

Water Quality Protection Program
Technical Advisory Committee Meeting
14 July 2016

NPS

Everglades, Biscayne Bay and Dry Tortugas National Parks
Report of Monitoring in Marine National Parks to WQPP

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786-650-5069

Measures:

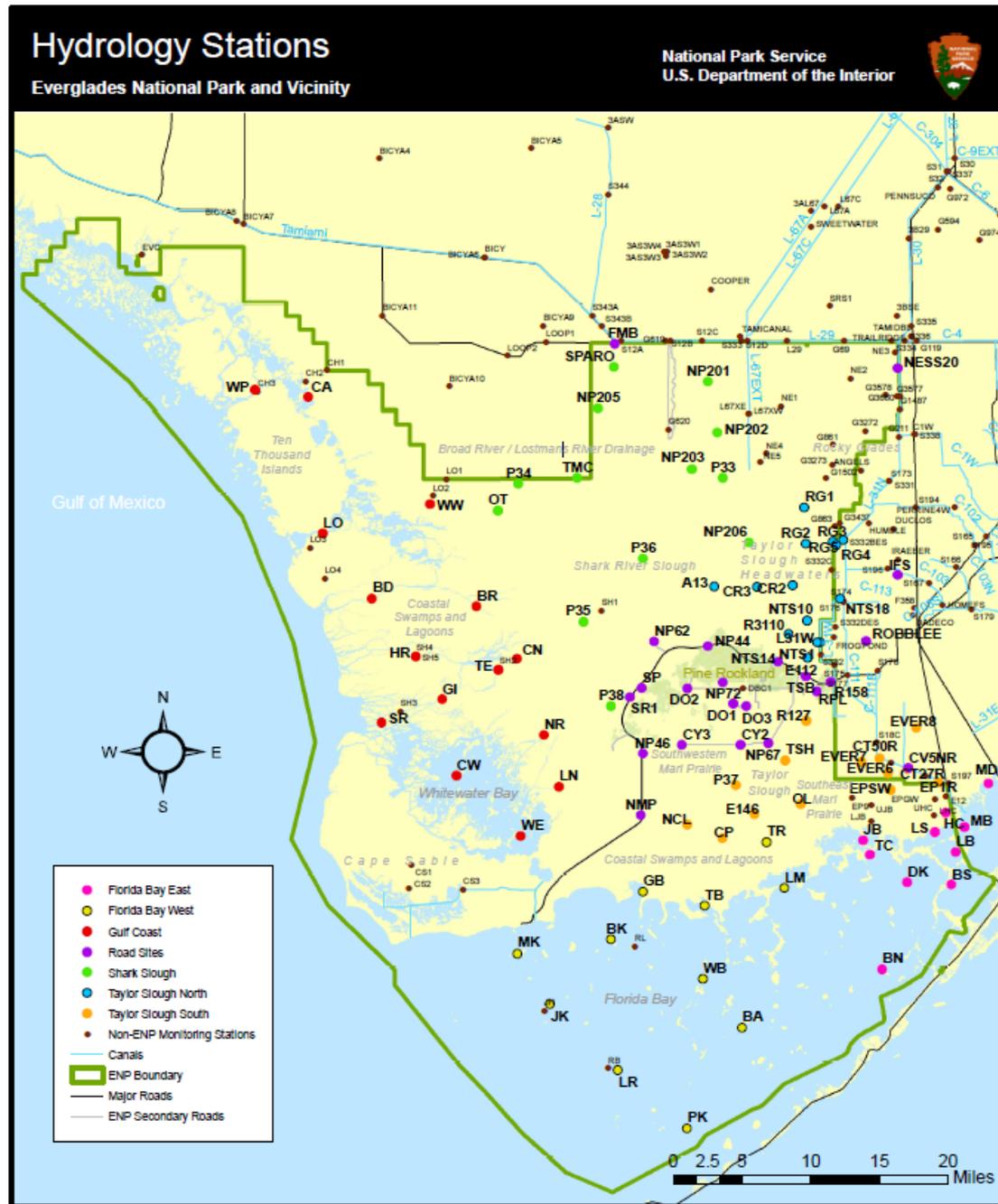
- Stage and precipitation-Marsh (67)
- Water Quality-Marsh
- Marine Monitoring Network (17) in Florida Bay (stage, precipitation, conductivity/ salinity, temperature, dissolved oxygen, chlorophyll a, pH, turbidity)

Goals:

- Monitor quality, amount and timing of water through the Everglades and in Florida Bay and detect ecological changes.

Objectives:

- Freshwater levels/precipitation for Shark River slough, Taylor Slough and roadside stations
- Water quality nutrient levels- Freshwater
- Water quality parameters- Marine



NPS Everglades National Park – Hydrological Monitoring of the Everglades and Florida Bay

Duration: 1952 -2016 (Marsh)

1989-2016 (Marine)

Sampling: Continuous in real time via telemetry

Agencies:

- NPS Everglades National Park
- USGS
- SFWMD

Summary:

- Increasing salinity trend in the bay from 1996 through 2009, with the most pronounced increases in the Central and East bay.
- Continuous Florida Bay monitoring alerted us to the 2015 seagrass dieoff within days to weeks of initiation.

Database site:

- Everglades National Park
SFNRC **DataForEver**
Database Portal <https://mink/>



Duration: 1989-2016

Sampling:

- Monthly until 2011 then switched to every other month. Switched to monthly again beginning May 2016.
- Initially ?? stations (1989-2004); reduced to ~25 FB marine stations (2005-2016).

