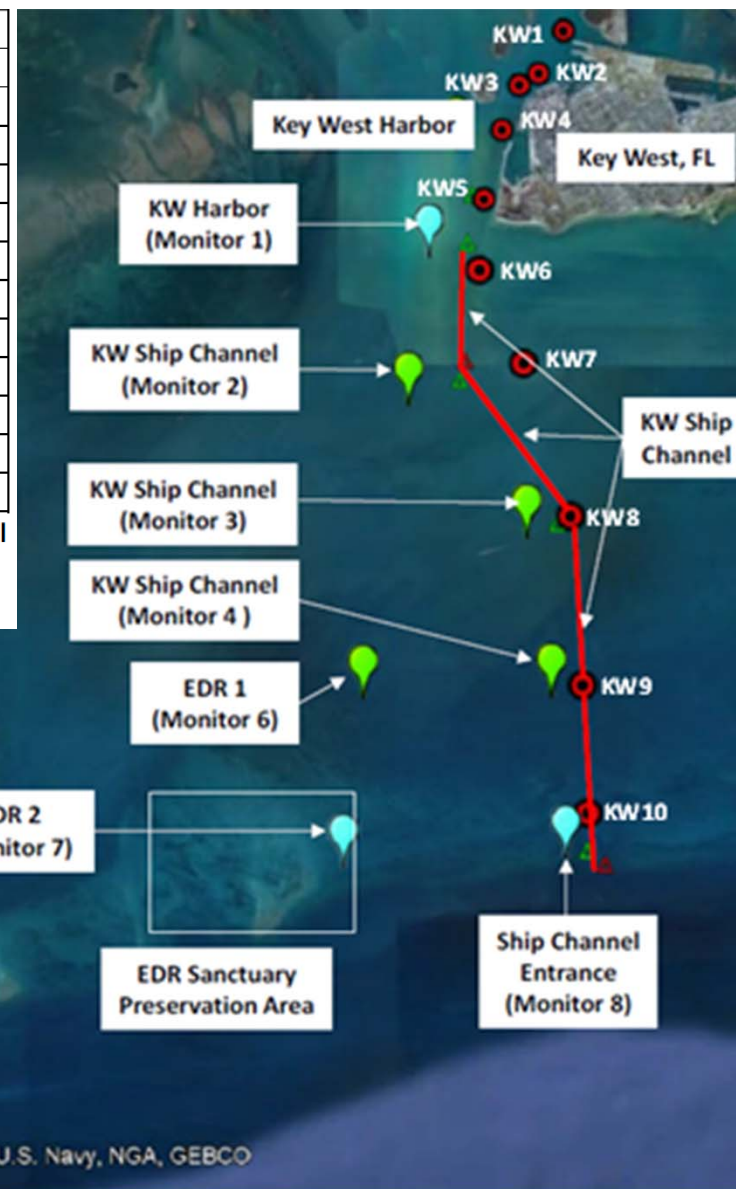


Table 2. FIU Water Sample Lab Analysis

Dissolved Inorganic Nutrients (NO ₂ ⁻ , NO ₃ ⁻ , NH ₄ ⁺ , PO ₄ ⁻³)
Total Phosphorus (TP)
Total Nitrogen - ANTEK (TN)
Total Organic Carbon (TOC) and Dissolved Organic Carbon (DOC)
Dissolved Silicate (SI)
Chlorophyll a (GF/F filtered, spectrofluorometric)

