FLORIDA COASTAL EVERGLADES LTER
FCE IV YEAR TWO ANNUAL REPORT
FOR NSF AWARD DEB- 2025954


View of Shark River, Everglades from the tower at FCE site SRS-6. Photo: Lukas Lamb-Wotton

Reporting Period: 3/1/2022 – 12/15/2022

Submitted December 2022

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This material is based upon work supported by the National Science Foundation through the Florida Coastal Everglades Long-Term Ecological Research program under Cooperative Agreements DEB-2025954, DEB-1832229, DEB-1237517, DBI-0620409, and DEB-9910514. Any opinions, findings, conclusions, or recommendations expressed in the material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

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Accomplishments

Major goals of the project

Since 2000, the Florida Coastal Everglades Long Term Ecological Research (FCE LTER) program has been revealing how the accelerating rate of sea-level rise interacts with climate variability and freshwater management to shape gradients of coastal ecosystem production, the movement of energy through food webs, and the value of ecosystem services to growing human populations. FCE long-term data, experiments, and models have shown rapid-paced changes associated with sea-level rise, extreme events, and freshwater flow diversion, threatening the persistence of vegetated habitat, dependent food webs, significant below-ground carbon pools, and associated ecosystem services. Everglades restoration is increasing seasonal freshwater pulses while a 2017 hurricane delivered a storm surge pulse to the FCE, offering an unprecedented landscape-scale test of the overarching question: **Will increased pulses of fresh and marine water and their associated resources maintain vegetated coastal ecosystems supporting highly connected food webs and valued ecosystem services while sea-level continues to rise?** The FCE IV conceptual framework integrates theoretical concepts of 'ecosystem development' and 'pulse dynamics' to understand how social-ecological responses to increasing climate variability and extremes depend on the magnitude, timing, and duration of these 'pulses' and their interaction with other persistent changes ('presses'). Four hierarchical research questions ask: (1) how the climate drivers of hydrologic presses and pulses are changing, (2) how governance of freshwater restoration reflects changing values of ecosystem services, (3) how ecological landscapes serve as endogenous filters that feed back to the climate system, and (4) how ecosystem structural and functional responses influence long-term ecosystem trajectories. These questions will be addressed through continued long-term and new data collection along two transects with contrasting hydrologic presses and pulses, human dimensions research, a new ecosystem vulnerability experiment, process and landscape-scale modeling and scenarios approaches, and a large suite of collaborative projects sponsored by leveraged funding.
The proposed research expands the ecological disturbance theory through the integration of ecosystem development and pulsed dynamics. Social-ecological systems are linked by disturbance, disturbance may change system vulnerability to other environmental drivers, and feedbacks between ecosystems and disturbance drivers can influence trajectories of ecosystem development. The proposed research predicts that freshwater restoration will reduce the effects of sea-level rise and saltwater intrusion (a hydrologic press), and that hydrologic pulses (freshwater and marine) will control resource distribution and the long-term trajectories of coastal ecosystems and services. Freshwater restoration provides a landscape-scale test of how social-ecological systems are coupled in coastal regions exposed to accelerated sea-level rise and extreme events. Synthesis efforts will focus on comparative national and international research fostered to understand how chronic presses and increasing pulses determine ecosystem trajectories, addressing one of the most pressing challenges in contemporary ecology.

Major Activities

Climate Variability & Change
We published on the impacts of climate change and water management on the coastal ocean dynamics of the west Florida shelf. We continued analyses on 100 years of monthly precipitation for 23 Florida stations to identify long term trends, links to natural modes of variability, and possible influence of urban heat island effects.

Hydrologic Connectivity
We continued quantifying how pulses of fresh and marine water influence water level, inundation duration, groundwater-surface water exchange, and saltwater intrusion in surface and subsurface. We continued to collect rainfall and water levels at each of the Shark River Slough (SRS) and Taylor Slough (TS/Ph) sites (n = 14) and quantified long-term fluxes of salinity in both transects. We analyzed long-term tide gauge records and Sediment Accretion Rate (SAR) estimates to evaluate the resiliency of the coastal mangrove region to an accelerating rate of sea level rise. We continued to use remote sensing techniques to monitor changes in water levels.

Social Landscape

Water Governance/Cultural & Economic Values: We published syntheses on design in Miami resilience, hosted a public workshop on disaster preparedness in the Everglades, and conducted site observations and surveys of stakeholders. We completed a review of ecosystem services valuation related to Everglades restoration and developed an economic analysis framework of ecosystem service benefits of restoration, including an economic survey of anglers fishing in Lake Okeechobee.

Ecological Landscape

Vegetation & Geomorphic Gradients: We developed a method to detect vegetation change patterns using a combination of stereo-photo interpretation and passive and active remote sensing data analysis. We modeled historic landward creek expansion of the coastal creek network (1952 - 2018), improved hydrologic models to understand geomorphic gradients and vegetation dynamics, and expanded elevation bias estimate models for graminoid marsh and prairie communities to model finer-scale hydrologic connectivity in the Everglades.

Vegetation Dynamics: We continued to map high resolution plant communities using satellite and airborne LiDAR canopy structure metrics, including the saline mangrove-freshwater ecotone, started woody vegetation mapping throughout the Everglades, and collected a third set of marsh vegetation data to analyze effects of hydrologic restoration. We are using fine-scale sawgrass biomass, salinity, depth, and elevation measurements to detect and verify patterns illustrating coastal vulnerability. We worked to calibrate the BISECT model to simulate changes in water level, hydroperiod, groundwater and surface water salinity and project changes due to water management and sea level rise.

ECOSYSTEM STRUCTURE & FUNCTIONS

Abiotic Resources & Stressors: We continued high frequency water quality data and conducted our annual surface soil survey at all FCE sites.

Detritus & Microbes: We quantified long-term changes in dissolved and particulate organic matter and associated microbial communities along gradients of salinity and P and continued to collect monthly water samples from SRS and TS/Ph sites (n = 14) for quantifying dissolved organic carbon (DOC) concentrations, dissolved organic matter (DOM) fluorescence characteristics. We collected quarterly samples of DOM structural and isotopic composition, and breakdown rates of particulate organic carbon (POC). We have also characterized microbial communities in water column and associated with various POC components (leaf litter, periphyton, soil, and sediments).

Vegetation: We used long-term observations in marsh, mangrove, and seagrass ecosystems and periphyton communities, manipulative experiments, and state-of-the-art remote sensing to understand landscape vegetation (above- and belowground) and C dynamics (vegetation and soil) in response to environmental drivers. We quantified inorganic C rates from artificial substrates to understand water and P pulses on periphyton contributions to marl soil accretion. We measured long-term water level, sawgrass productivity, and water quality (including salinity) in marshes. We established an experiment to evaluate adaptive capacity of salinizing marl-forming marshes. We continued evaluating the long-term effects of Hurricane Irma on mangrove total (Litterfall + Wood Production) Net Primary Productivity (NPP) rates and resilience of forested wetlands to hurricanes. We assessed long-term changes in aboveground biomass (AGB) and wood production in response to hurricanes. We continued measuring NPP rates of scrub mangroves. We used NASA G-LiHT airborne data before (Mar 2017) and after (Dec 2017, Mar 2020) Hurricane Irma to capture the immediate impacts and mangrove recovery. Using time series canopy height models, we quantified changes in canopy height regrowth according to height and species classes.

Consumers: We characterized food web structure and function using stable isotopes to examine spatiotemporal trends in production sources related to hydroclimatic drivers. Stable isotope data from 2019 provided a baseline for food web structure and production sources (green vs. brown food webs). Samples from 2020-2022 are being processed.

We continued long-term (2004-2022) electrofishing of freshwater prey and consumer abundances (**Figs. 1-2**) and continued long-term sampling of Bull Shark abundance (and other consumers) via long line sampling.

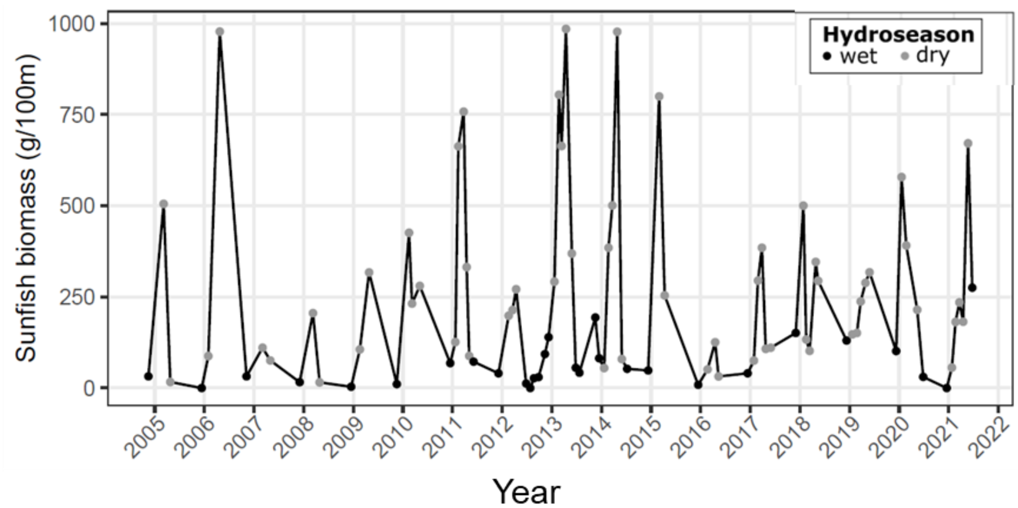


Figure 1. Long-term biomass of sunfishes (*Lepomis* spp.) at the SRS ecotone across wet and dry seasons for 2004-2021.

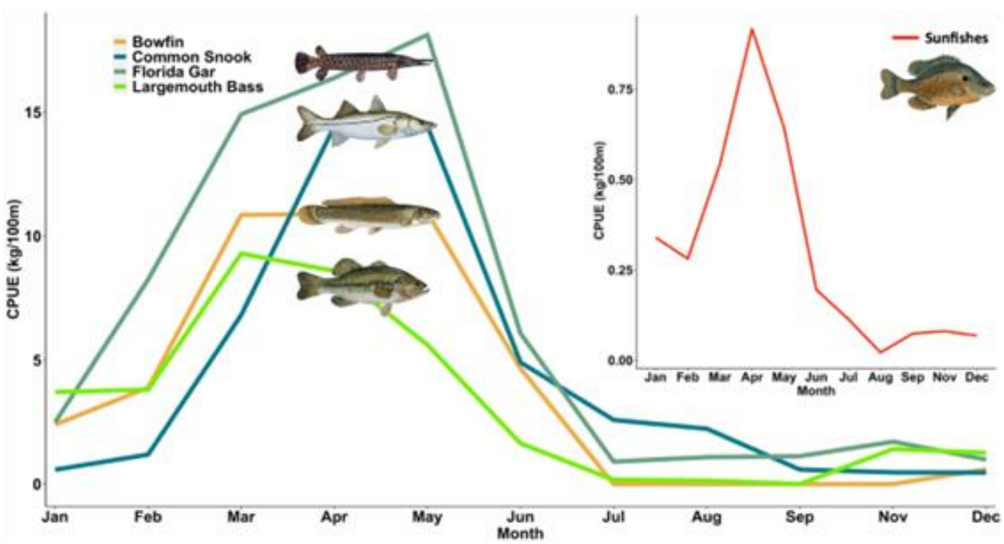


Figure 2. Monthly median species biomass CPUE (kg/100m) at the ecotone in Shark River, ENP 2004-2021.

We continued sampling tissues of consumers for pairing their movement and trophic ecology to understand how hydrologic connectivity and increased fresh and marine water pulses affect nutrient and toxin accumulation in consumers (C and N stable isotopes, mercury, methyl mercury and selenium). Blood samples were used for stable isotope analyses and toxicity biomarker assays. A total of 78 juvenile Bull Sharks caught between 2018 -2022 were analyzed.

We continued tracking consumer movement using acoustic telemetry and replaced aging acoustic telemetry receivers. We continued to analyze movement patterns for 170 tagged Common Snook since 2011 (**Fig. 3**).

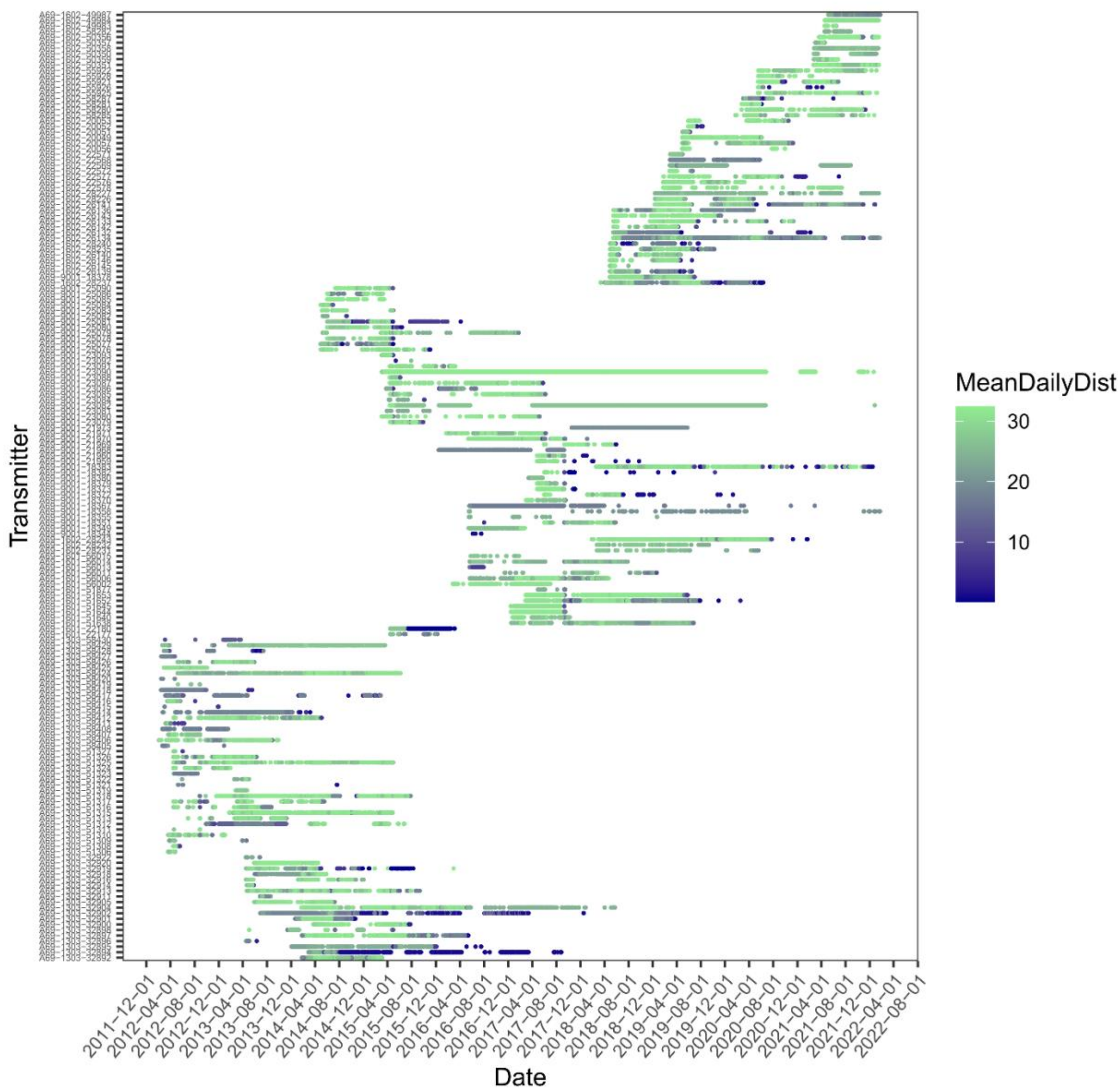


Figure 3. Abacus plot depicting the acoustic telemetry detections for 170 tagged Common Snook in the Shark River across the project period of record (2012-2022). Detections for each individual fish are represented by points which and that color-coded by mean daily river location where each fish was detected (MeanDailyDist, river km relative to the coast).