Agencies:

- SFWMD

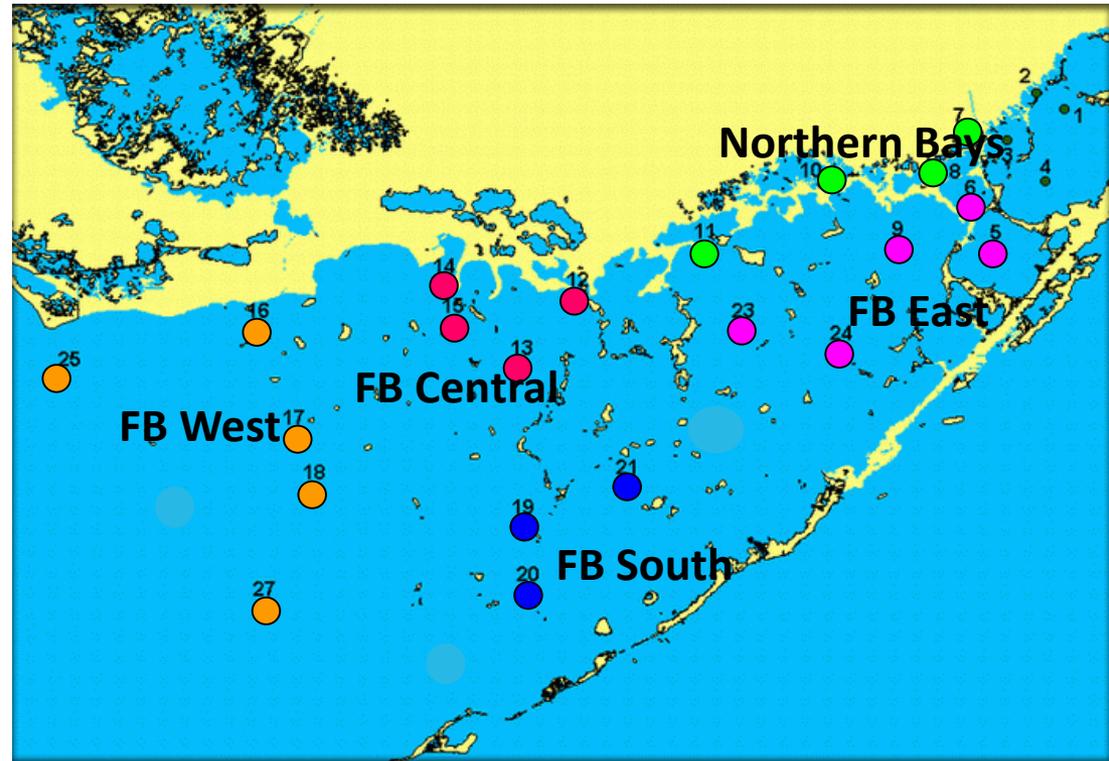
Measures:

Water quality parameters:
Chl-a, NO_x, NO₂, NH₄, TN, TOC,
TPO₄, OPO₄, TSS, Turbidity,
Conductivity, Temperature, pH,
Dissolved oxygen, Secchi depth

Database site:

- SFWMD: DBHYDRO Database

http://my.sfwmd.gov/dbhydroplsql/show_dbkey_info.main_menu

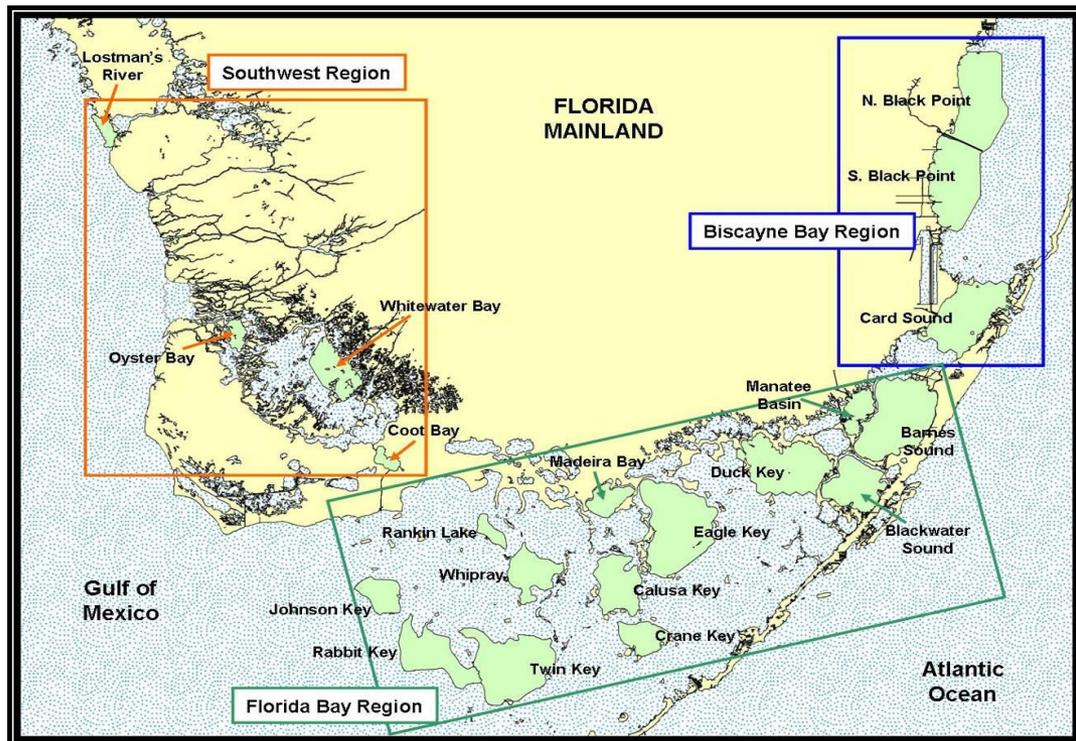


CERP-RECOVER Program
(Monitoring and Assessment Plan)
Southern Coastal Systems Benthic Habitat Measures:

- Seagrass distribution and abundance by BBCA, modified Braun-Blanquet cover-abundance index (% cover).
- Seagrass reproductive status, epiphyte loads, and biomass.