Spring 2022

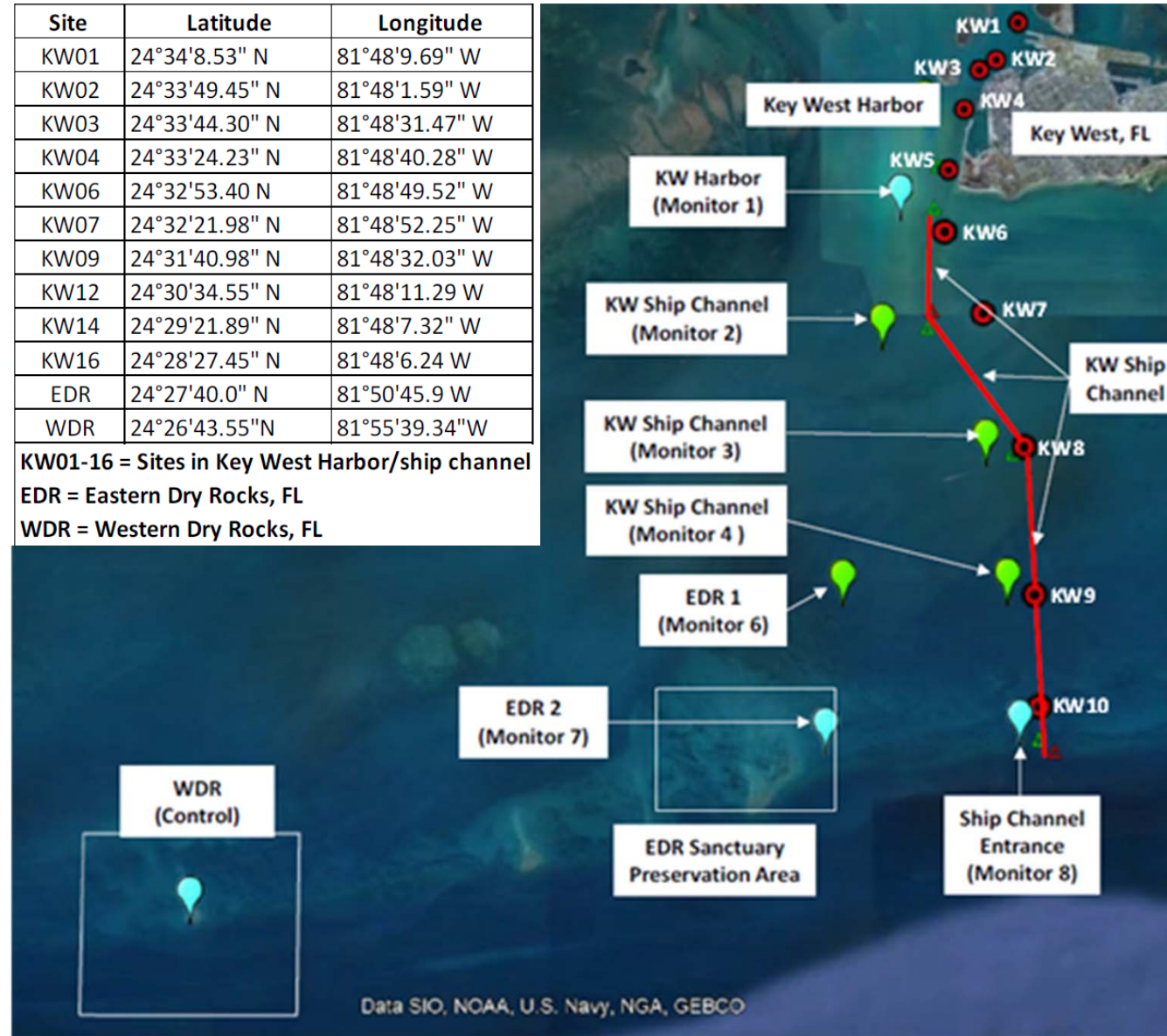
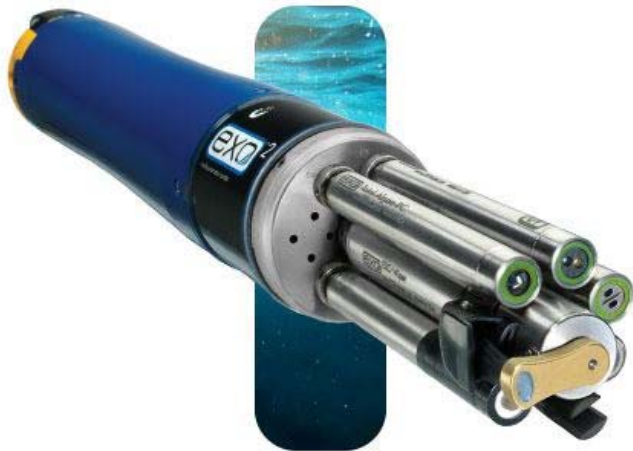
- Awarded KWWQ Project from EPA
- Double YSI sensor coverage
- Creates an array to track water quality changes from disturbances in the Key West harbor and shipping channel

