

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**

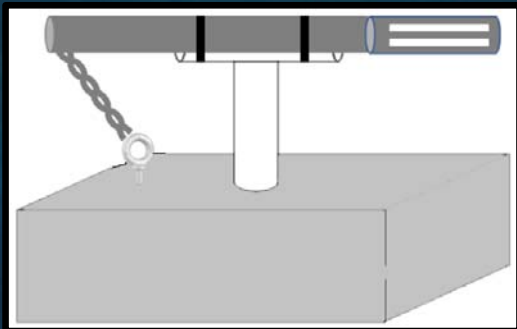
- **Basic water quality testing in KW Harbor and ship channel (red lines)**
- Temperature
- Salinity
- Dissolved oxygen (DO)
- Turbidity
- Ammonia
- pH
- Hydrogen sulfide

- **Spring 2021**



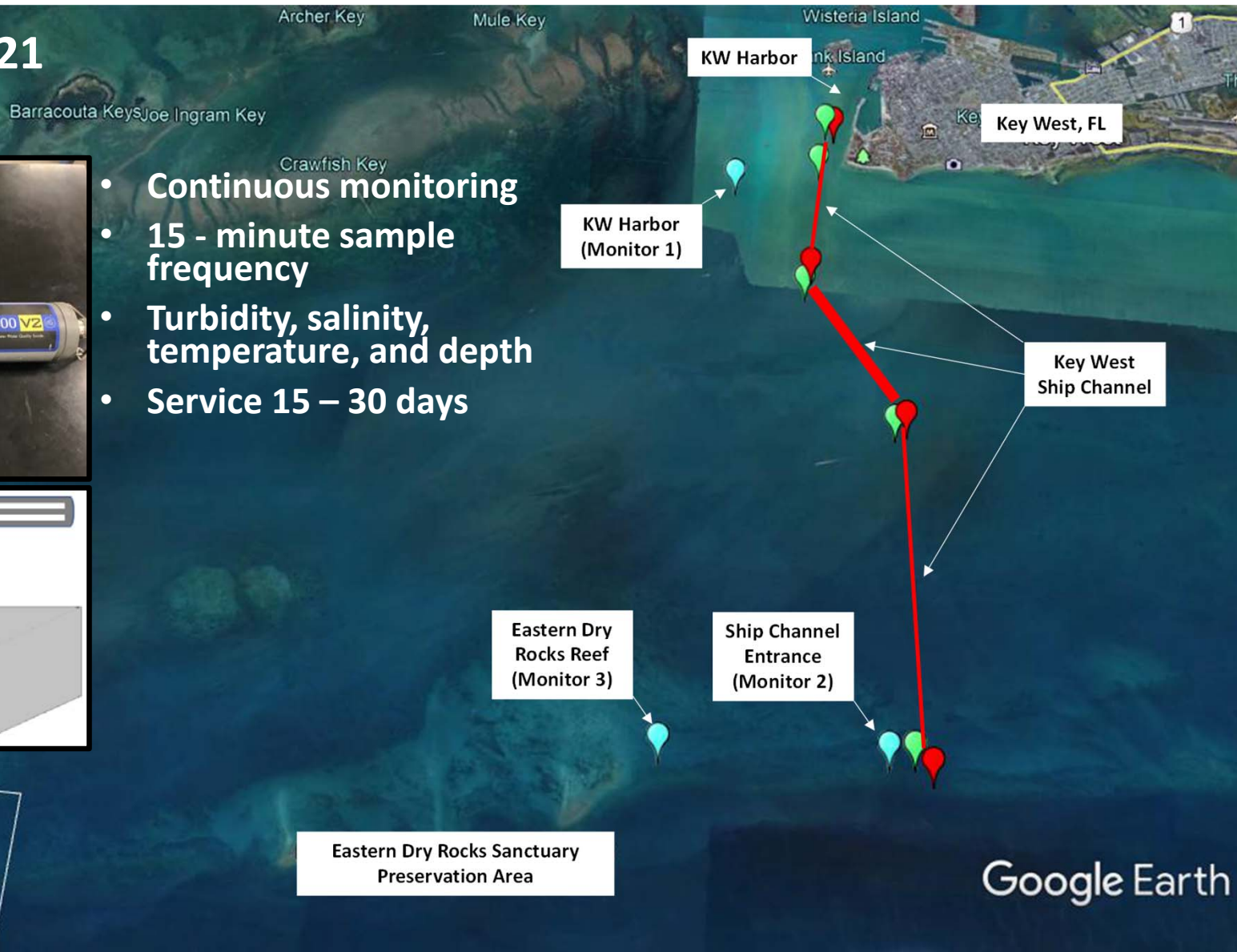
Google Earth

- Summer 2021
- Fall 2021



Western Dry
Rocks Reef
(Control)