Goals:

- Monitoring to measure responses of the South Florida ecosystem to CERP implementation.
- Establish reference conditions and variability.
- Determine status and trends.
- Detect unexpected responses of the ecosystem to changes in stressors resulting from CERP activities



Sampling:

- 10 basins in Florida Bay, partitioned into 30 grid cells for random sampling.
- 15 permanent transects.
- Seagrass distribution and abundance and changes in abundance are estimated using the geostatistical gridding method of kriging.
- Planar areas for each cover class are calculated.

NPS Everglades National Park – Fisheries Habitat Monitoring of Florida Bay

Objectives:

- to understand relationships among salinity, water quality and SAV distribution and abundance in south Florida,
- to provide data to separate human-induced changes from natural ecosystem variation
- to verify model predictions on species-level and ecosystem-level responses to system perturbations.

Duration:

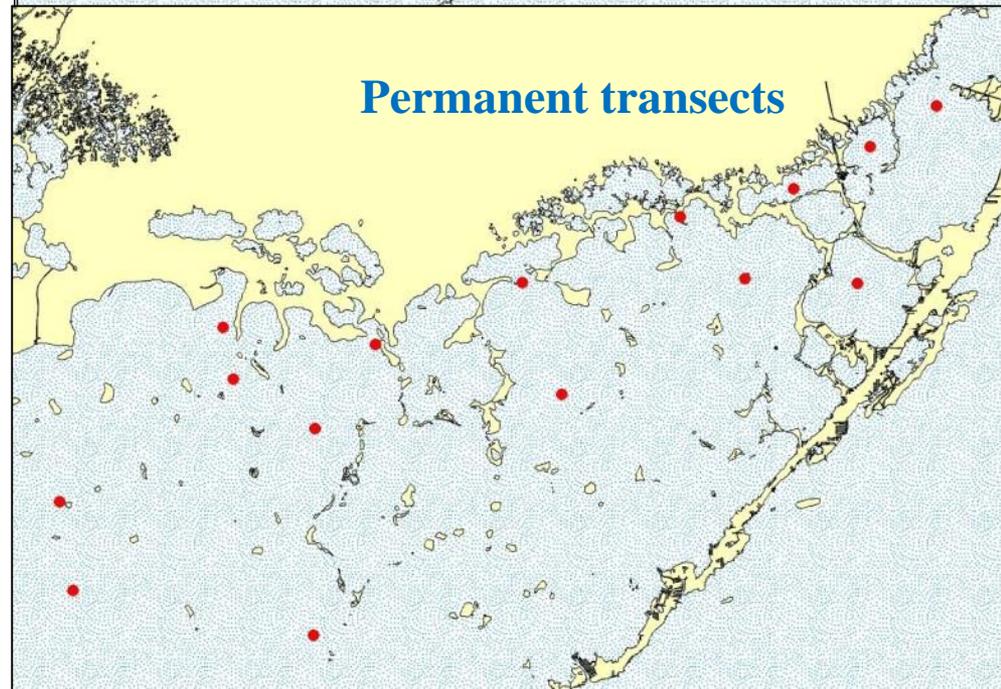
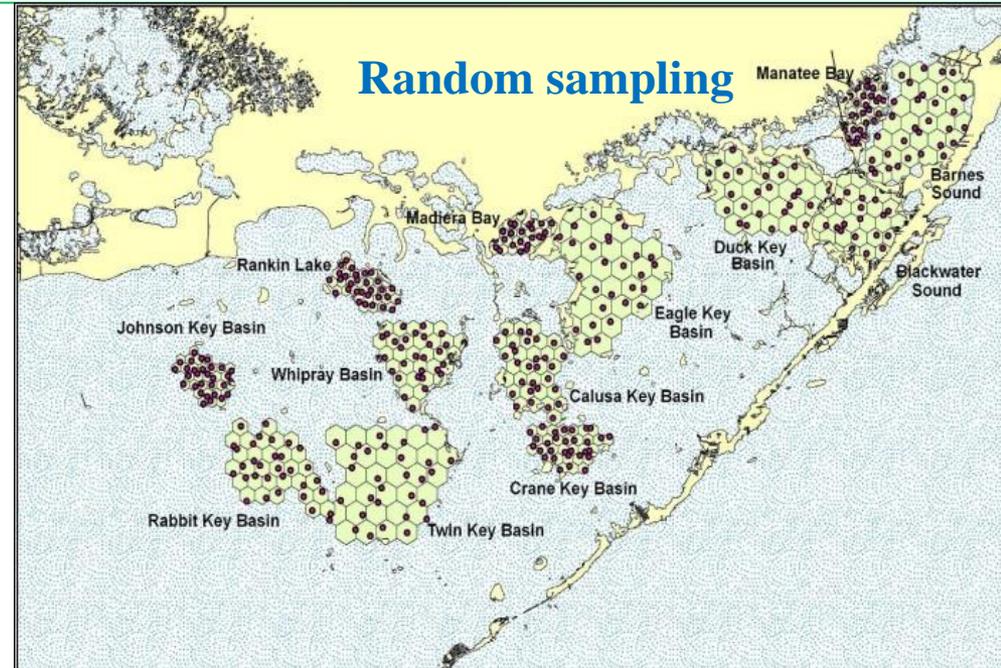
- FHAP began in 1995, continues under the RESTORE program
- FHAP sampling = 2x/year, spr/fall

Agencies:

- FWC FWRI St Petersburg
- SFWMD

Reference:

- CERP Monitoring and Assessment Plan Annual Report 5 – June 28, 2016 Project Title: South Florida Fisheries Habitat Assessment Program (FHAP-SF)



NPS Everglades National Park –Biscayne Bay Salinity, SAV, Higher Trophic Level Monitoring

CERP-RECOVER Program

(Monitoring and Assessment Plan)