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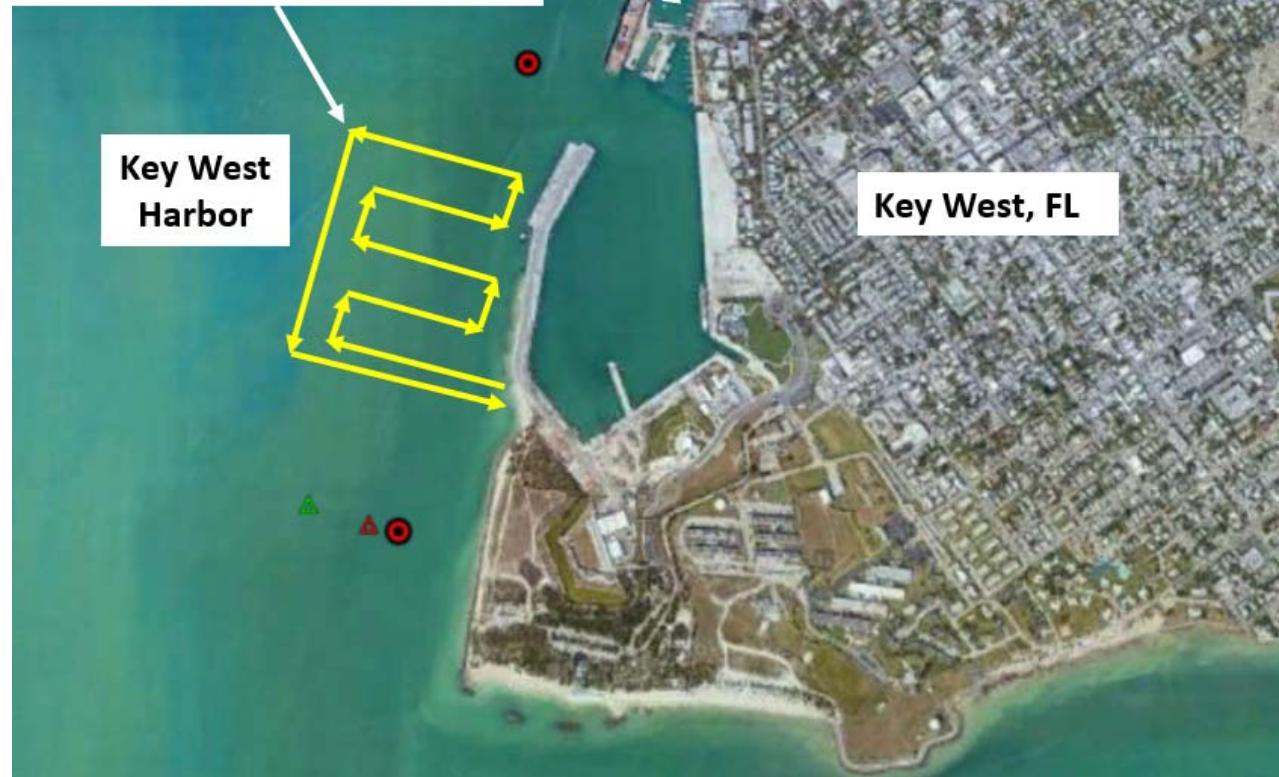


Summer 2022

- Deploying autonomous underwater vehicle (AUV) with YSI EXO in the nose cone.
- Immediately before and after cruise ships enter the KW harbor
- DO, turbidity, salinity, temperature, phytoplankton concentration
- Marine science research assistants and internship students



IVER AUV (above) & data collection track (yellow below)