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



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

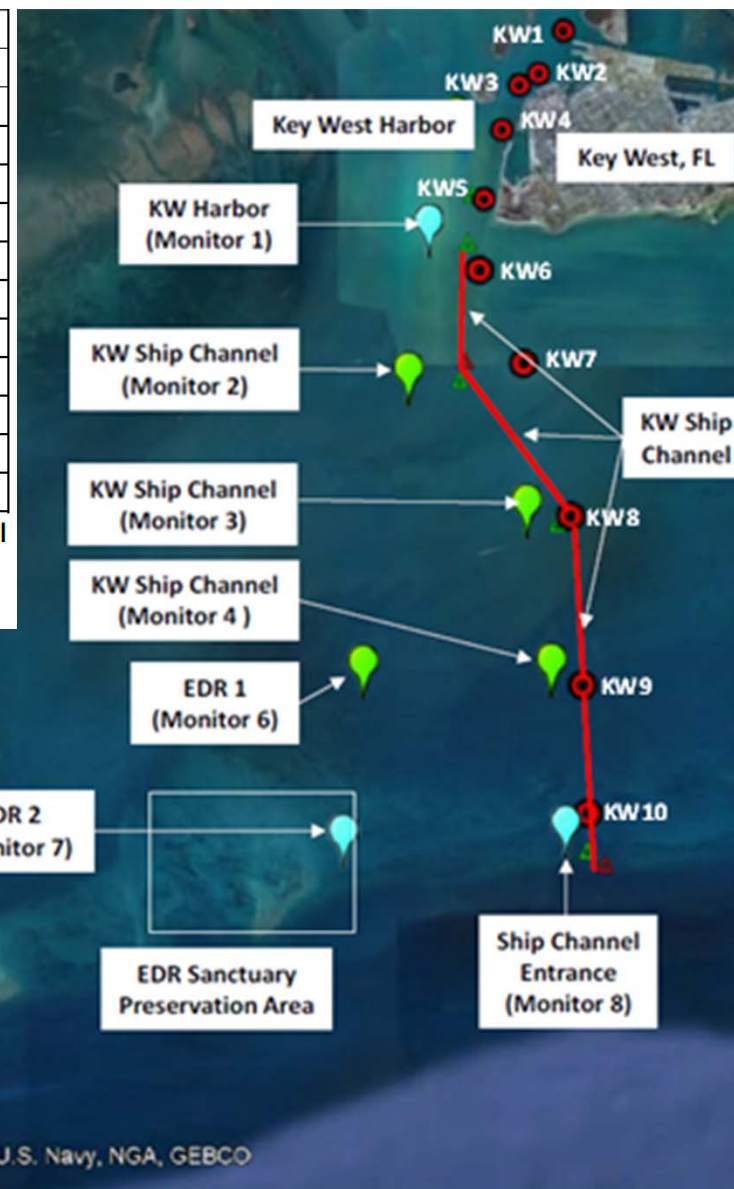


Table 2. FIU Water Sample Lab Analysis

| |
|---|
| 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