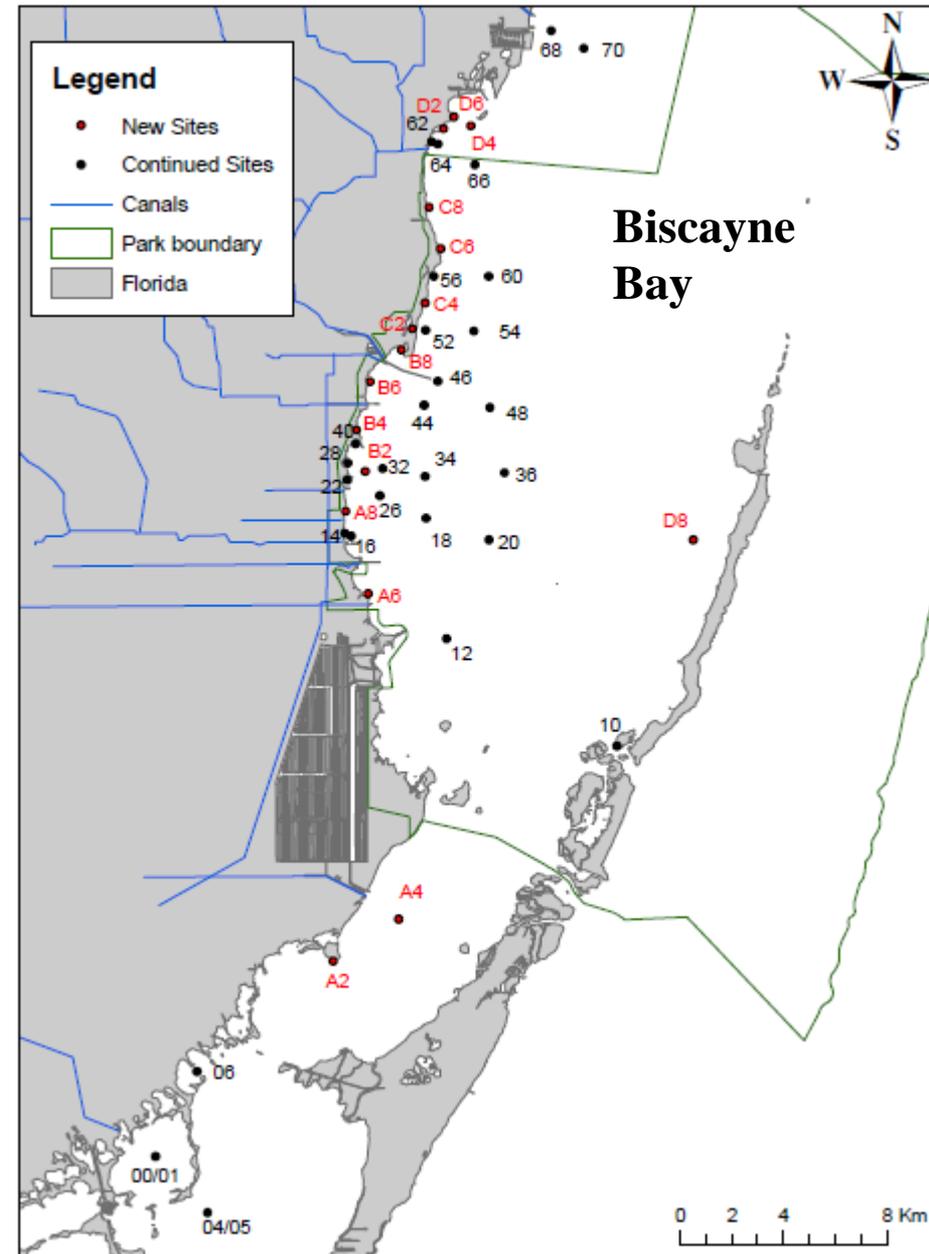
Southern Coastal Systems –IBBEAM, DERM

Measures: Salinity, temperature and depth.

Nearshore SAV, Alongshore Epifauna, and Mangrove Fish

Goals:

- Restoration goal for salinity is to reestablish a more natural estuarine salinity gradient from nearshore to offshore by returning to a more diffuse runoff pattern.
- Restoration goals for SAV include a more diverse seagrass community with greater spatial coverage of seagrass beds containing mixed species.
- Restoration goals for higher trophic levels include enhanced function of the SCS as nursery grounds for fishery species, and increasing the diversity and density of fish and invertebrate assemblages along the mangrove shorelines of the SCS.



Specific Objective:

- To reestablish a more mesohaline nearshore salinity regime to support natural diversity and abundance of SAV, fish and invertebrates in nearshore habitats.

Sampling:

- 47 NPS stations (continuous data) for salinity and temperature. 47 co-located biotic sampling sites.
- DERM salinity and SAV stations sampled monthly.

Duration:

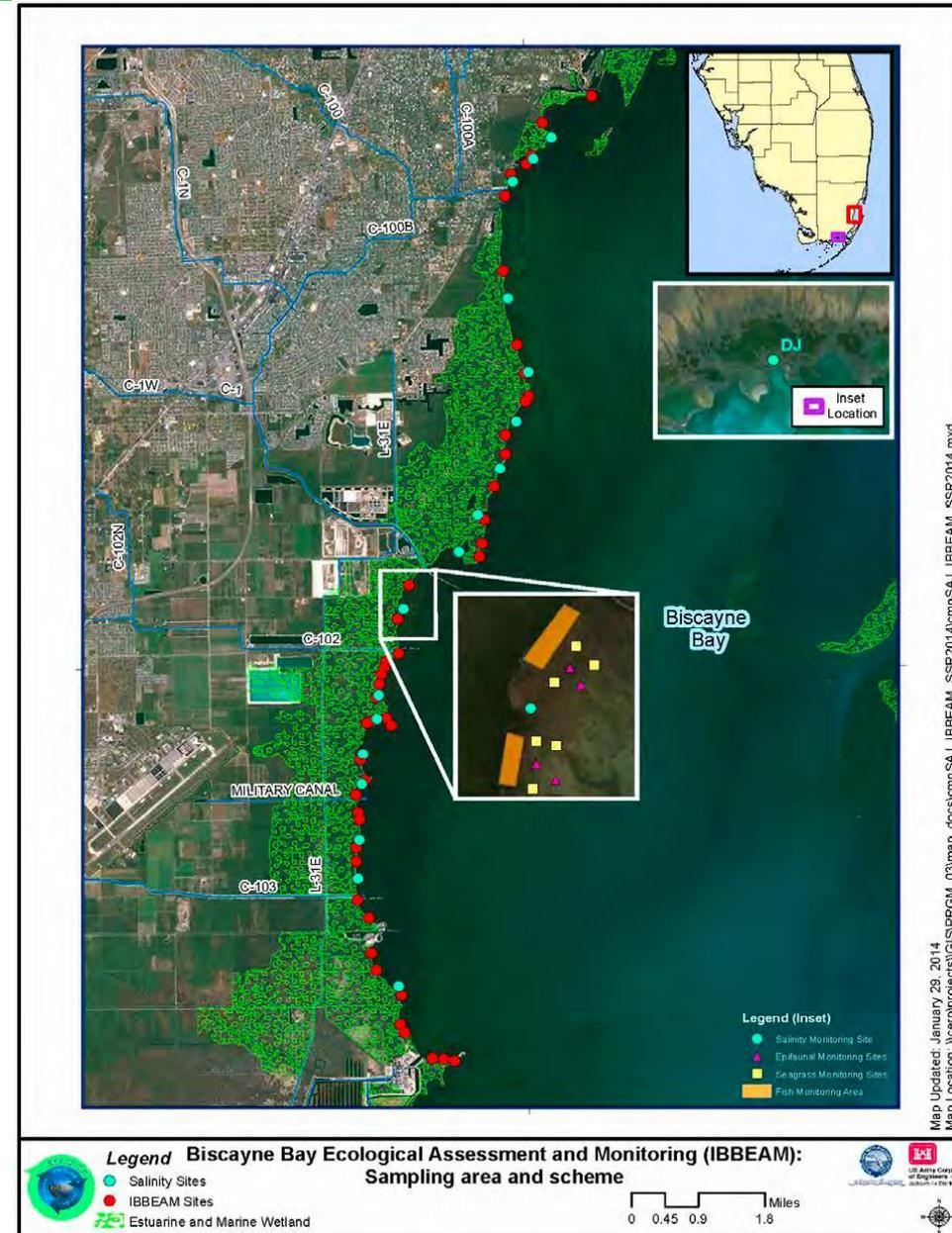
- NPS stations 2004 (2010)-2016
- Miami-Dade DERM 1999-2016

Agencies:

- NPS, NOAA, UMiami, Miami-Dade DERM

Web links to databases and reports:

- **DataForEver** Database Portal
<https://mink/>
- CERP Southern Coastal Systems 2014 System Status Report



NPS Everglades National Park –Biscayne Bay Water Quality (CERP-MAP)

Specific Objective:

- To compare water quality TN, TP and chlorophyll-a in relation to 2012 numeric criteria.

Agencies:

- Miami-Dade DERM
- SFWMD

Web links to report:

- CERP Southern Coastal Systems 2014 System Status Report

Summary Years 2009-2012: Based on AGM (Annual Geometric Mean)

AGM for Total Phosphorus Concentration (mg/l)									
Bay Region	MBS	CS	SCI	SCM	SCO	NCI	NCO	SNB	NNB
Criterion	0.007	0.008	0.007	0.007	0.006	0.007	0.008	0.01	0.012
2009	0.002	0.002	0.003	0.002	0.002	0.003	0.003	0.003	0.005
2010	0.003	0.003	0.003	0.002	0.003	0.003	0.003	0.004	0.005
2011	0.003	0.002	0.003	0.003	0.002	0.003	0.002	0.004	0.005
2012	0.003	0.003	0.003	0.002	0.002	0.003	0.003	0.005	0.006

AGM for Total Nitrogen Concentration (mg/l)									
yr	MBS	CS	SCI	SCM	SCO	NCI	NCO	SNB	NNB
Criterion	0.58	0.33	0.48	0.35	0.24	0.31	0.28	0.29	0.3
2009	0.13	0.31	0.30	0.16	0.13	0.18	0.15	0.16	0.17
2010	0.11	0.27	0.30	0.13	0.10	0.13	0.09	0.11	0.14
2011	0.18	0.29	0.27	0.17	0.15	0.19	0.15	0.12	0.15
2012	0.15	0.23	0.34	0.18	0.14	0.16	0.15	0.14	0.17

AGM for Chlorophyll-a Concentration (ug/l)									
Bay Region	MBS	CS	SCI	SCM	SCO	NCI	NCO	SNB	NNB
Criterion	0.4	0.5	0.4	0.2	0.2	0.5	0.7	1.1	1.7
2009	0.51	0.31	0.31	0.22	0.26	0.53	0.47	0.73	1.36
2010	0.66	0.47	0.49	0.35	0.35	0.51	0.68	0.87	1.74
2011	0.66	0.34	0.47	0.31	0.25	0.42	0.51	0.85	1.61
2012	0.70	0.38	0.46	0.28	0.24	0.46	0.48	0.88	1.65

Bay Regions: BSMB=Barnes Sound-Manatee Bay; CS=Card Sound; SCI=South Central Inshore; SCM=South Central-Mid; SCO=South Central Outer; NCI=North Central Inshore; NCO=North Central Outer; SNB=Southern North Bay; NNB=Northern North Bay

= Region is compliant with Numeric Nutrient Criteria Standard
 = Region is not compliant with Numeric Nutrient Criteria Standard