We are using stable carbon ($\delta^{13}C$) and nitrogen ($\delta^{15}N$) isotope analysis, and total mercury (THg) skin (n = 89) and blubber (n = 89) tissues, and potential prey, muscle tissue (n = 127), to investigate trophic interactions of dolphins in mesohaline rivers, inland low-salinity bay, coastal oligohaline bay, Florida Bay and the Gulf of Mexico (**Fig. 4**). Hg loads increase with estimated trophic level and are higher in dolphins that feed more in estuarine and freshwater than marine food webs.

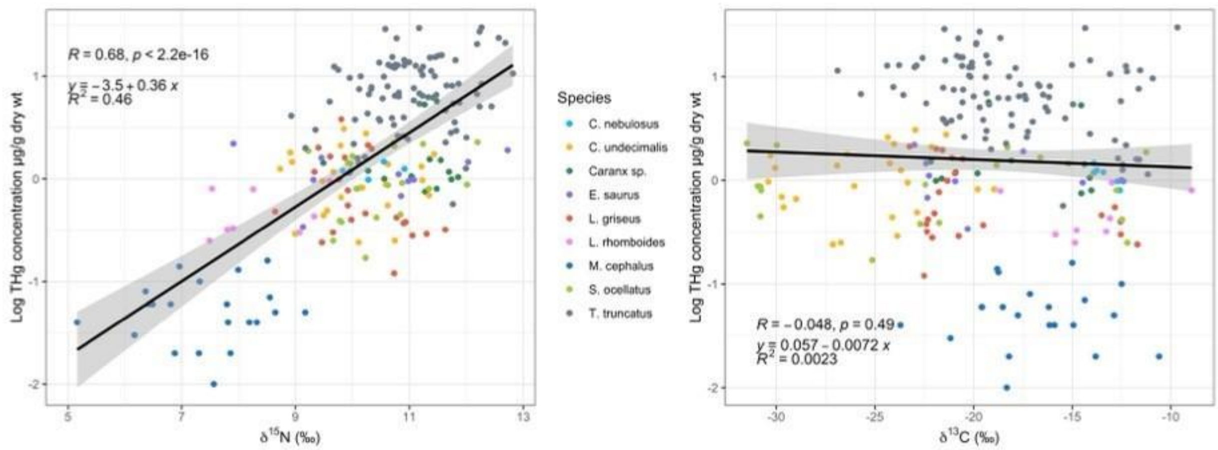


Figure 4. Relationship between THg concentration (µg/g dry wt, log transformed) and $\delta^{15}N$ (left) and $\delta^{13}C$ (right) values of bottlenose dolphins and their potential prey. Shaded area represents the 95% confidence band.

We continued studying invasive species (African Jewelfish, Asian swamp eel).

Carbon Fluxes and Ecosystem Trajectories: We evaluated how increased pulses of fresh and marine water and their associated resources change ecosystem structure and function by expanding the Everglades Landscape Model and the Everglades Flux Tower Network.

The eddy covariance flux network (**Table 1**) includes eddy covariance tower sites in freshwater marsh (SRS-2), freshwater marl prairie (TS/Ph-1), mangrove scrub (TS/Ph-7), tall riverine mangrove forest (SRS-6), seagrass (Bob Allen), and the ecotone between freshwater marsh and mangrove scrub (SE-1). New towers incorporated into the FCE Flux Tower Network include a tower in dwarf cypress, the tall cypress, and a pine upland ecosystem in Big Cypress National Preserve (USGS).

Table 1. FCE-LTER eddy covariance tower sites.

AmeriFlux Site ID	Description	FCE-LTER ID
US-DCS	Dwarf Cypress Swamp	BNP-DCS
US-Elm	Everglades (long hydroperiod marsh)	SRS-2
US-Esm	Everglades (short hydroperiod marsh)	TS/Ph-1
US-EvM	Everglades Saltwater intrusion marsh	SE-1
US-PiU	Pine Upland	BNP-PiU
US-Skr	Shark River Slough (Tower SRS-6) Everglades	SRS-6
US-TCS	Tall Cypress Swamp	BNP-TCS
NA	Mangrove Scrub	TS/Ph-7
NA	Seagrass	Bob Allen

Specific Objectives

Climate Variability & Change

Using a high resolution (1.5 km) regional ocean model (ROMS) we evaluated the separate and combined effects of freshwater discharge management (**Fig. 5**) and climate warming by 1 °C (**Fig. 6**) on the Loop Current (LC) intrusions on the West Florida Shelf (WFS) and its dynamics in the subtropical western Atlantic. This work highlights a theme of the FCE LTER in identifying how future policy scenarios of freshwater distribution may reduce vulnerability to rapid climate change.

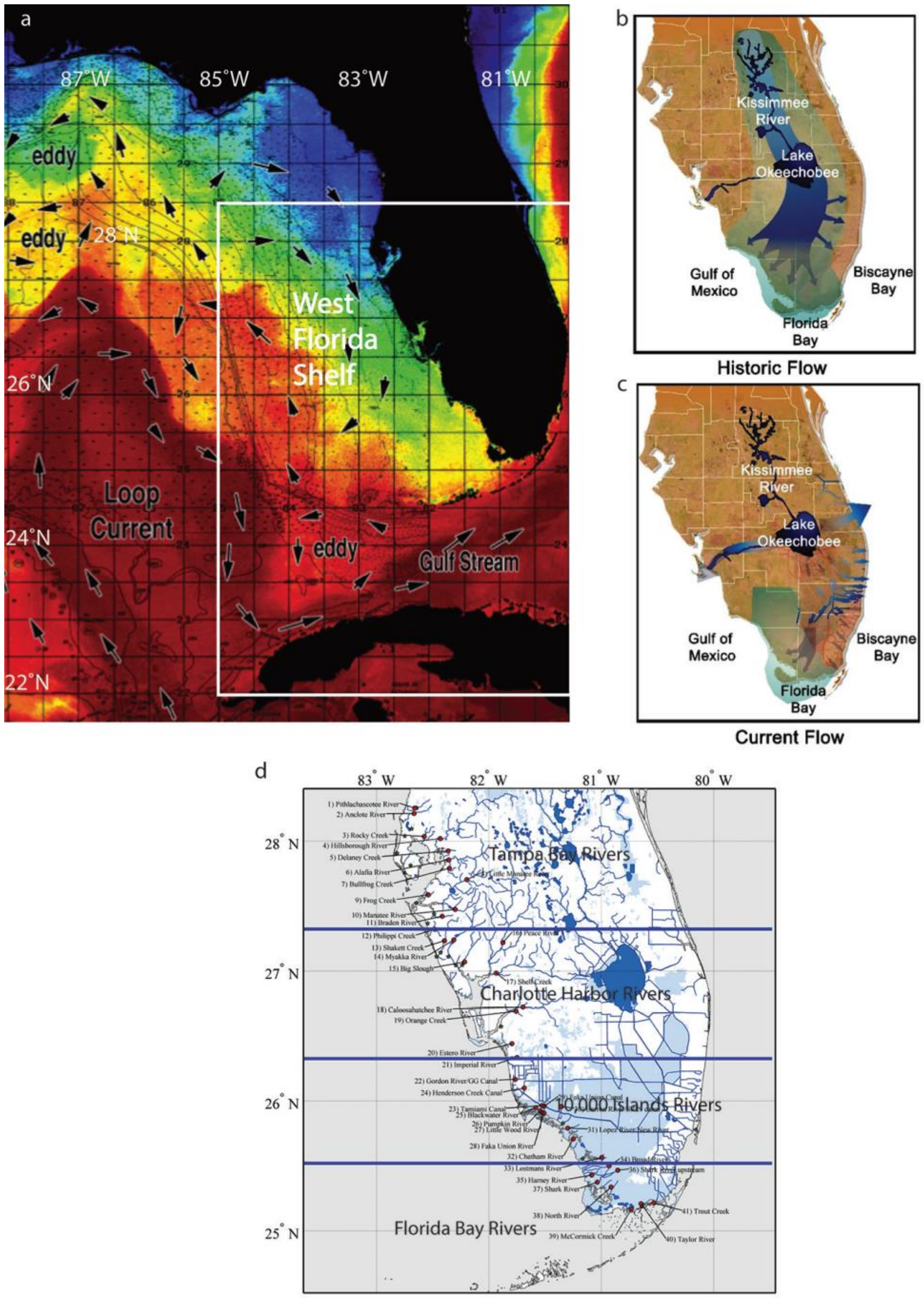


Figure 5. (A) Eastern Gulf of Mexico Sea Surface Temperature (SST) depicting the Loop Current and its surface intrusion on the West Florida Shelf (Courtesy RoffsTM). Each grid line represents a parallel or a meridian and are spaced by 0.5°. Arrows show the flow direction. Thin lines show the bathymetric contours. The white rectangle shows the numerical model domain. (B) Paleontological and (C) current water pathways of the Everglades ecosystem in southern Florida (Credit: USACE 2018). (D) Florida rivers used in the ROMS model and the ad hoc subdivision in four basins, namely from north to south: Tampa Bay Rivers, Charlotte Harbor River, 10,000 Islands Rivers, and Florida Bay Rivers.

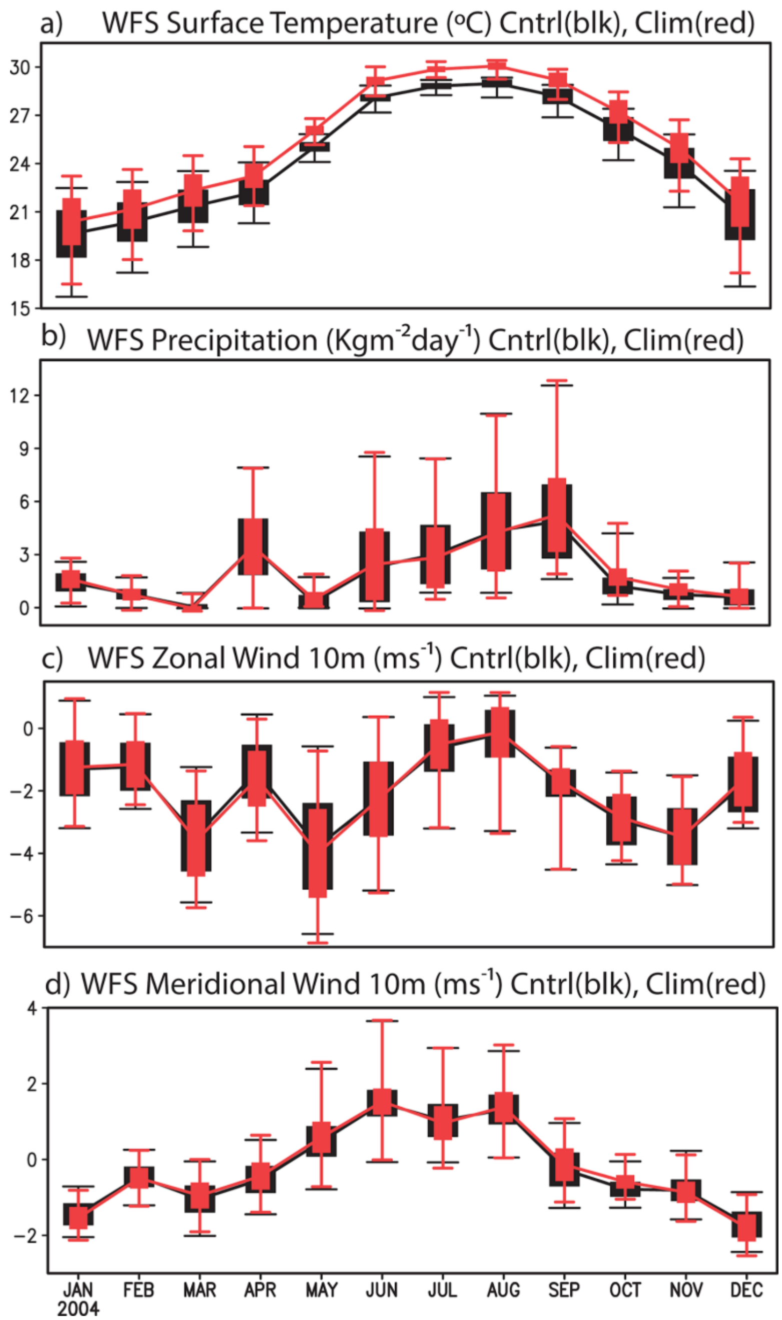


Figure 6. Box and whisker plot describing the (A) surface temperature (°C), (B) precipitation (kg m^{-2} d^{-1}), (C) zonal component of the wind (ms^{-1}), and (D) meridional component of the wind (ms^{-1}) forcing in the control (black) and climate change (red) scenarios. Boxes are centered on the mean values for the region of the West Florida Shelf (WFS) and extend to plus and minus one standard deviation from the mean and whiskers identify maximum and minimum values in the region.

Hydrologic Connectivity
Our objectives were to (1) determine the physiochemical and hydrological properties of peat and marl soils, (2) ascertain sediment accretion rates along the coastal Everglades in response to the accelerating rate of sea level rise, (3) quantify the flux of water and salt along the two transects on seasonal and long-term time frames, (4) determine the connectivity of constituents at the freshwater-saltwater interface, and (5) further refine remote sensing techniques to detect changes in water levels and depths across the FCE.

SOCIAL LANDSCAPE

Water Governance/Cultural & Economic Values: Our objectives were to understand different approaches to synthesizing social resilience as it relates to climate-change during the Anthropocene with the Everglades. We also aimed to complete analyses of stakeholder needs and responses to Everglades restoration. Finally, our goal was to develop and quantify how ecosystem services valuation change with different restoration scenarios and the impacts on ecosystem service cost-benefit ratios.

ECOLOGICAL LANDSCAPE

Vegetation & Geomorphic Gradients: Our main objectives were (1) to quantify landward expansion rates of coastal creek networks as a response to sea-level rise; (2) to quantify species composition/vegetation patterns and patterns of change along the northern and eastern boundary of ENP at two different spatial scales; (2) to quantify and model the spatial patterns of vegetation change as a function of hydrological restoration and fire regimes; (3) to map and model woody-species dominated plant communities in the greater Everglades region; and (4) to expand calibration and validation of LiDAR data derived terrain and vegetation canopy models that will help us to more accurately model hydrological conditions and to estimate vegetation-specific above ground biomass.

ECOSYSTEM STRUCTURE & FUNCTIONS

Abiotic Resources & Stressors: We evaluated the trends and variance structure of the long-term water N:P and salinity data relative to determine spatiotemporal dynamics of press and pulse of these critical resources and stressor. An ongoing collaborative effort led by collaborator P. Julian is evaluating this structure using a larger, compiled dataset from stations throughout the FCE domain.

Detritus & Microbes: Our objectives were to understand patterns of dissolved and particulate organic matter and microbial decomposers along salinity and P gradients of SRS and TS/Ph by (1) synthesizing of long-term DOC concentrations, dissolved organic matter (DOM) fluorescence characteristics, and DOM structural and isotopic composition, (2) quantifying breakdown rates of labile and recalcitrant particulate organic matter standard substrates, and (2) characterizing assemblages of water-column and benthic microbial communities.