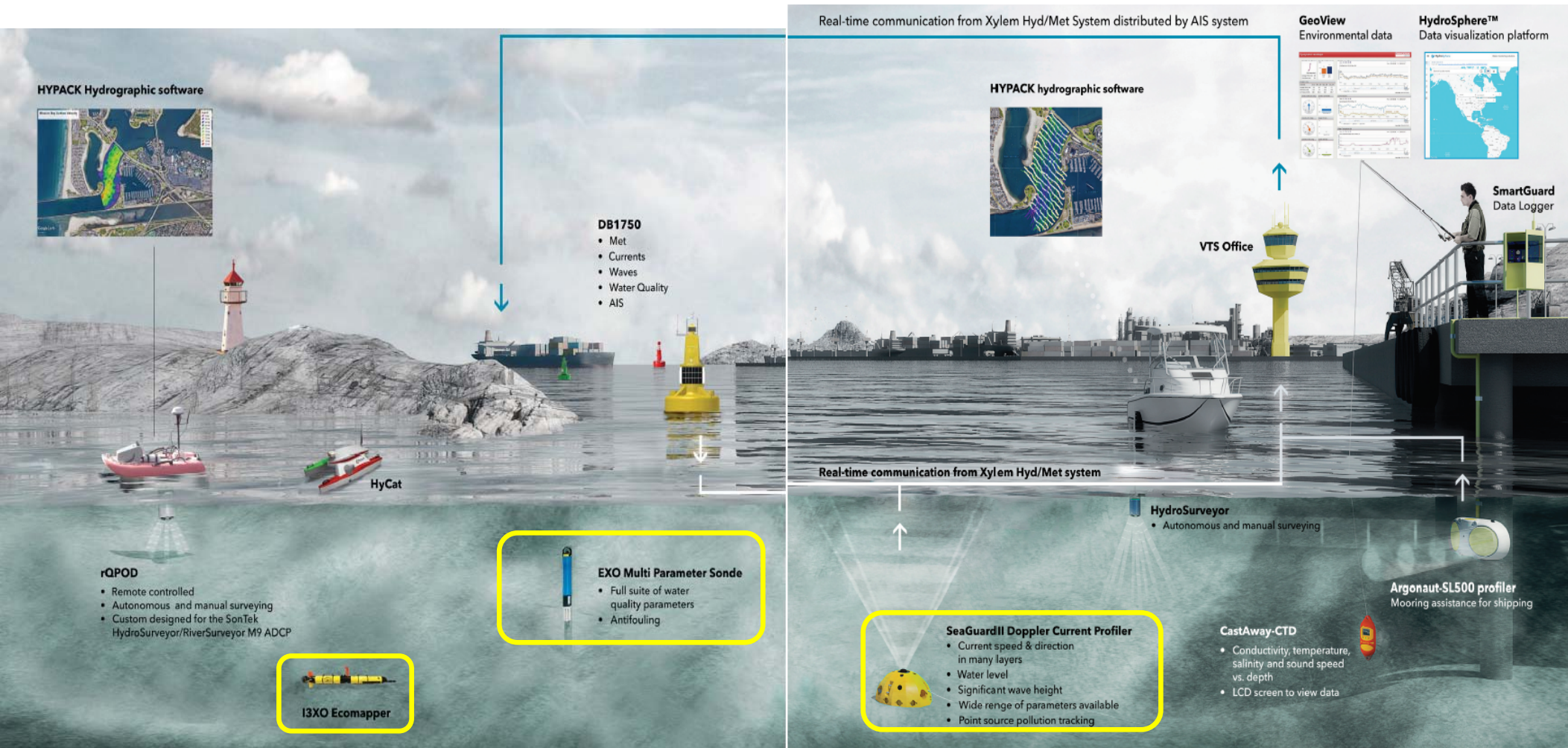


Gaps in Water Quality Monitoring

- KWWQ only funded for one year
- KWWQ focus on KW harbor and ship channel
- Very little near shore (< 500 m) WQ monitoring
- Monitoring of storm water effluents
- Monitoring for chemicals of emerging concern (CECs)
 - Endocrine disruptors
 - Pharmaceuticals
- Monitoring of mooring fields or marinas for basic indicators of anthropogenic pollution



Water Quality Monitoring Technology



Recommendations

- **Partnership with CFK**
 - Local
 - Build upon KWWQ project
 - Environmental Service Learning
 - Research Assistantships, Internships, marine science classes
 - Network (e.g. FIU Water Quality Monitoring Lab, FKNMS, FDEP, NPS, etc.)
 - Some Technology (e.g. i3XO Ecomapper, YSI EXO and 6600 data sondes)
- **Data buoys**
- **Current profilers**
- **Suggested locations**
 - Near shore (< 500 m)
 - Mooring fields
 - Outfalls
 - Popular beaches (e.g. Higgs beach, Smathers beach)
 - Control site (e.g. Western Dry Rocks)
 - Water proximal to landfills
 - Marinas

Table 1. CFK Marine Science Courses for Participation in KWWQ

Course	Fall	Spring	Summer
OCB 2102C Marine Data Collection	1	1	0
ISC 2132 Basic Research Diving	1	1	1
ISC 3133 Advanced Research Diving	1	0	0
OCB 2262C Assessing Coral Reef Habitats	0	0	1
OCB 2263C Coral Reef Biology and Management	2	1	0
OCB 2107C Monitoring Caribbean Reef Fish	0	0	1
OCB 3035 Nearshore and Offshore Ecology & Assessment	1	0	0
OCB 4624 Estuarine and Coastal Ecology	0	1	0
OCB 4103L Forensic Marine Science Lab	1	0	0
Total	7	4	3



Questions?



Crystal-clear water at Smathers Beach



First cruise ship after the anthropause