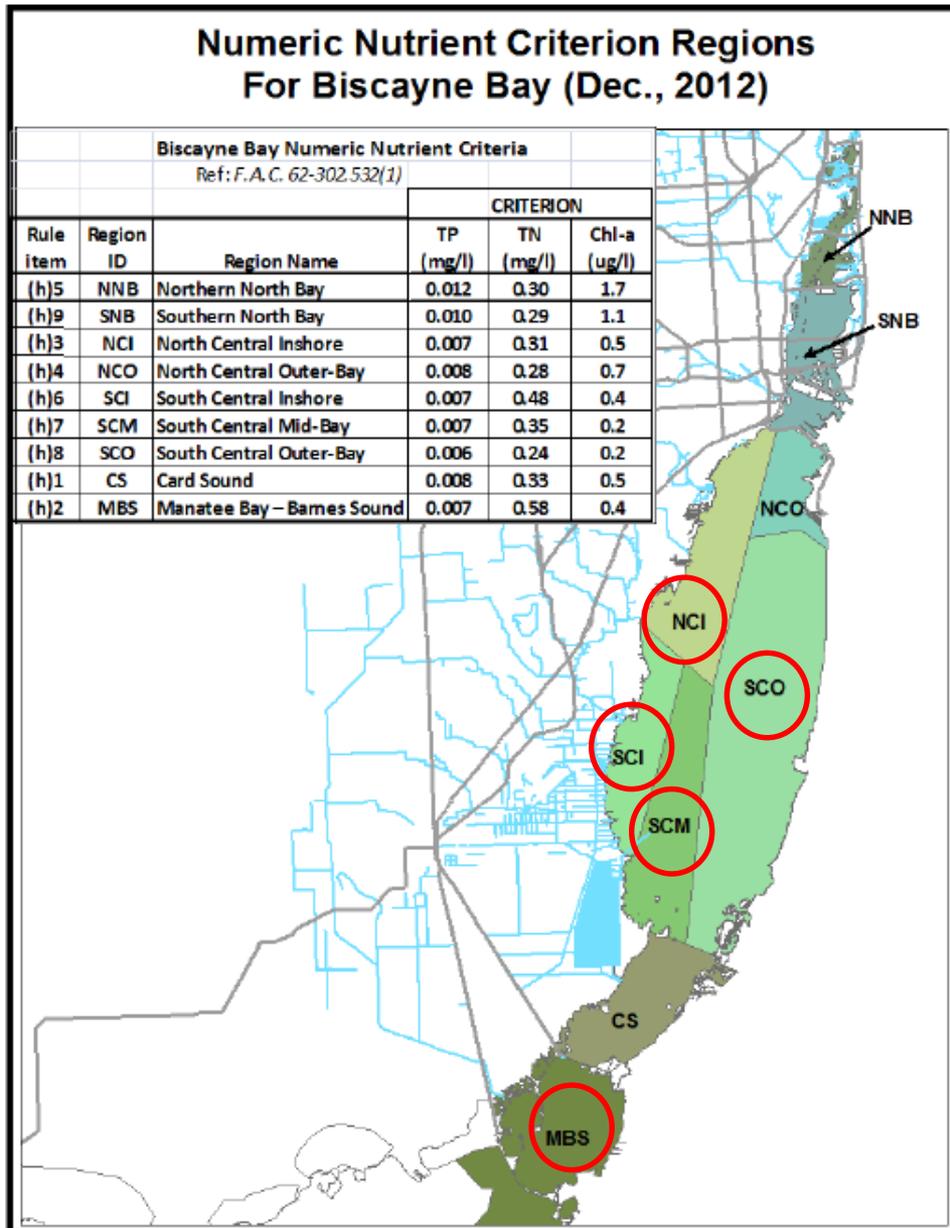


Figure 7-19. Nine Biscayne Bay Numeric Nutrient Criteria indicator regions and their associated numeric criteria. (ug/L – microgram per liter.)

NPS Everglades National Park – CERP-MAP Biscayne Bay

Summary of results or observed trends:

- Analyses suggest impairment in the nearshore salinity regime in comparison to desired conditions.
- The occurrence of *H. wrightii* and *T. testudinum* in the study domain remained largely stable over the POR.
- A gradual declining trend in gulf pipefish abundance was observed, whereas no clear trend in the other taxa was apparent over the POR.
- Biscayne Bay's current nearshore environment does not constitute the mesohaline habitat that CERP seeks to reestablish. The littoral zone is currently occupied by floral and faunal species assemblages operating below productive potential. In part, this is due to inadequate and unnatural freshwater flows that limit the duration and spatial extent of mesohaline conditions, limiting the abundance of species characteristic of south Florida estuaries.
- Water quality for 2009-2012 TN and TP compliant. Chl-a high in southern Biscayne Bay due to three bloom events.

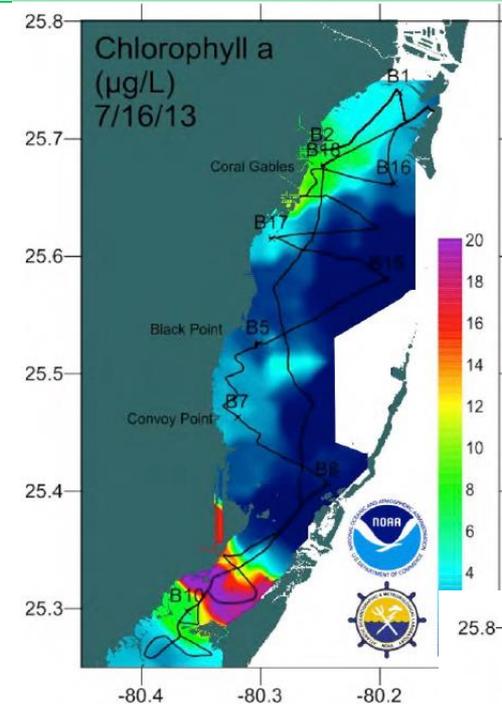


Figure 7-20. Chla concentrations in Biscayne Bay on July 16, 2013. The black line shows the survey's boat track of continuous-flow water quality analysis.