Vegetation: We determined how water and P pulses influence periphyton contributions to carbon exchange and soil accretion and analyzed long-term inorganic carbon accumulation rates at FCE sites relative to hydrology and P availability. We quantified macrophyte species composition and aboveground *Cladium* biomass and NPP at all Taylor Slough sites. We evaluated the long-term effects of Hurricane Irma on spatiotemporal patterns of mangrove aboveground biomass and NPP in Shark River estuary. Using remote sensing tools, we quantified changes in mangrove canopy height regrowth and recovery post-disturbance in ENP. We also analyzed long-term NPP rates of *R. mangle* dominated scrub mangrove forests in Taylor River using a methods comparison.

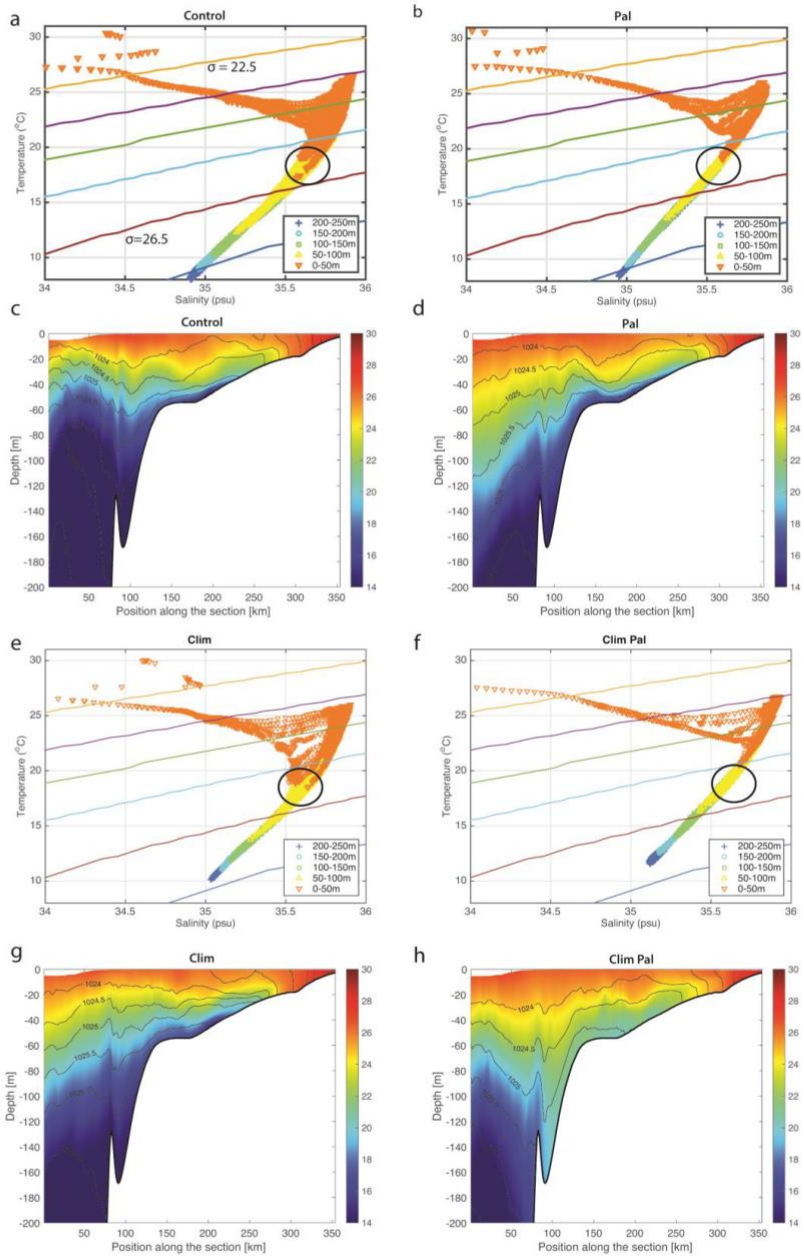
Consumers: We tracked changes in food web structure and function, particularly shifts in resource contributions to consumers over seasons and as a function of spatial gradients in salinity and primary productivity across the freshwater-estuarine-marine habitat mosaic, with the long-term goal of predicting how SLR and restoration will interact to reorganize energy landscapes. Examine if increased pulses of fresh and marine water and their associated resources will result in a greening of food webs, shifts in consumer communities from detrital- to algal-feeding, and an increase in trophic efficiency. We examined effects of hydroclimatic factors on long-term fish community structure and consumer movement, along with the role of matches/mismatches in peak predator/prey abundance in energetics and body condition of mesoconsumers. We integrated consumer movement and trophic ecology (from stable isotopes) to examine variation in consumer-mediated trophic coupling and consumer-mediated nutrient transport across habitat boundaries as a function of the interaction of SLR and restoration effects. Pair acoustic telemetry and dietary tracers to identify if changes in the scales of consumer movements alter trophic dynamics by facilitating increased nutrient transport among freshwater, ecotone, and marine food webs. We quantified spatiotemporal food web dynamics using contemporary and historic data to examine effects of long-term water management practices and biological invasions by nonnative fishes. We examined the potential effects of mercury toxicity for juvenile Bull Sharks and determined factors contributing to mercury, methylmercury and selenium accumulation in Bull Sharks in the Everglades to better understand the impacts of shifting carbon sources in the food web. We linked our food web and movement ecology findings to human dimensions (e.g., recreational angling) and engaged with key stakeholder groups.

Carbon Fluxes and Ecosystem Trajectories: The primary objective is to build on the current flux network by exploring within and between ecosystem variation. Specifically, we are trying to work across scales to understand seasonal and annual patterns in CO_2 and CH_4 fluxes. This work supports FCE 4.2 goals by collecting core long-term data, integrating results from mechanistic studies, linking climate and disturbance legacies to future projections, and integrating core findings across the LTER network-wide collaborations.

Significant Results

Climate Variability & Change:

- Increased freshwater could mitigate warming effects by reducing stratification (**Fig. 7**).



- **Figure 7**. T/S diagrams for each scenario (a - Control, b – CERP FW flows, e – Climate change, f – Climate change+ CERP FW flows) and respective two-week mean temperature (°C) cross-section at 25.00°N at the peak of dry season in May 2004. The colored lines on the T/S diagrams show the σ density levels and the colored markers show the depth range. The black solid lines on the cross sections indicate the density contours labeled by their respective density in kg.m-3. Circles show the area in the diagram where water masses mixing differs between scenarios. The thinner the curve, the more mixed are the waters.

Hydrologic Connectivity:

- Regional SLR is greater than sediment accumulation (5.8 mm yr^{-1}) for mangroves (**Fig. 8**), with projected destabilization and conversion to open water by 2040-2050.
- Surface water salinities in TS/Ph and SRS vary with freshwater flows (**Figs. 9a-9d**). Salinities peak during the dry season and since 2016 (**Figs. 10a-10d, 11a-11d, 12**).
- Oxygen isotopic composition ($\delta^{18}O$) of dissolved inorganic phosphate (DIP) in both surface water and groundwater indicate sources of DIP other than biologically cycled (**Fig. 13**).
- C-band dual-polarization SAR backscatter sensitivity can be a reliable indicator of water depth in wetland environments (**Figs. 14, 15**). ICESat-2 and JEDI

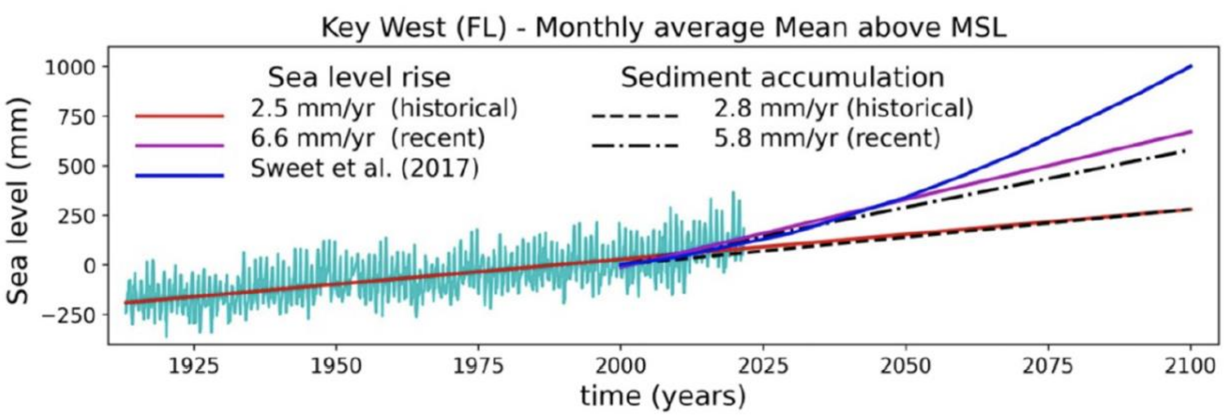


Figure 8. Left side: Historical and recent trends in Key West sea level elevation. Right side: Predicted Intermediate sea-level rise scenario and mangrove sediment accumulation rates based upon historical average derived from all study sites (2.8 mm/yr) and recent average (5.8 mm/yr) generated from Southwest Everglades National Park recent core interval data. Cyan line marks the Key West mean monthly value (1913–2021). These projections assume ground level is at zero mean sea level in year 2000. Source: Parkinson and Wdowinski (2022)

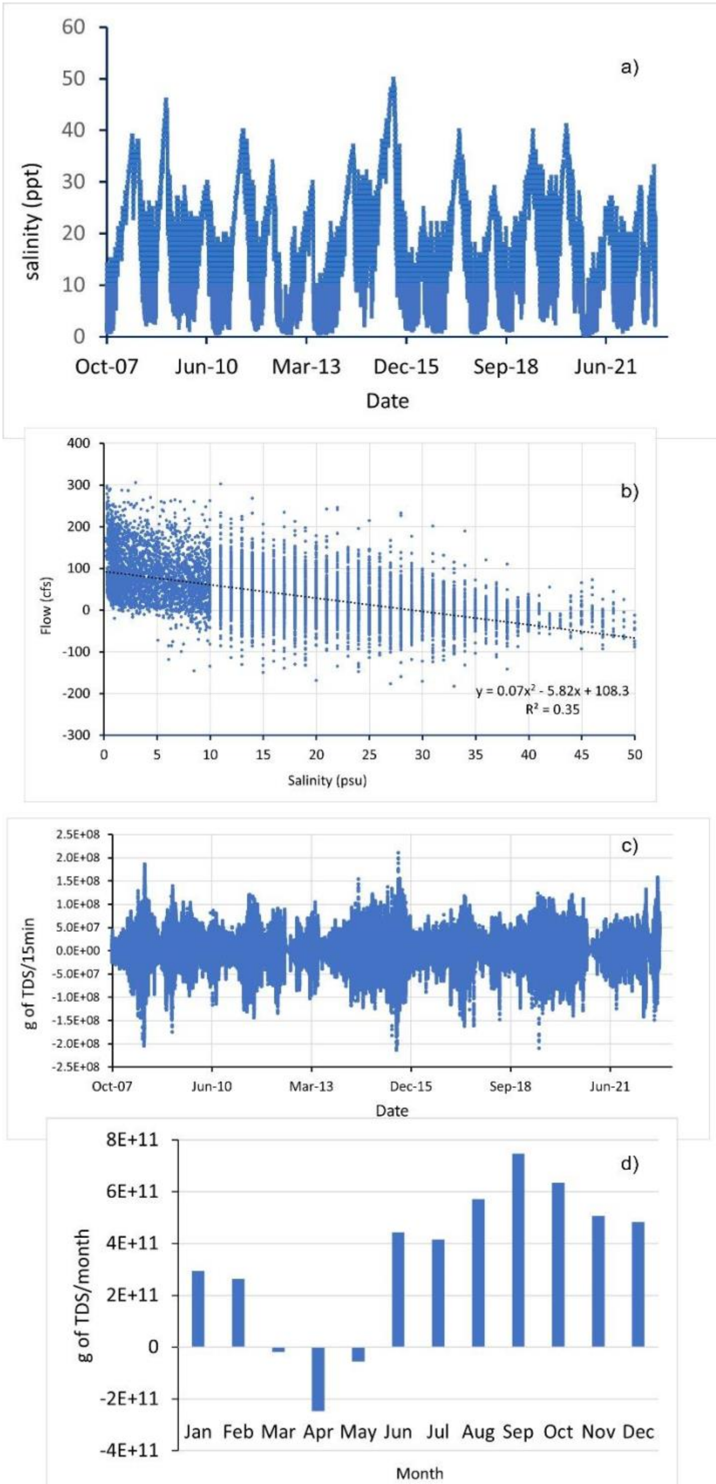


Figure *9.* At the mouth of the Taylor River a) long-term salinity; b) variation in surface water flow with salinity; c) grams of total dissolved salt (TDS) flux at 15 minute intervals; and d) average monthly grams of total dissolved salt (TDS) flux.

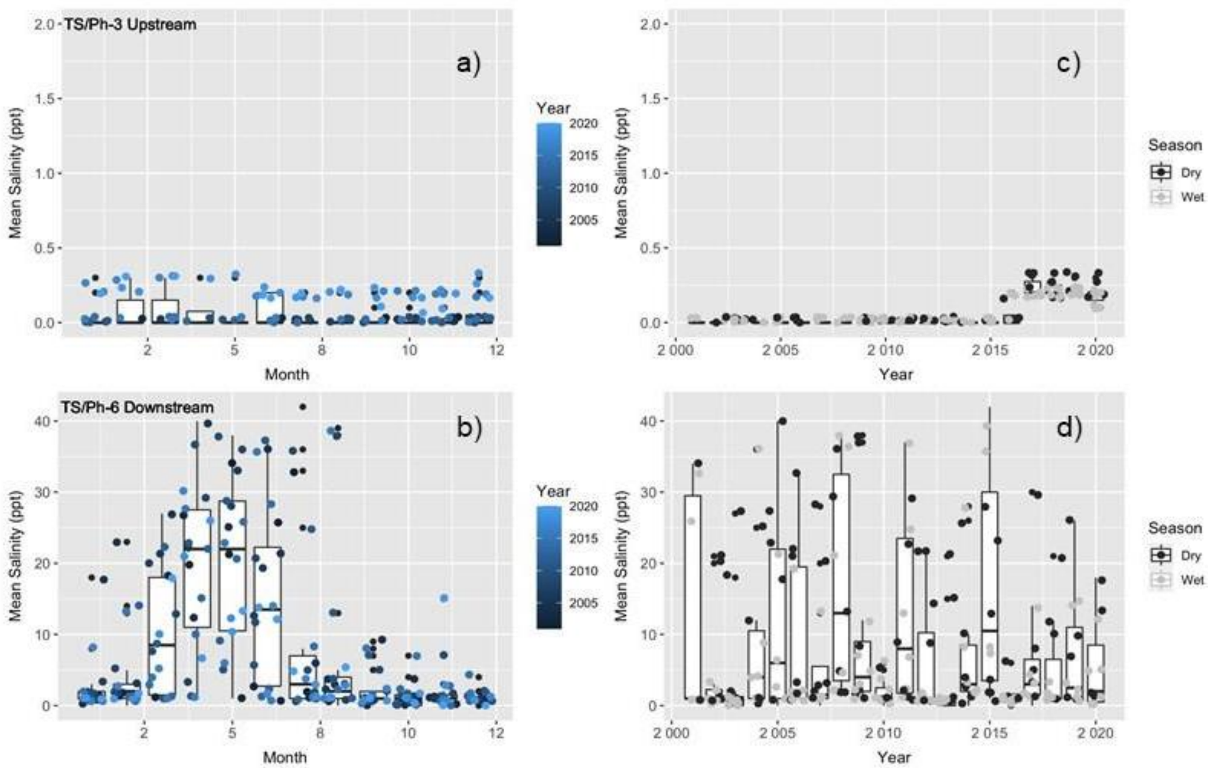


Figure 10. Monthly box-plots of long-term (2000-2020) salinity compared to values in 2000 and 2020 at TS/Ph-3 (a) and TS/Ph-6 (b). Seasonal box-plots of long-term (2000-2020) salinity compared to values in 2000 and 2020 at TS/Ph-3 (c) and TS/Ph-6 (d).