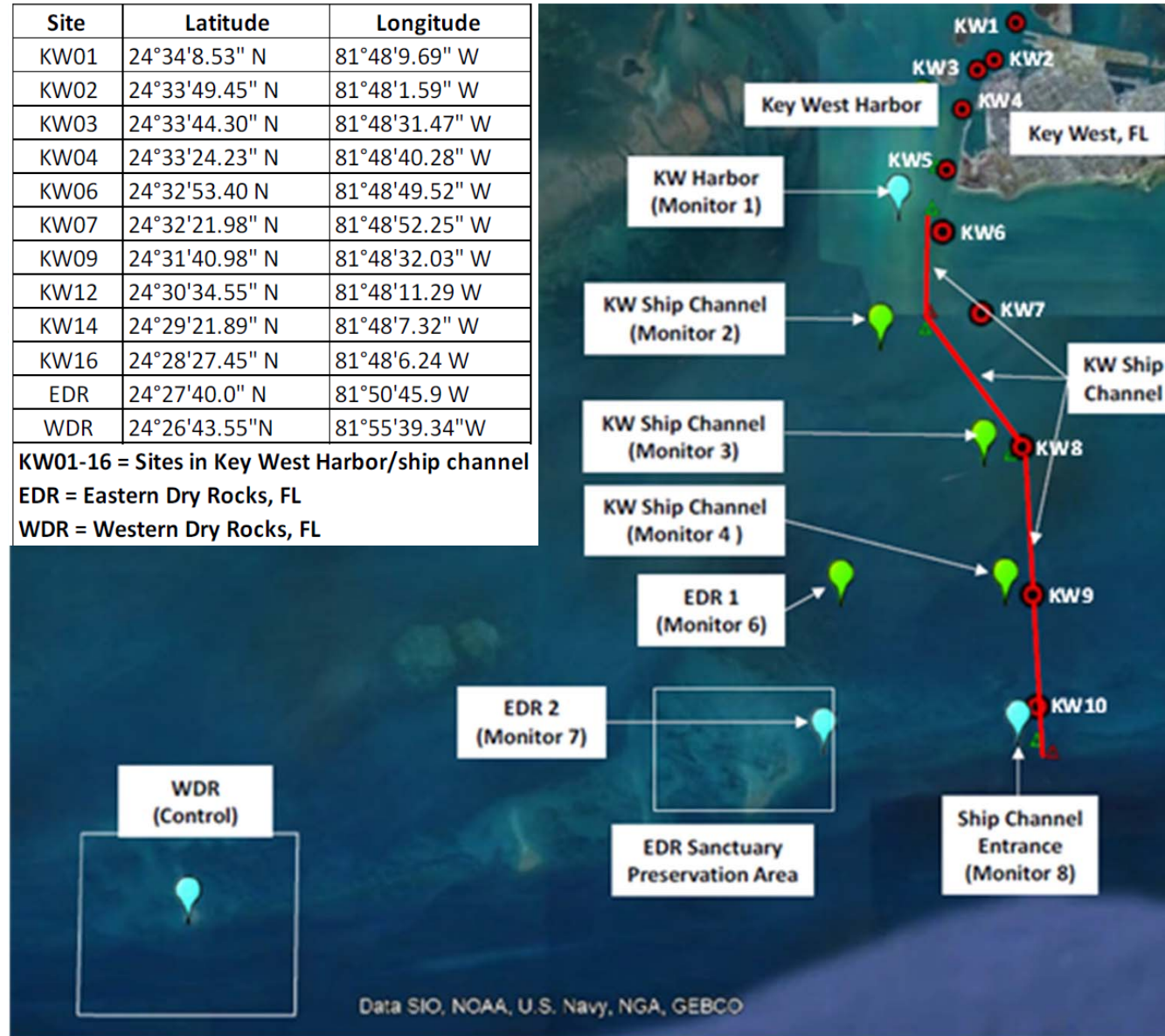
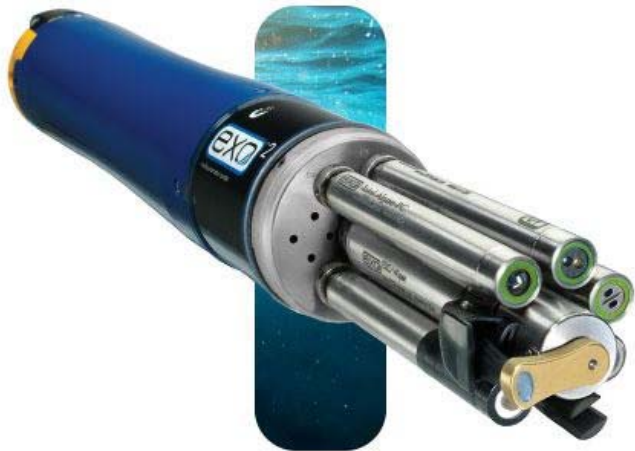
- Awarded KWWQ Project from EPA
- Double YSI sensor coverage
- Creates an array to track water quality changes from disturbances in the Key West harbor and shipping channel