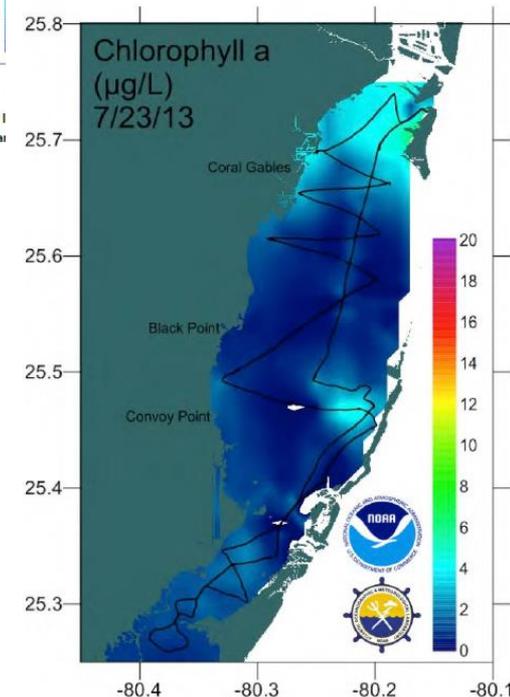


Figure 7-21. Chla concentrations in Biscayne Bay on July 23, 2013. The black line within the bay shows the survey's boat track of continuous-flow water quality analysis.

NPS Everglades National Park –Fish Monitoring of the Dry Tortugas (DRTO)

- **Reef Visual Census (RVC)**

Measures: Fish & Benthic sampling

- Spatial comparisons
- Life history stage
- Diversity

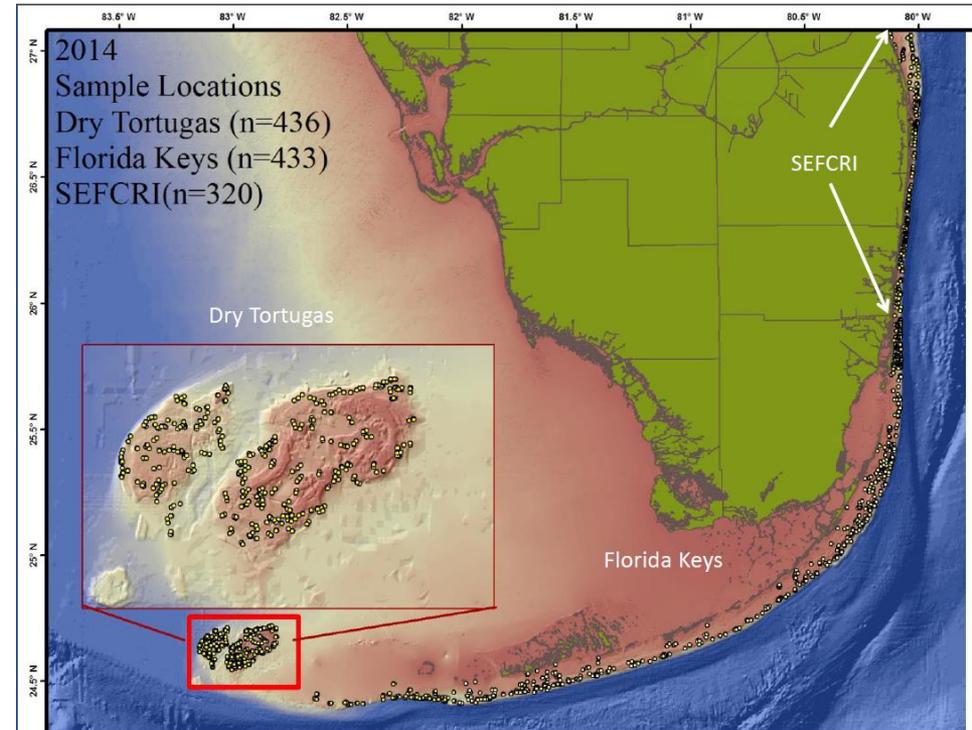
Metrics: Percent occurrence, density, relative abundance, species richness, length frequency, biomass

Goals:

- Coral reef fisheries-independent monitoring
- Linking reef fish spatial abundance & benthic habitats

Objectives:

- Status and trends of DRTO coral reef fish communities.
- Fisheries assessment-DRTO reef gamefishes (groupers and snappers).
- Evaluate the conservation efficacy of the Research Natural Area (RNA) as a no fishing marine reserve (January 2007).