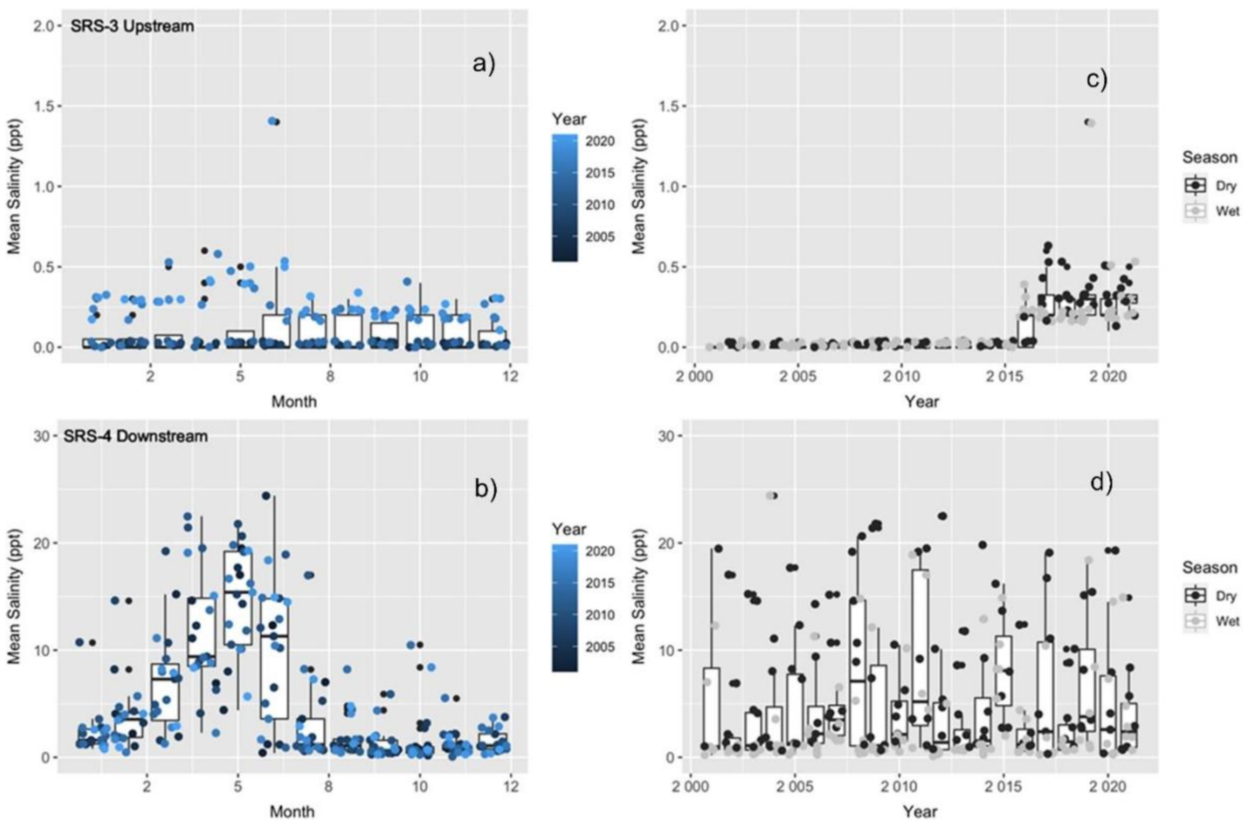


Figure 11. Monthly box-plots of long-term (2000-2020) salinity compared to values in 2000 and 2020 at SRS-3 (a) and SRS-4(b). Seasonal box-plots of long-term (2000-2020) salinity compared to values in 2000 and 2020 at SRS-3 (c) and SRS-4 (d).

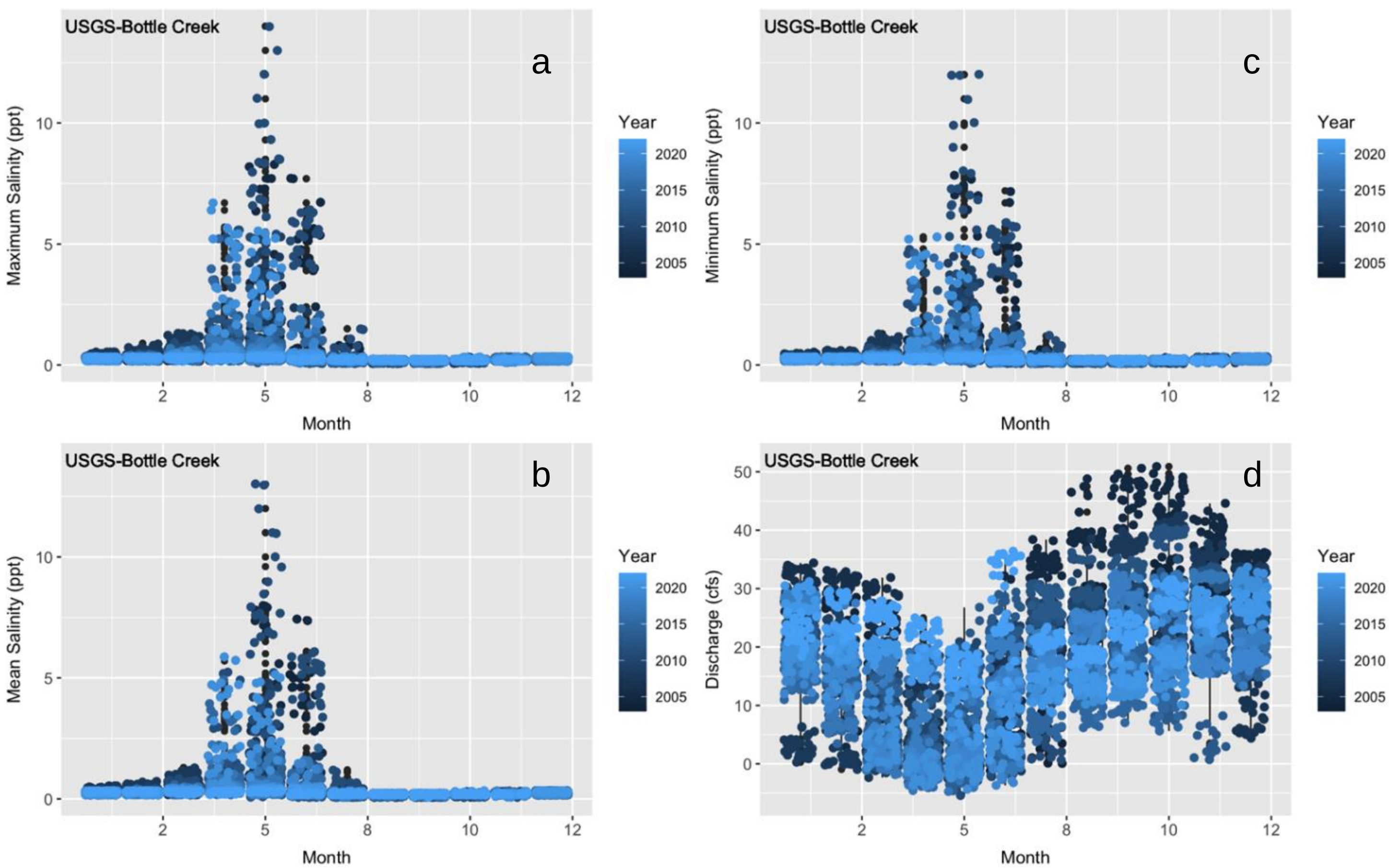


Figure 12. Maximum (a), men (b) and minimum salinity (c) at Bottle Creek near SRS-3 by month. Discharge (d) measured at Bottle Creek. Data from USGS https://waterdata.usgs.gov/fl/nwis/dv?referred_module=sw&site_no=022908295.

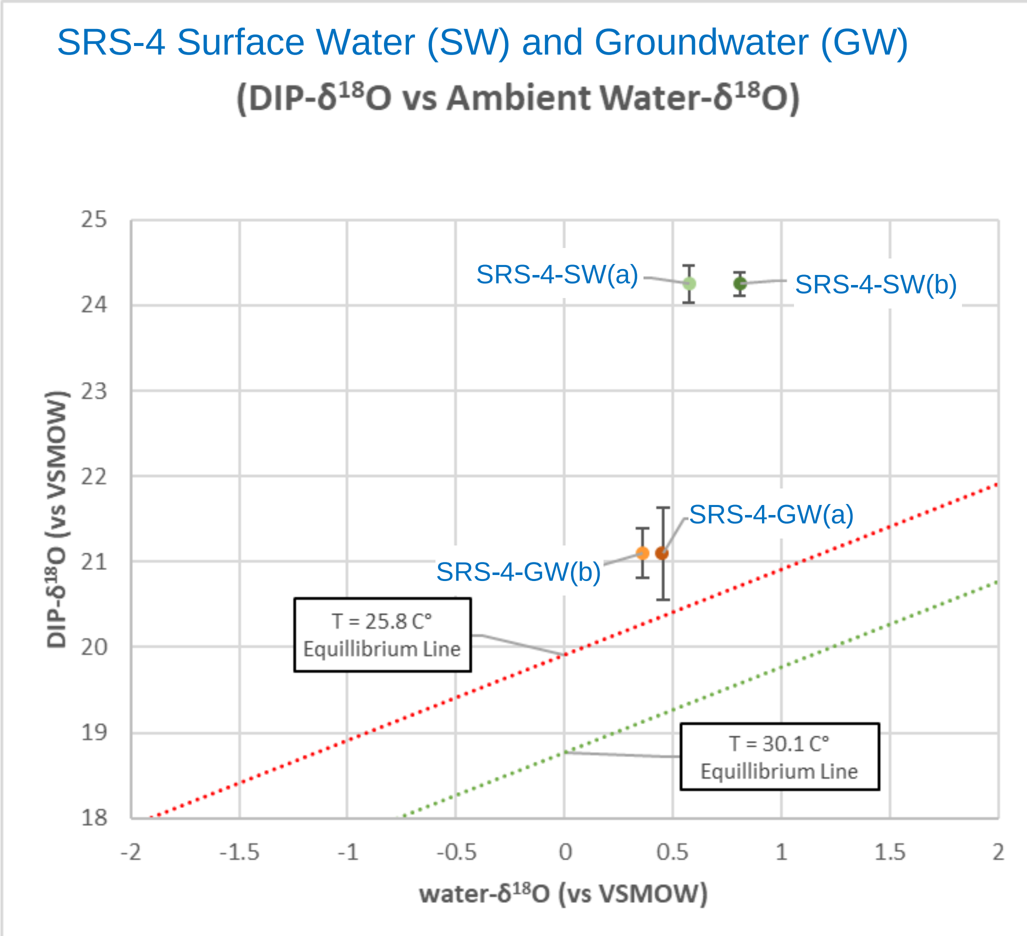


Figure 13. $\delta^{18}O$ value of dissolved inorganic phosphate (DIP) versus the $\delta^{18}O$ value of surface water (SW) and groundwater (GW) at SRS-4. Dashed lines represent the values of $\delta^{18}O$ of the DIP and water at the ambient temperatures if the DIP pool consists entirely of biologically cycled DIP.

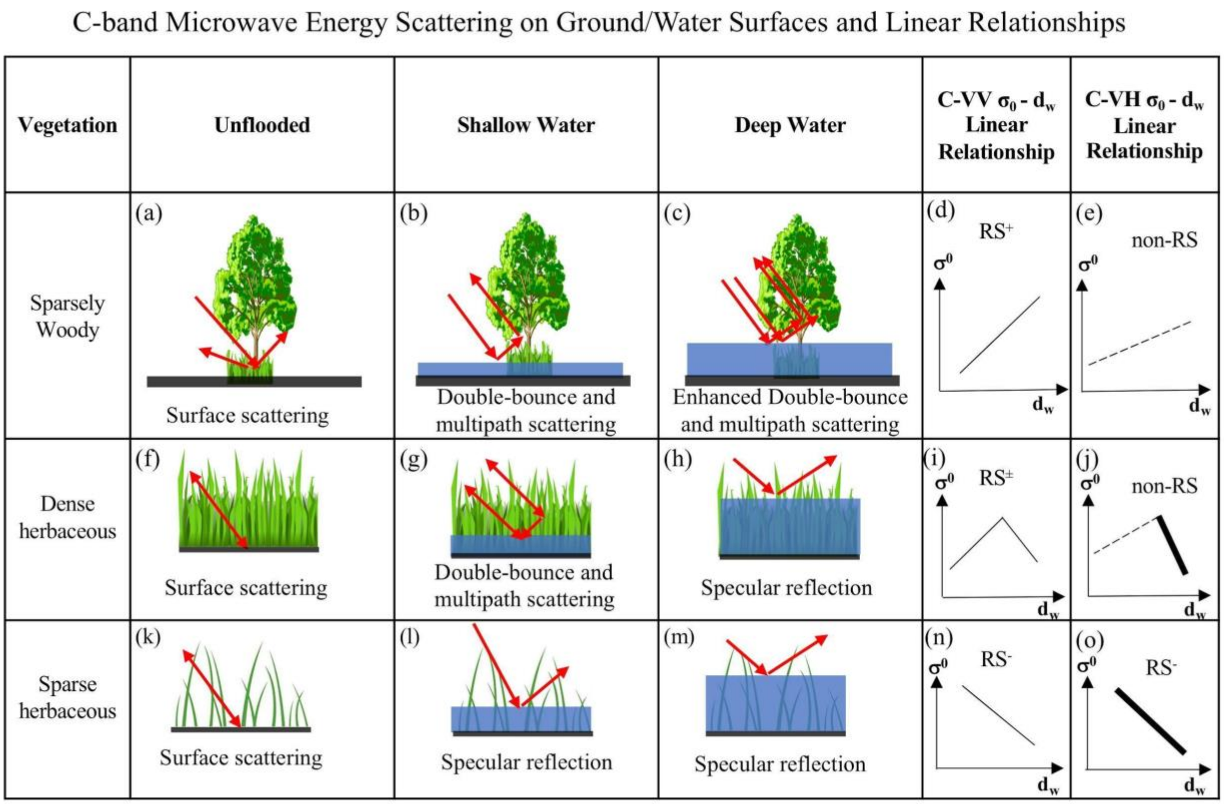


Figure 14. Schematic illustrations of the suggested C-band microwave energy scattering from the ground or water surfaces and linear σ°-d_w relationships for both C-VV and C-VH σ° for the same vegetation types with Figure 2: sparse woody, medium dense herbaceous, and sparse herbaceous. The text in each grid presents the dominant scattering mechanism(s). Dashed lines in (e) and (j) denote weaker linear relationships (less R^2) and less sensitivity (shallower slope) to variations in water depths in C-VH observations than C-VV, and the bold lines in (j) and (o) denote stronger linear relationships and greater sensitivity to variations in water depths than C-VV. Source: Zhang et al. (2022a)