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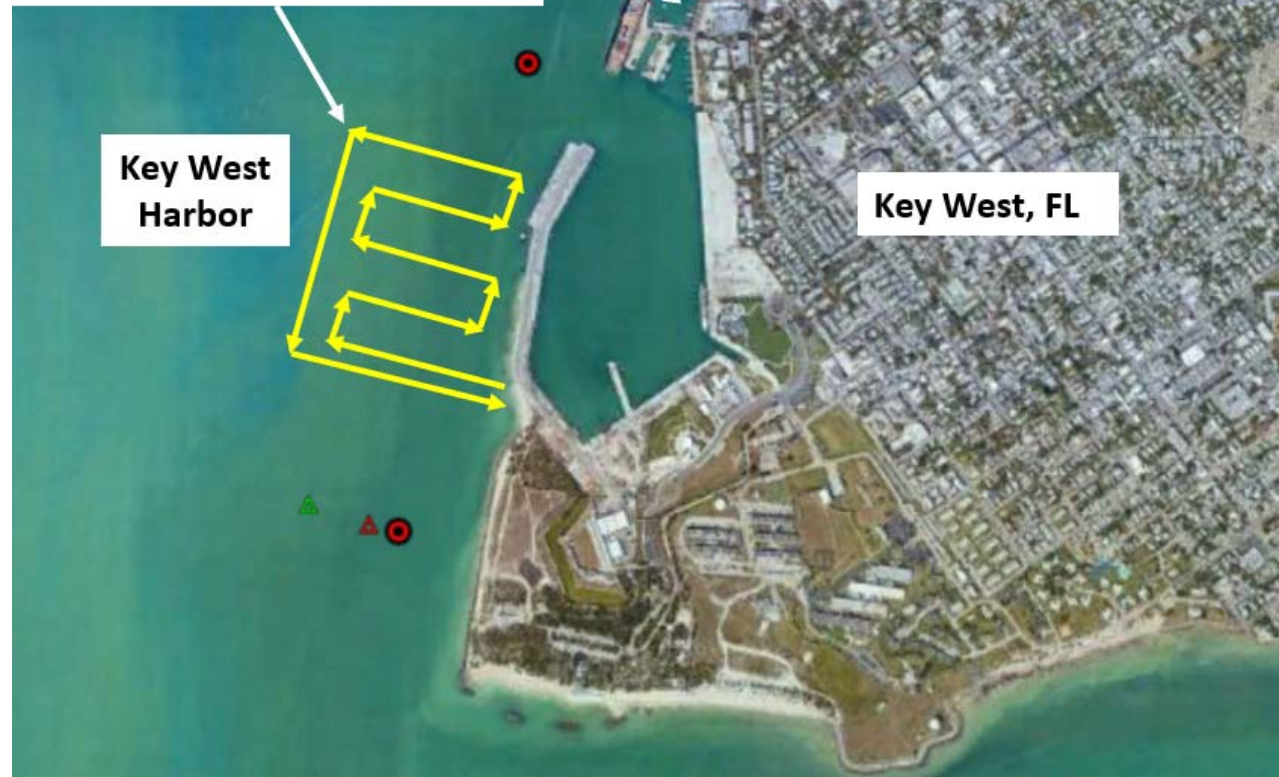