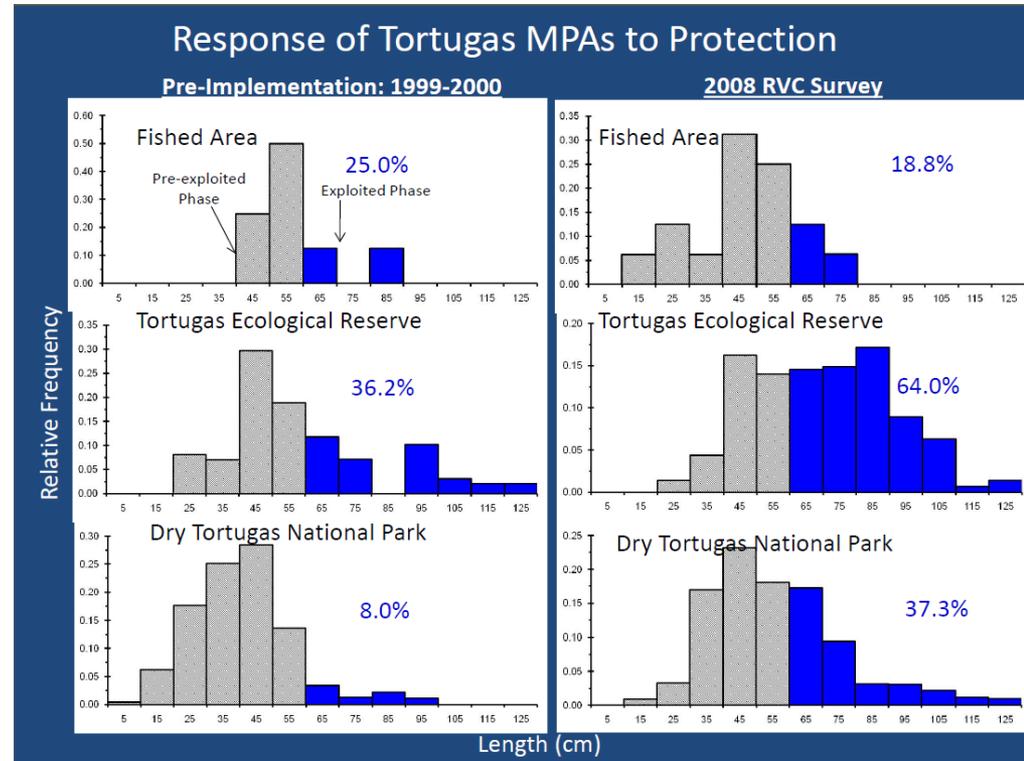
Duration: 1999-2016 Annually or every other year(?)

Agencies: U Miami (RSMAS)
FDEP (FWC)
NOAA (SFSC)
NPS (DRTO and SFCN)

- **Reef Visual Census (RVC)**

Summary:

- DRTO accounts for one-third to one-half of the adult spawners of principal gamefishes in the southern Florida reef ecosystem (black grouper, red grouper, mutton snapper, and yellowtail snapper), and this proportion has generally increased from 1999 to 2010.
- DRTO contains a greater number (62-93%) of juveniles of principal fishery species than other areas in the Tortugas region.
- “Assessment of Coral Reef Multispecies Fishery Resources and RNA Performance in Dry Tortugas National Park, 1999-2018”



Web links:

<http://femar.rsmas.miami.edu/rvc.html>

<http://floridakeys.noaa.gov/sac/othermaterials/20150616rvc.pdf>

https://www.nps.gov/ever/learn/nature/upload/DRTO-Science-Plan_Sept152015.pdf

NPS Everglades National Park –Reef Monitoring of the Dry Tortugas (DRTO)

• Coral Reef Monitoring (CREMP)

Measures:

- Overall net change in stony coral percent cover and stony coral species richness
- Overall net change in measurable reef community parameters
- Changes observed in individual reef communities or changes linked to specific regions of the landscape

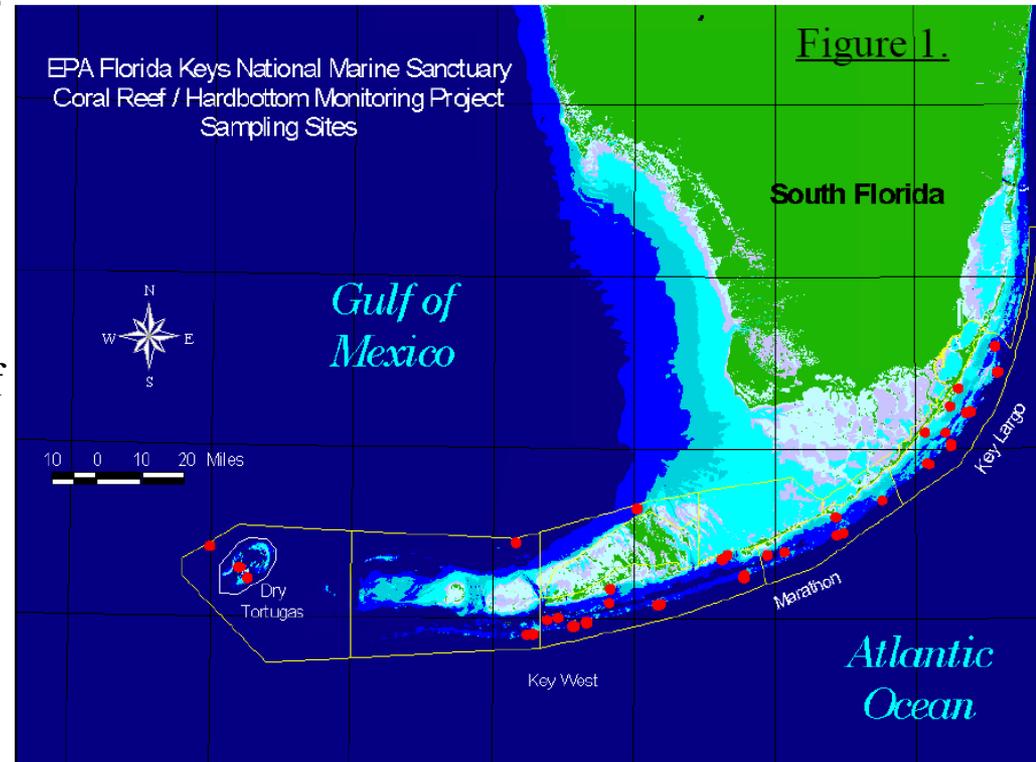
Goals:

- Status of reef habitats at 148 stations in 40 reef sites in the Florida Keys National Marine Sanctuary

Objectives within DRTO:

- conduct benthic surveys in the Park
- report on the health of *Acropora* populations (federally listed species)
- conduct surveys near mooring balls to determine diver-related impacts

Duration: 1996-2016



Sampling: Annual & Quarterly surveys

Agencies: FWC (FWRI)

Summary:

Stony coral has shown little recovery since 1999
Octocoral cover increased consistently from 2000 to 2014

Reference website:

http://ocean.floridamarine.org/fknms_wqpp/page/s/cremp.html