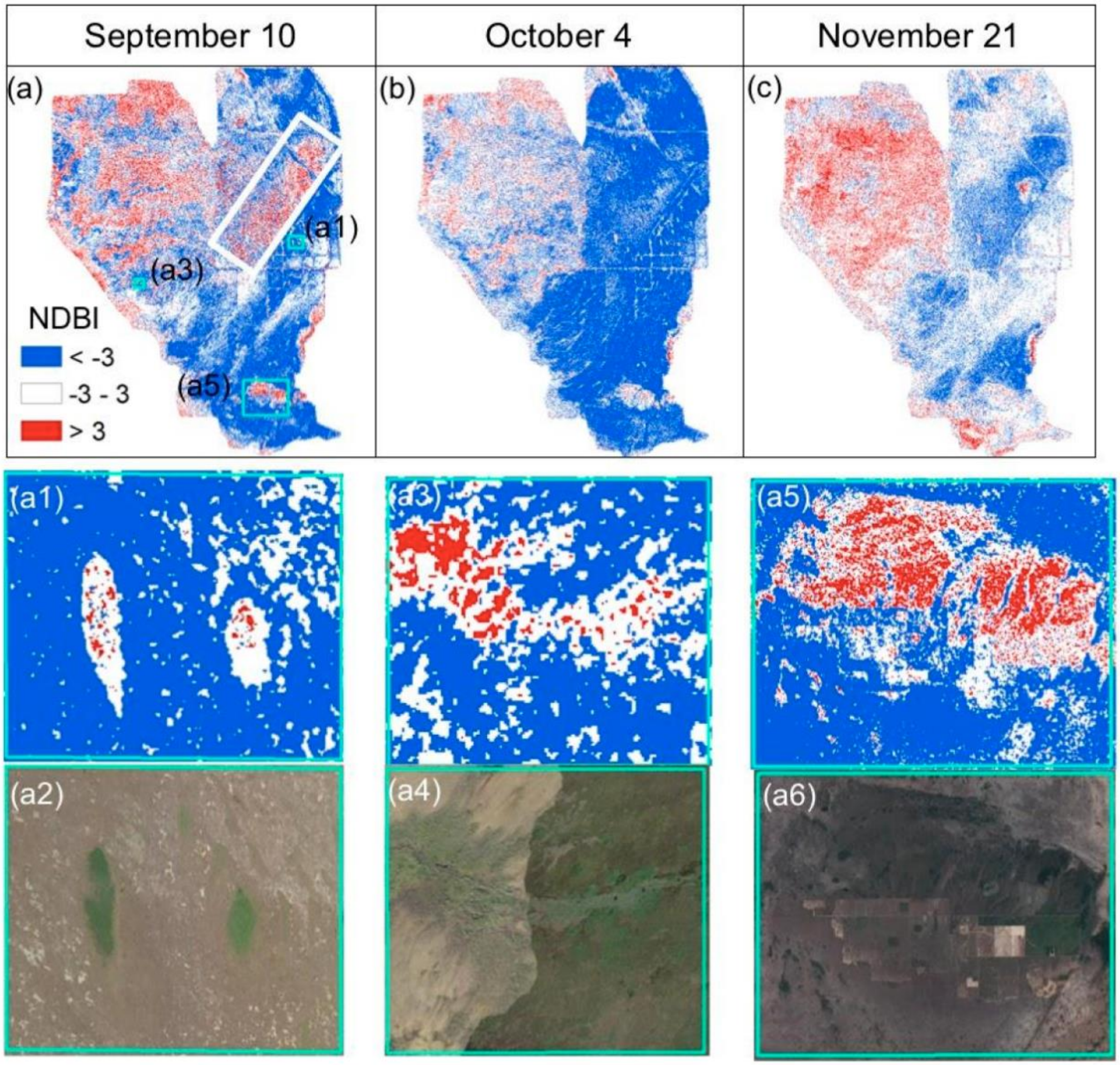


Figure 15. Maps of significantly increased water depth in the Everglades during (10 September) (a) and after (b and c) the 2017 Hurricane Irma using Normalized Difference Backscatter Index (NDBI) that calculates mean and standard deviation values for pre-event backscatter. Increased water depth by at least 12 cm occurred in pixels with high positive NDBI values (>3) or negative over woody vegetation and high negative (<-3) NDBI values over herbaceous vegetation. (a1–a6) Zoomed-in views of three exemplary areas with (a1,a3,a5) displaying classified NDBI values and (a2, a4, a6) displaying the corresponding optical images. Source: Zhang et al. (2022b)

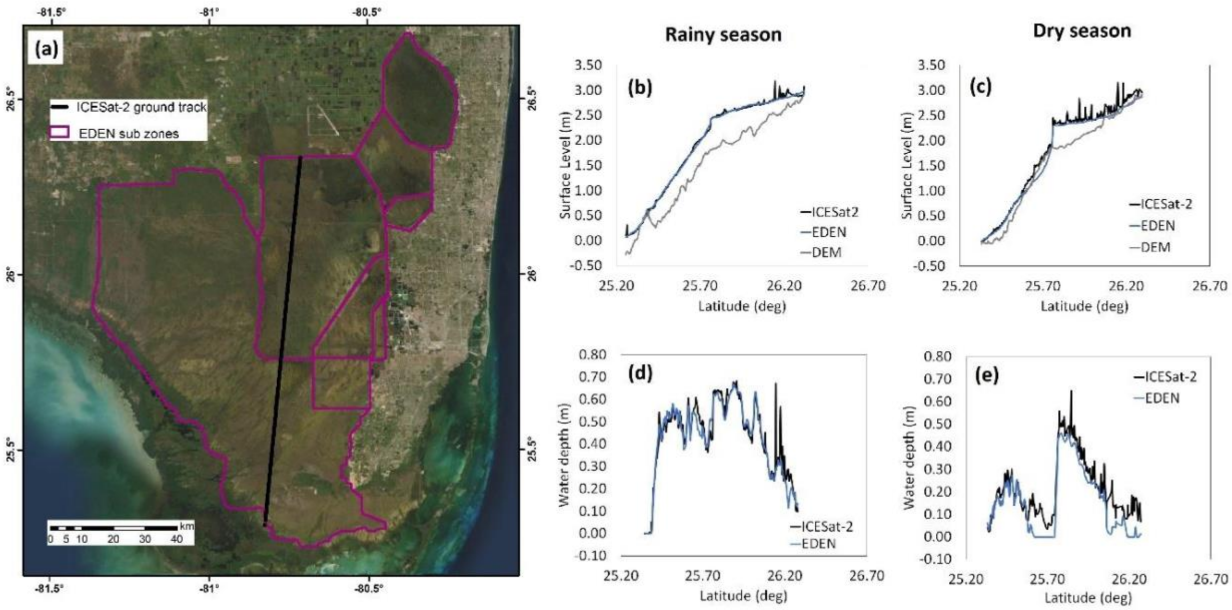


Figure 16. Profile location (b) and (d) represent the water level and water depth profile respectively for the rainy season (October), (c) and (e) represent the water level and water depth profile respectively for the dry season (January). Source: Palomino et al. (2022).

SOCIAL LANDSCAPE

Water Governance/Cultural & Economic Values:

- Cybernetic synthesis and geographic bricolage offer two competing visions of resilience.
- Interviews with local communities suggest they will stay in place regardless of sea rise and environmental destruction.
- Economic valuation of restoration revealed that real-estate, C storage, and urban water supply have highest monetary benefits.
- Lake Okeechobee anglers altered fishing behavior during algal blooms, potentially leading to a reduction in economic benefits.

ECOLOGICAL LANDSCAPE

Vegetation & Geomorphic Gradients:

- Length and number of coastal creeks expanded from 1952 to 2018 (**Table 2**).
- Density of creek formation shifted landward from a maximum expansion at around 21 km from the coast between 1960 and 1973 to a peak increase in density at about 23 km after 1973 (**Fig. 17**).
- Rate of sea-level rise (SLR) is accelerating compared to historical (~1900 to present), recent (2000-2020), and last decade.
- Sediment accumulation rates of coastal wetland communities are less than the observed rate of SLR over the past decade.

- Rates of SLR are expected to continue accelerating and therefore landward migration, habitat shifts, or conversion to mud flats or open water is predicted.

Table 2. Tidal creek expansion metrics of the Shark-Harney-River creek network between 1952 and 2018 by period.

Year	Total Length (meters)	Segments (count)	Creek Expansion (meters/year)	Average rate per segment (meters/year)
1952-1960	3,810	117	476.25	4.07
1960-1973	10,695	333	822.69	2.47
1973-1984	11,516	290	1,046.91	3.61
1984-2018	21,768	549	640.24	1.17

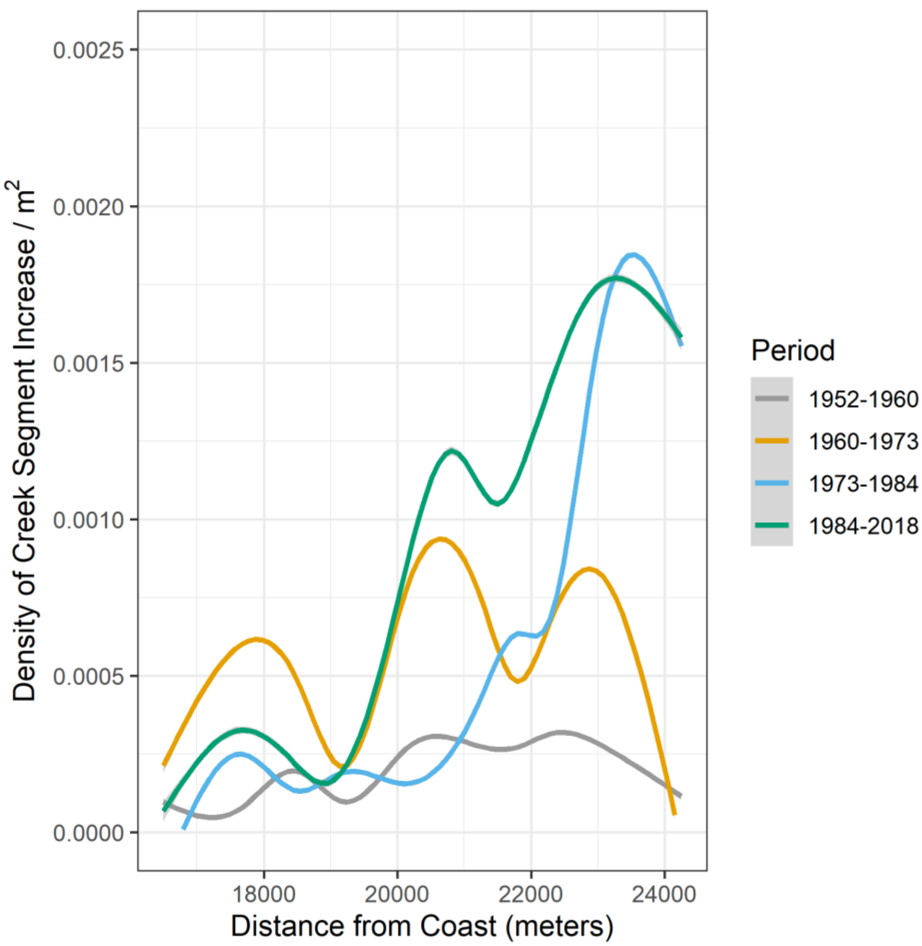


Figure 17. Creek density increase of the Shark-Harney-River creek network as a function of distance to the coast for four time periods 1952-1960, 1960-1973, 1973-1984, and 1984-2018.

ECOSYSTEM STRUCTURE & FUNCTIONS

Abiotic Resources & Stressors:

- Freshwater pulse durations are increasing in SRS marshes, and pulse amplitude and freshwater pulse duration are increasing in TS/Ph marshes. Pulse legacies drive long-term press (**Fig. 18)**.
- Pulse increase not detected but hurricane and drought disturbances have left long legacies, mobilizing P from coast to interior (**Fig. 19**).
- Long-term synthesis from > 300 sites throughout the FCE reveals nutrient hotspots along the coast and increasing press of P at the oligohaline ecotone (**Fig. 20**).
- Climate variability and change and freshwater restoration are increasing the availability of P throughout the FCE (**Fig. 21**).

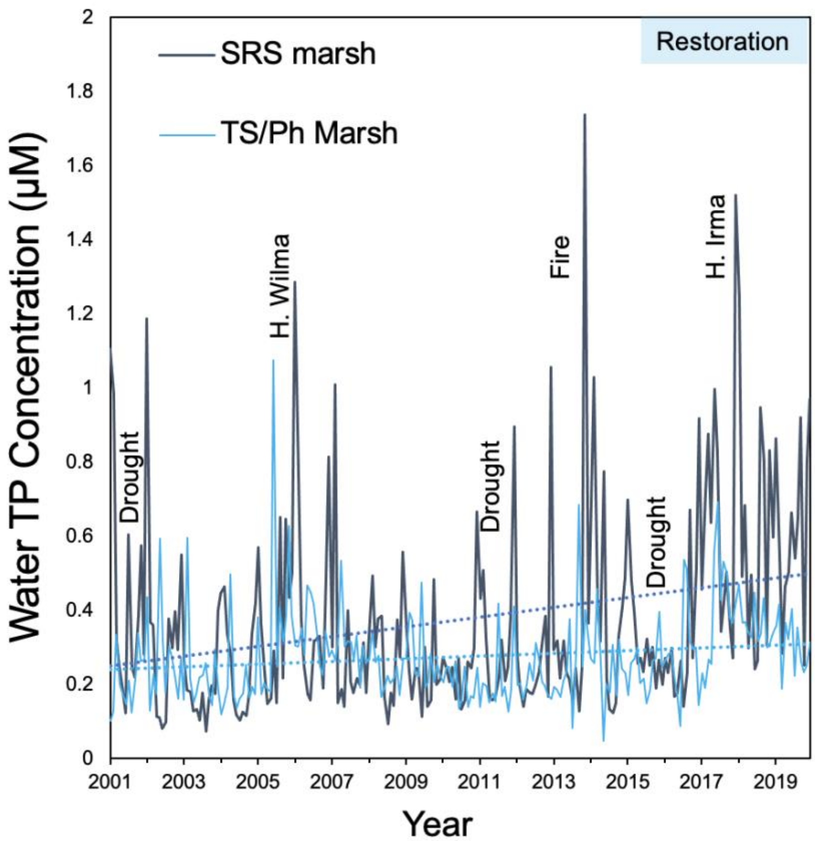


Figure 18. Long-term (2001-2021) surface water total phosphorus (TP) concentrations from Shark River Slough (SRS) and Taylor Slough/Panhandle (TS/Ph) freshwater marshes illustrate a pulsed dynamic and increasing trend over time with climate disturbances and restoration drivers.