Summer 2022

- 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)

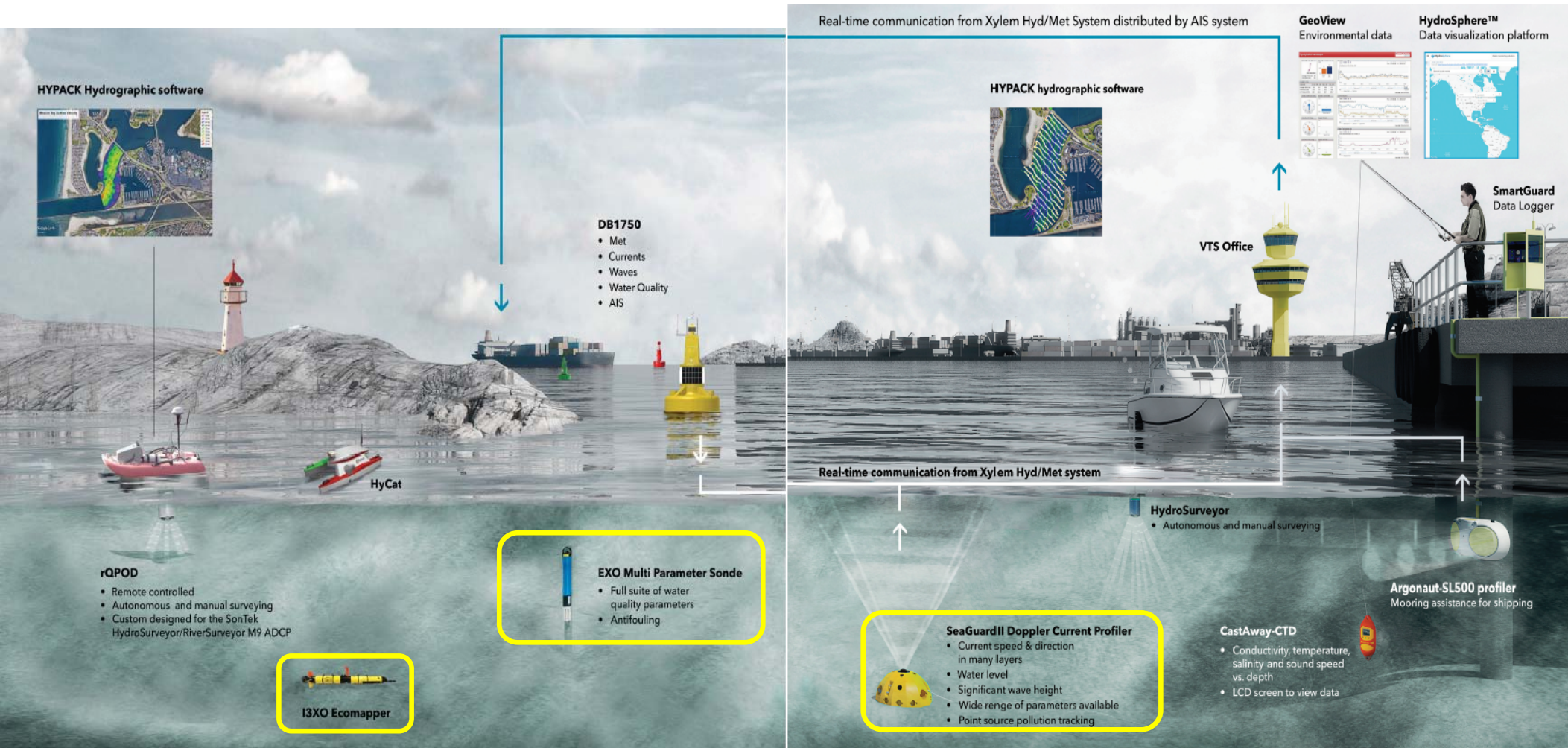


Gaps in Water Quality Monitoring

- 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