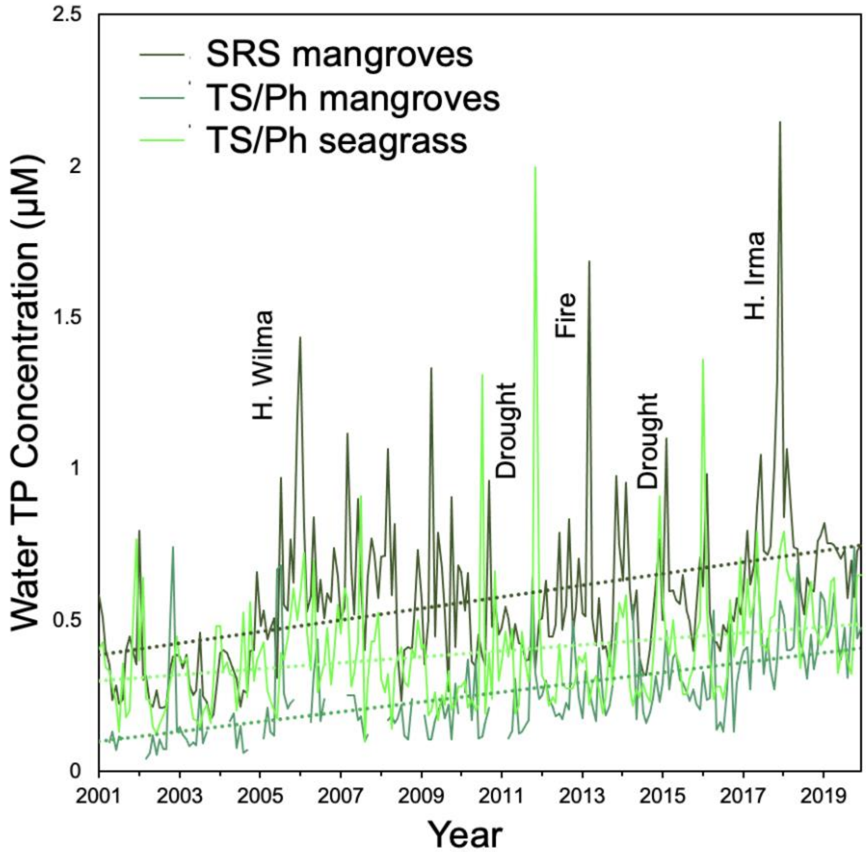


Figure 19. Long-term (2001-2021) surface water total phosphorus (TP) concentrations from Shark River Slough (SRS) and Taylor Slough/Panhandle (TS/Ph) mangroves and seagrass meadows illustrate a pulsed dynamic and increasing trend over time with climate disturbance drivers.

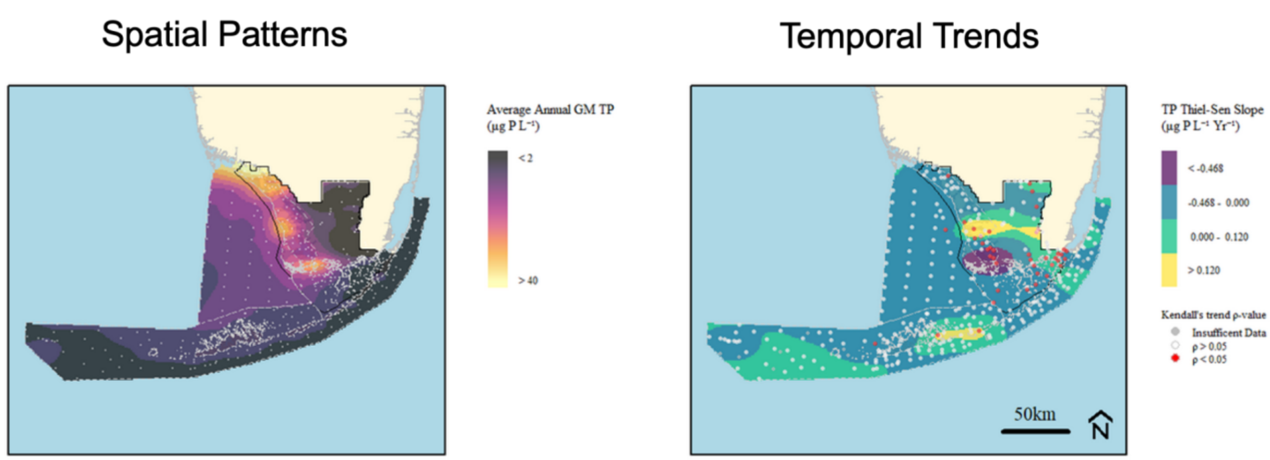


Figure 20. Left: Annual rate of change of the geometric mean(Thiel-Sen slope value) for total phosphorus (TP) individual stations across the Everglades-Florida Bay-West Florida Shelf-Keys ecosystem for the period of record. Right: Average annual geometric mean for TP concentrations across the study area.

FCE Region	TP Pulse Amplitude	TP Pulse Duration	TP Press Trend
Whole System	+	+	+

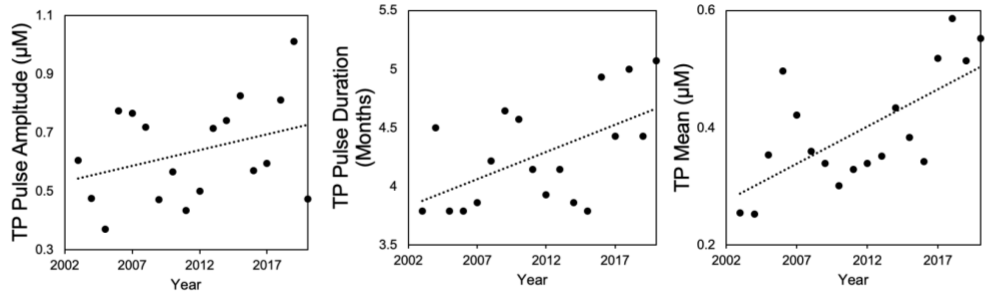


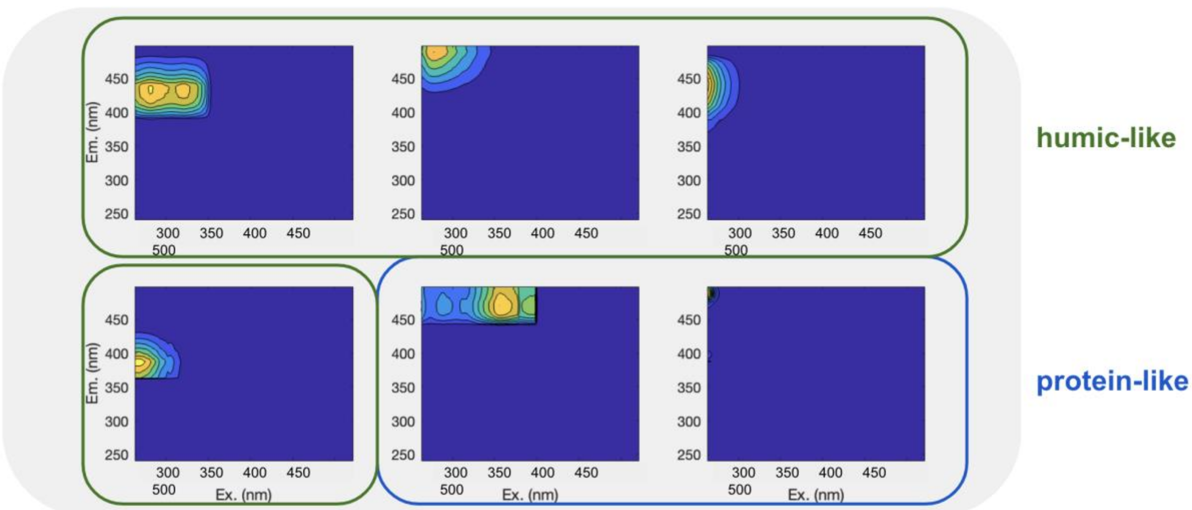
Figure 21. Directional increases in pulse amplitude and duration and press slope for total phosphorus (TP) concentrations throughout the FCE freshwater marshes, mangroves, and seagrass meadows.

Detritus & Microbes:

- Hydrology influences DOM quality differently in SRS and TS/Ph, and a revised long-term model (**Fig. 22**) has identified ecosystem-specific differences in DOM composition (**Fig. 23A)** and recent increases in marine carbon sources in seagrass and mangrove ecosystems exposed to rapid sea-level rise (**Fig. 23B**).
- DOC concentrations increase with shallower water in SRS peat marshes, whereas in mangrove estuaries of SRS, DOC increases with wet-season water depth and flows from upstream marshes (**Figs. 24A, 24D**). Shallower water depths in SRS are associated with higher algal contributions to DOM in both marshes and mangroves (**Figs. 24B, 24E**).
- DOC concentrations increase with increasing water depths in TS/Ph marl marshes and mangroves (**Figs. 25A, 25D**). Shallower water depths in TS/Ph mangroves are associated with higher algal contributions to DOM (**Fig. 25B**) and lower humic contributions to DOM (**Fig. 25E**).
- Wet-season DOM from SRS peat marshes is more aromatic and more humic, and DOM from SRS mangroves is more humic, more complex, and has higher TN. In contrast, DOM from TS/Ph marl marshes is less seasonally variable, whereas DOM from TS/Ph mangroves is more aromatic and more complex in the wet season. Increases in water flows during the wet season increase humic DOC in marshes and mangroves **(Fig. 26)**.
- *R. mangle* and *T. testudinum* litter have less recalcitrant organic carbon than *C. jamaicense* and *Eleocharis* litter (**Fig. 27**), which in addition to having higher foliar P content explains why mangrove and seagrass litter breakdown rates are higher than that of marsh litter species regardless of which ecosystem the litter is decomposing (**Fig. 28**).
- Marsh water column microbial communities are dominated by Gammaproteobacteria. In mangrove-dominated areas, other Gammaproteobacteria, and in coastal areas in TS/Ph, Alphaproteobacteria dominate. Differences between pre- and post-Irma were more pronounced in downstream sites at SRS and TS/Ph, namely SRS 4-6 and TS/Ph 6, 7, and 9,

compared to marsh sites (**Fig. 29**).

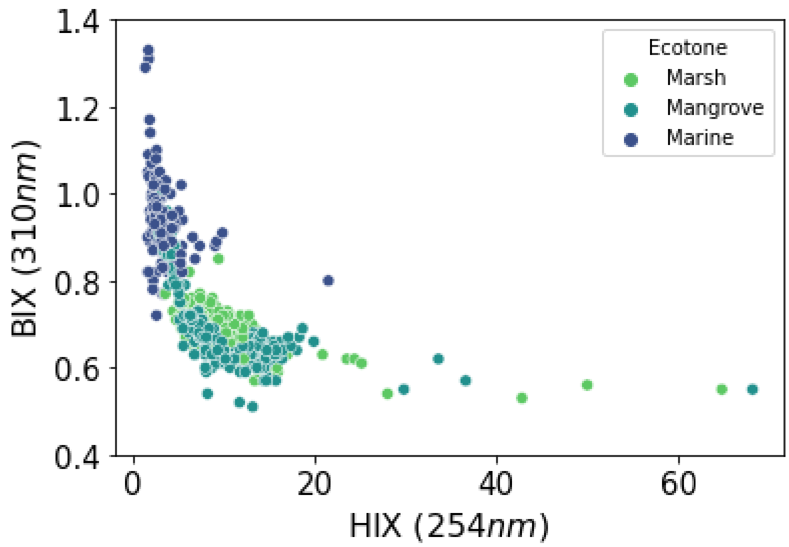
- Soil and periphyton samples are distinct from each other and from detritus microbial communities. Detritus microbial communities cluster mostly based on ecosystem, e.g., marine, ecotone, marsh, independent of litter origin, with the exception of *Eleocharis* litter that is degraded by distinct communities in marshes/ecotone sites (**Figs. 30, 31**).
- Benthic prokaryotes, not fungi, varied among marsh, mangrove, and seagrass ecosystems (**Fig. 32**). Sulfur- and sulfate-reducing microorganisms increased in relative abundance with salinity (**Fig. 34c**). Nitrifiers had highest relative abundances in TS/Ph marshes and SRS mangroves (**Fig. 33**). Relative abundances of 16S rRNA gene abundance of sulfate-reducing microorganisms increase with salinity in freshwater and brackish peat marsh soils (**Fig. 34**).



C1	281 (320)	433	Ubiquitous humic-like
C2	278	480	Terrestrial humic-like, suggested as photo-refractory
C3	<260	441	Terrestrial humic-like, fulvic acid-type
C4	270	387	Microbial humic-like
C5	360 (370)	460-480	Protein-like, suggested as photo-labile
C6	<260	475	Protein-like

Figure 22. Parallel factor analysis (PARAFAC) model of long-term (2011-2021) fluorescent dissolved organic matter (fDOM) across Everglades ecosystems (e.g., marsh, mangrove, and seagrass) reveal distinct and common contributions to fDOM composition.

(A)



(B)

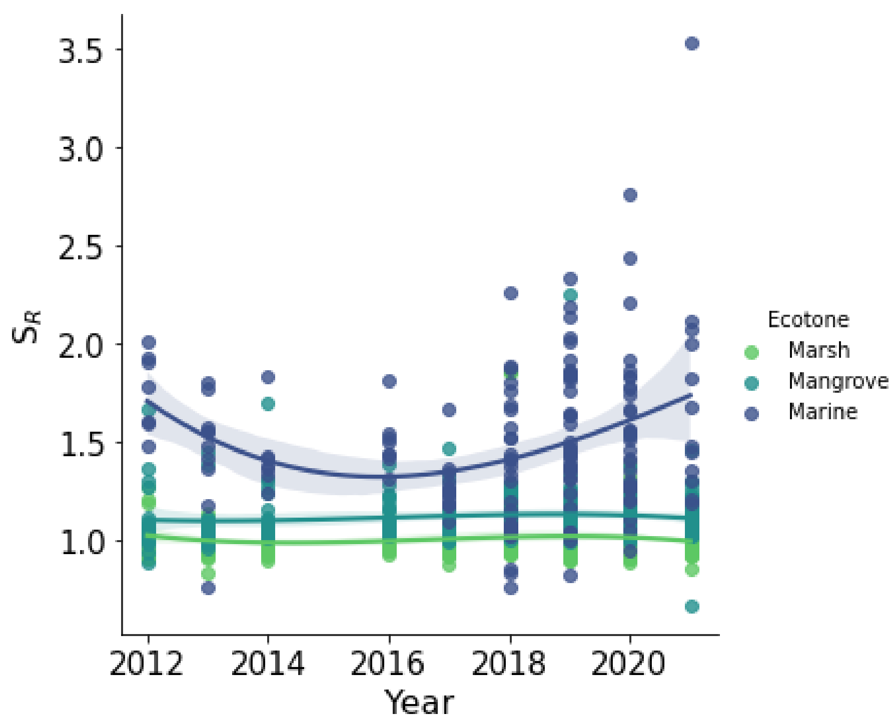


Figure 23. Long-term (2000-2021) patterns of **(A)** composition of DOC illustrate distinct carbon sources across marsh, mangrove, and seagrass ecosystems. Humic, terrigenous sources of DOC (HIX) are dominant in marsh and mangrove ecosystems relative to newly produced autochthonous sources of DOC (BIX) common in marine ecosystems. **(B)** Increases in slope ratio (S_R), indicative of marine sources of carbon, are evident in marine and mangrove ecosystems undergoing rapid sea-level rise.

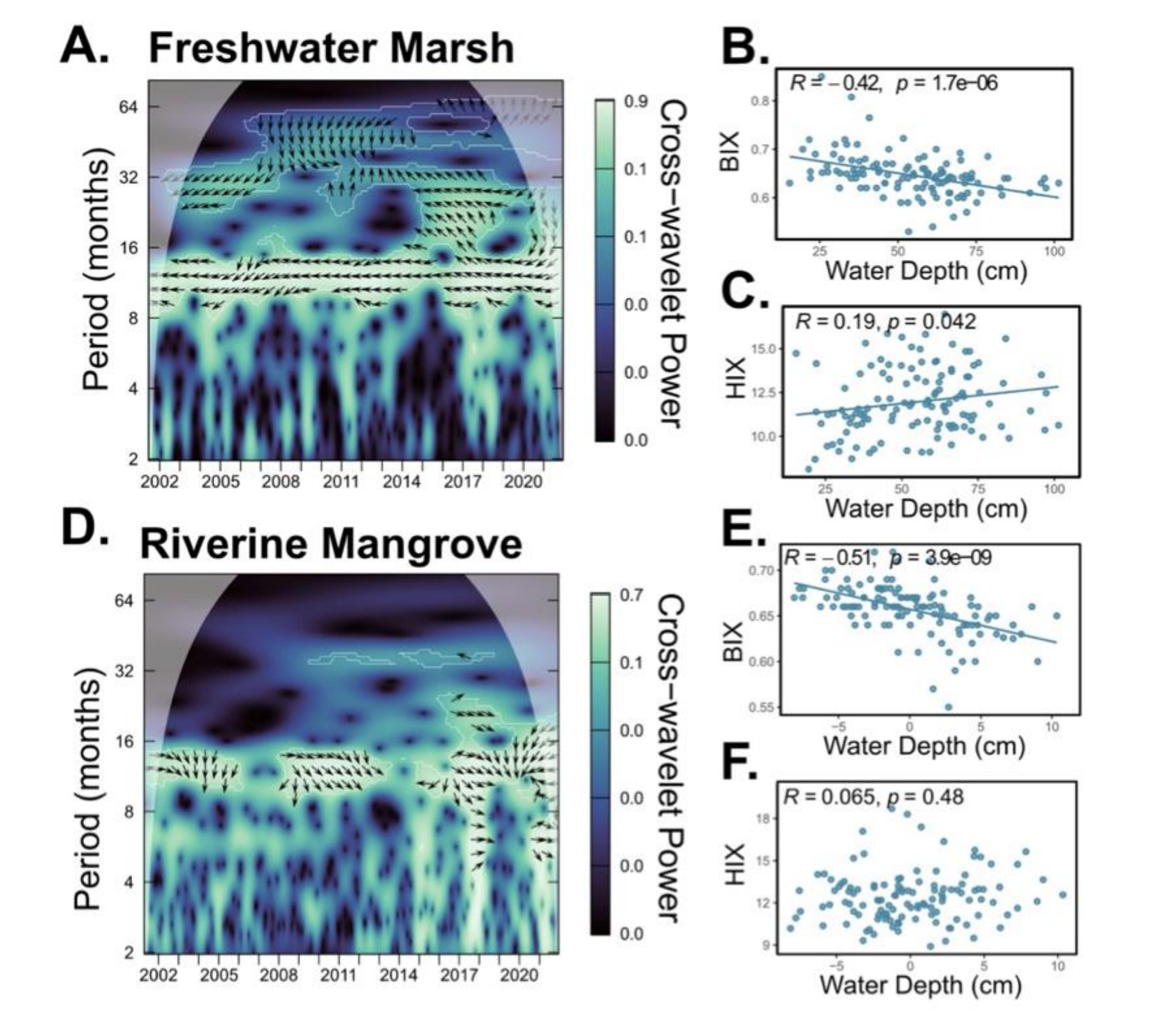


Figure 24A-24E. Long-term (2001-2021) patterns of DOC concentrations and compositions along marsh-to-mangrove gradients in Shark River Slough. Dissolved organic carbon patterns in Shark River Slough freshwater marsh (A-C) and riverine mangrove (D-F) habitats. Lighter areas with arrows on wavelet plots (A, D) indicate statistically significant cross-wavelet power between DOC concentrations (uMol/L) and water depth (cm). The facing of arrows at each time point describes the relationship between the two variables. Right facing arrows indicate the two variables are in phase, while left indicates out of phase. Arrows facing up indicate that changes in depth lag after changes in DOC, while arrows facing down indicate that changes in DOC lag changes in depth. Scatterplots use two fluorescence metrics: BIX (B, E) and HIX (C, F). Increasing BIX indicates increasing algal influence to DOC, while increase HIX indicates increasing humic influence to DOC

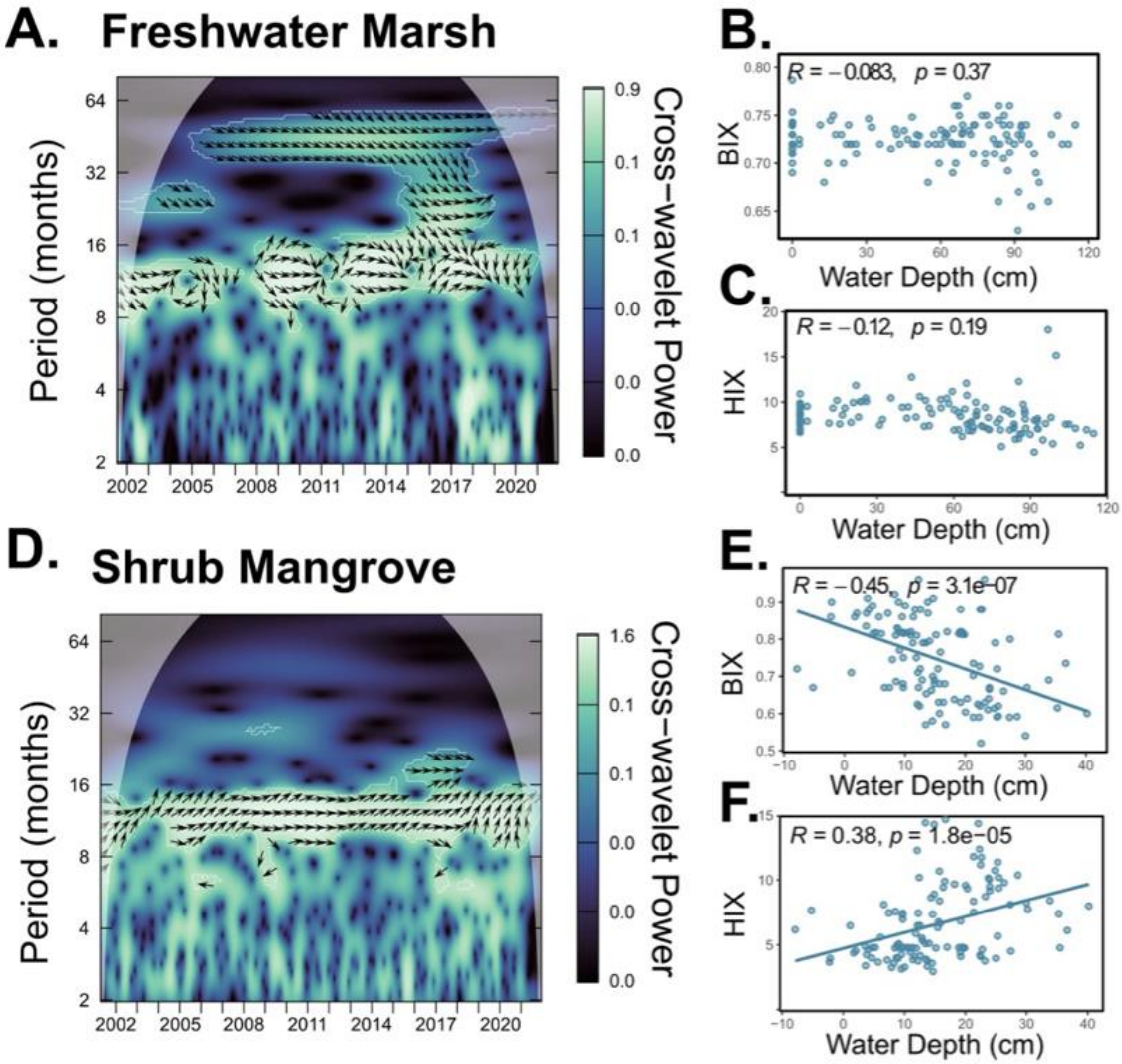


Figure 25A-25E. Long-term (2001-2021) patterns of DOC concentrations and compositions along marsh-to-mangrove gradients in Taylor Slough. Dissolved organic carbon patterns in Taylor Slough freshwater marsh (A-C) and shrub mangrove (D-F) habitats. Lighter areas with arrows on wavelet plots (A, D) indicate statistically significant cross-wavelet power between DOC concentrations (uMol/L) and water depth (cm). The facing of arrows at each time point describes the relationship between the two variables. Right facing arrows indicate the two variables are in phase, while left indicates out of phase. Arrows facing up indicate that changes in depth lag after changes in DOC, while arrows facing down indicate that changes in DOC lag changes in depth. Scatterplots use two fluorescence metrics: BIX (B, E) and HIX (C, F). Increasing BIX indicates increasing algal influence to DOC, while increase HIX indicates increasing humic influence to DOC.

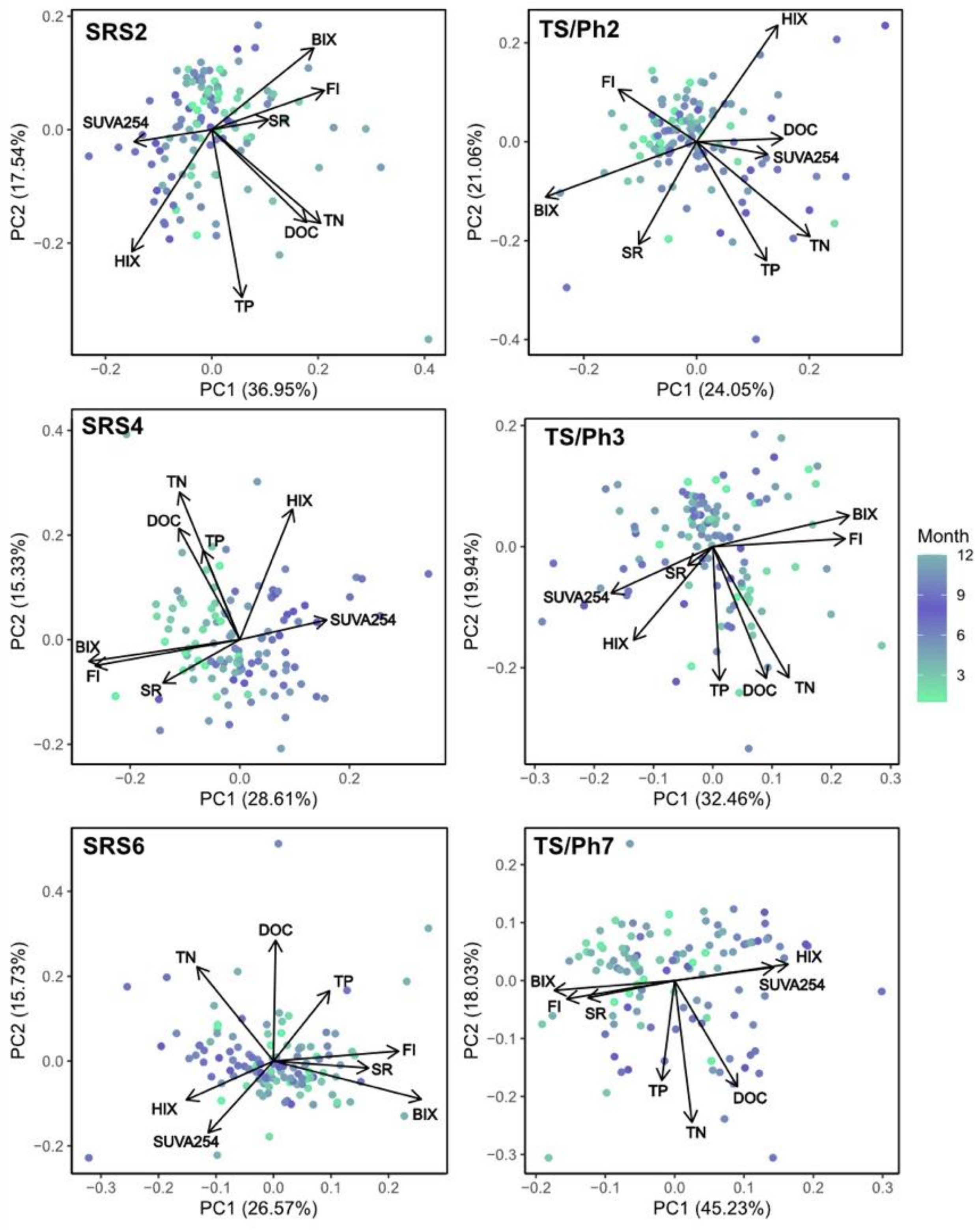


Figure 26. Long-term (2011-2021) patterns in seasonality of dissolved organic matter (DOM) along marsh-to-mangrove gradients of Shark River Slough (SRS) and Taylor Slough/Panhandle (TS/Ph). Wetland habitats include peat (SRS-2) and marl marshes (TS/Ph-2), ecotonal wetlands

(SRS-4, TS/Ph-3) and riverine (SRS-6) and scrub mangroves (TS/Ph-7).

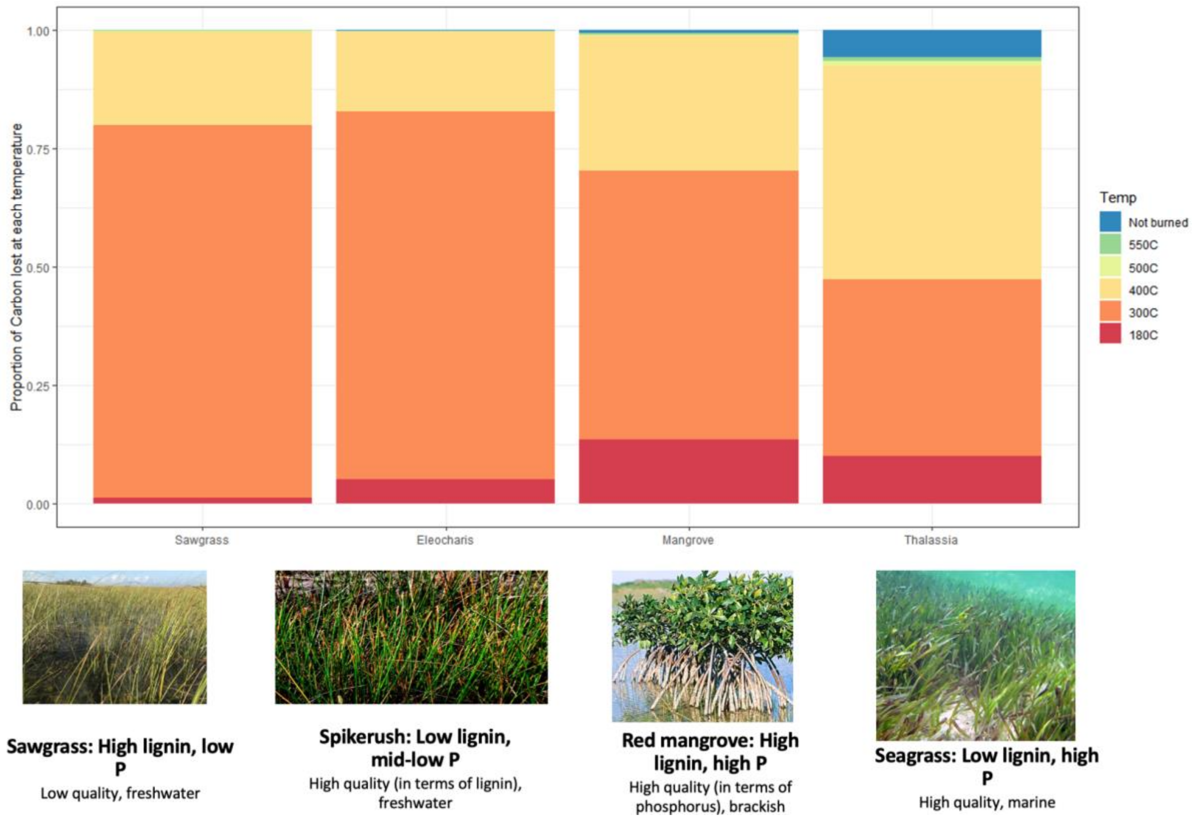


Figure 27. Ramped pyrolysis used to compare the relative recalcitrance of leaf litter species among marshes, mangroves, and seagrasses.

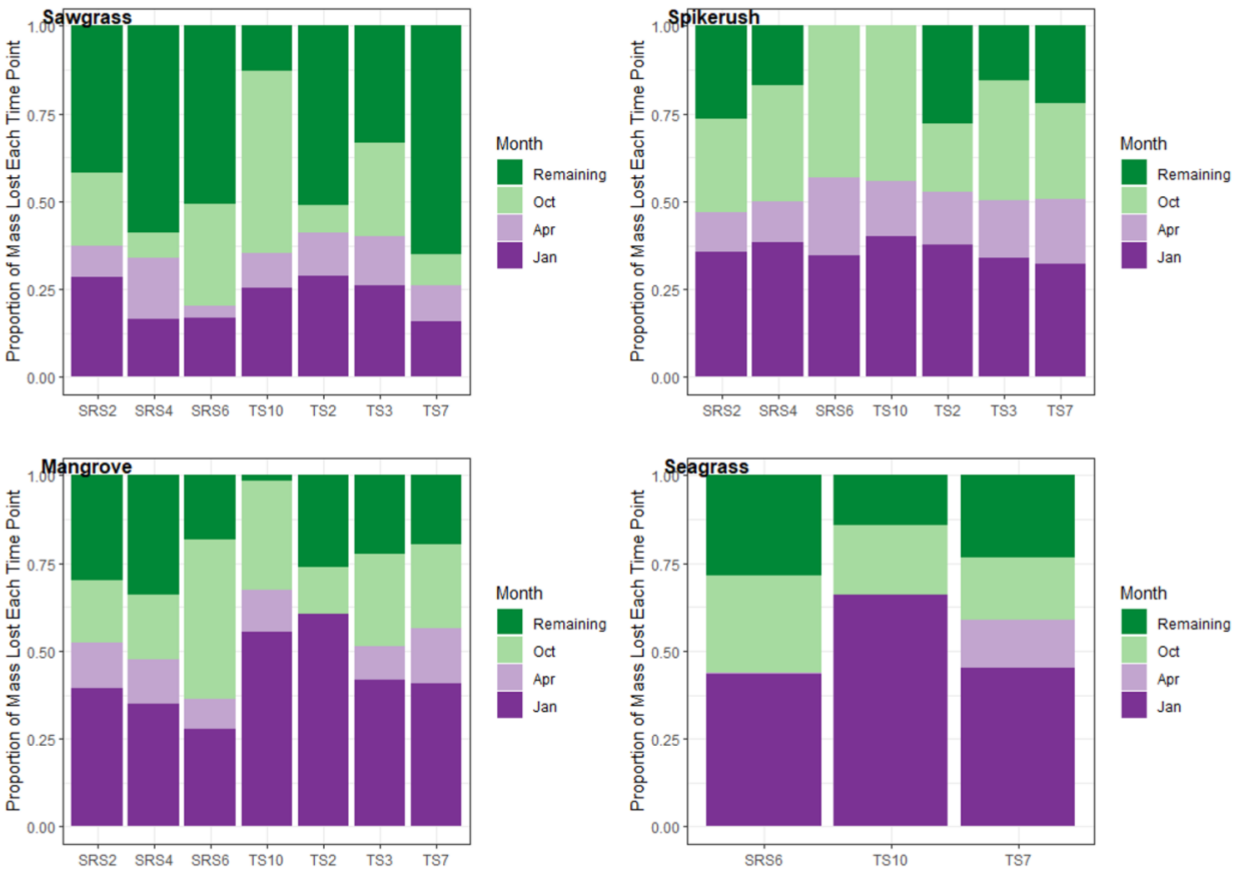


Figure 28. The breakdown rates (*k*) of dominant leaf litter species reciprocally incubated in marsh, mangrove, and seagrass ecosystems. Wetland habitats include peat (SRS-2) and marl marshes (TS/Ph-2), ecotonal wetlands (SRS-4, TS/Ph-3), riverine (SRS-6) and scrub mangroves (TS/Ph-7), and seagrass meadows (TS/Ph-10).

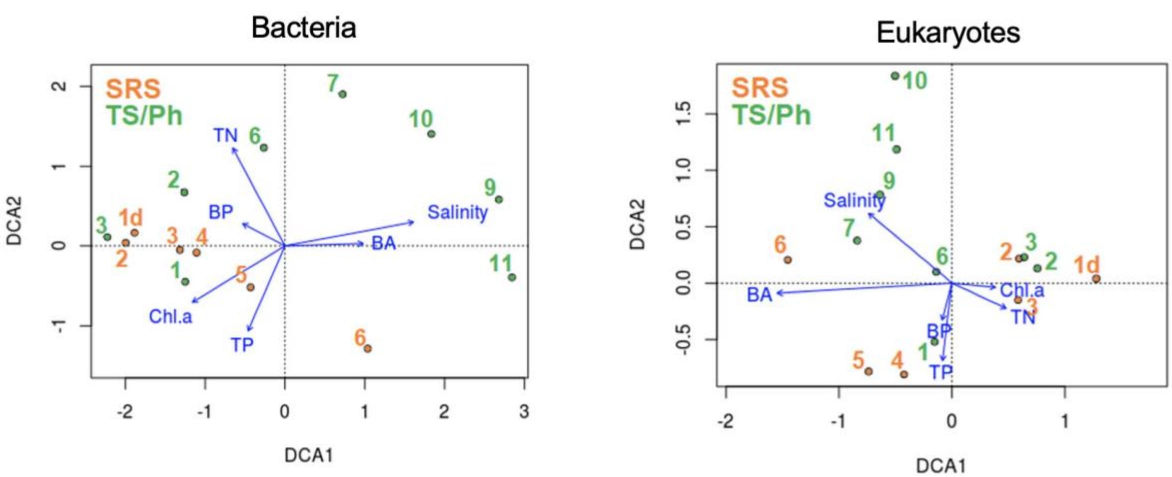


Figure 29. Water column microbial communities from monthly water samples collected along SRS and TS/Ph transects in 2018-2019. Published in Laas et al. 2022 *Microorganisms*.

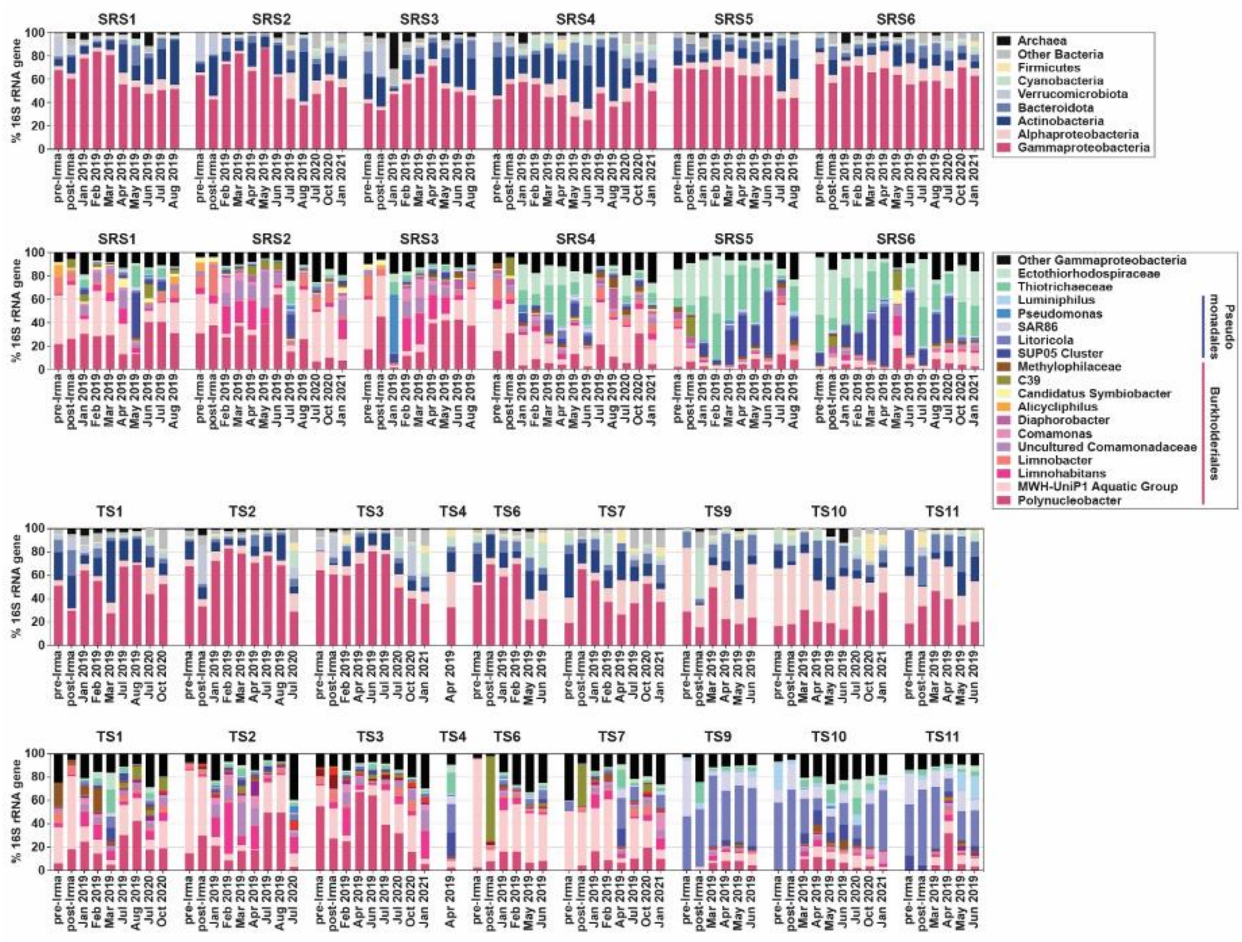


Figure 30. Summary of all 16S rRNA amplicon data from this project. The panels show main bacterial groups (upper panels) and subgroups of Gammaproteobacteria (lower panels) for Shark River Slough and Taylor Slough (TS/Ph).

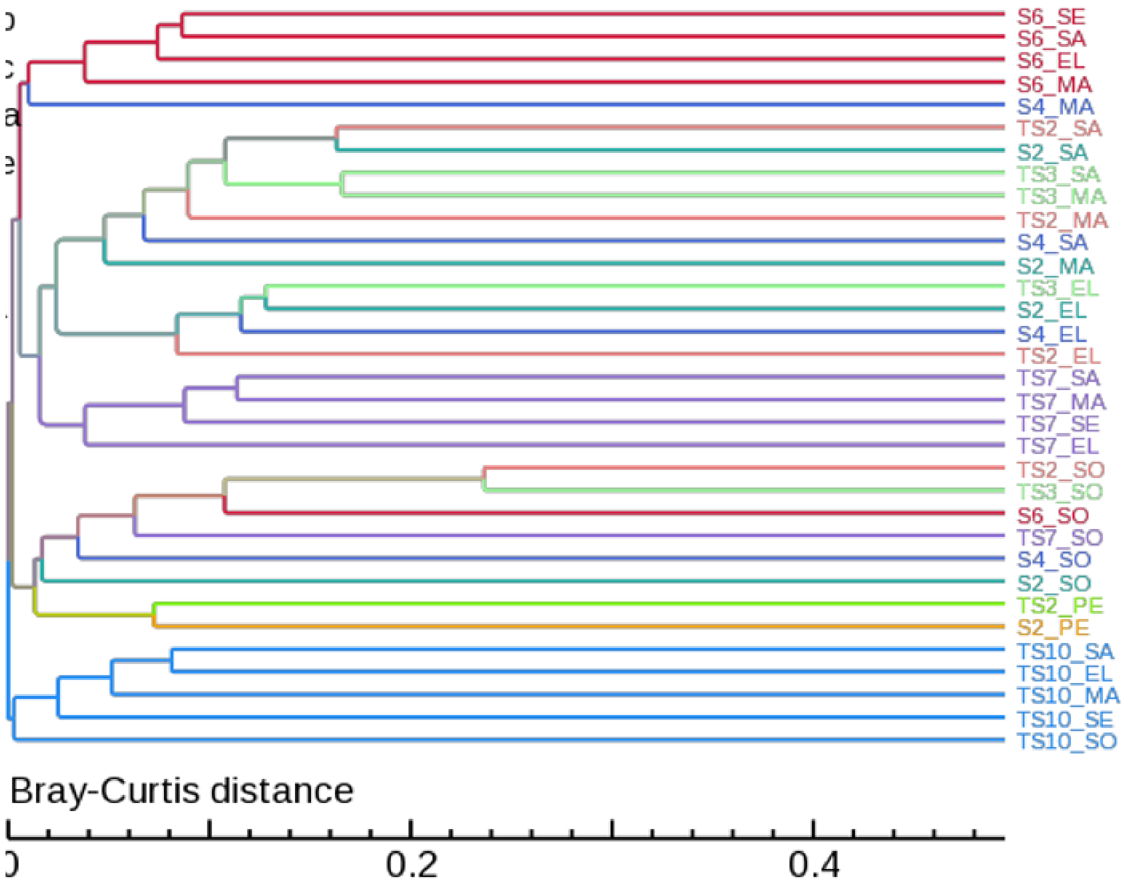


Figure 31. Taxonomic composition of messenger RNA retrieved from soil (SO), periphyton (PE), and litter samples (SE=seagrass, SA=sawgrass, EL=Eleocharis, MA=mangrove) at selected LTER core sites in the marshes, ecotones, mangrove-dominated, and coastal/oceanic sites. (software only allowed for 6 symbols; therefore: S = SRS, TS = TS/Ph sites).

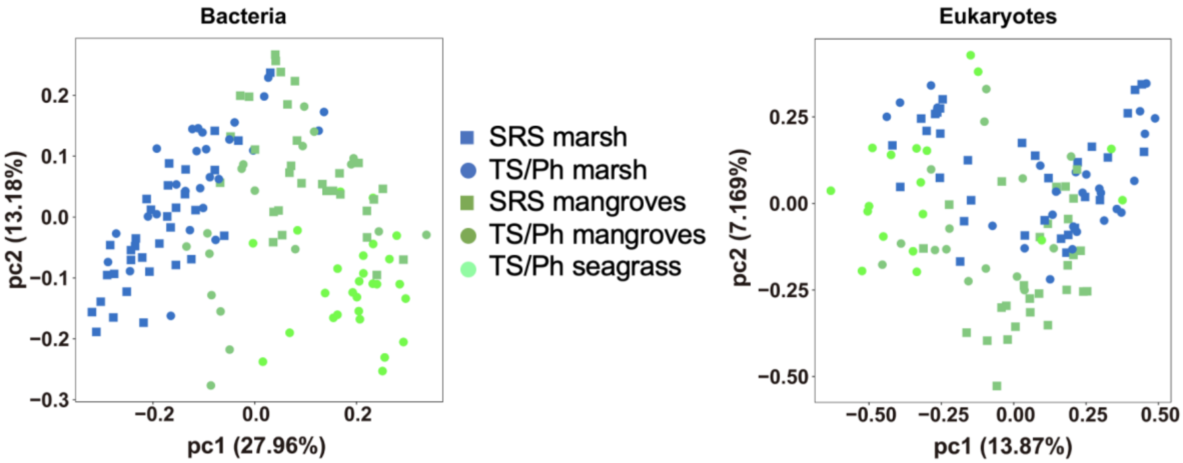


Figure 32. Principle Coordinate Analysis of Soil and sediment microbial community structure of Shark River and Taylor Slough transects separates freshwater wetland, mangrove wetland, and seagrass bed sediments. See Zhao et al. 2022 *Science of the Total Environment*.

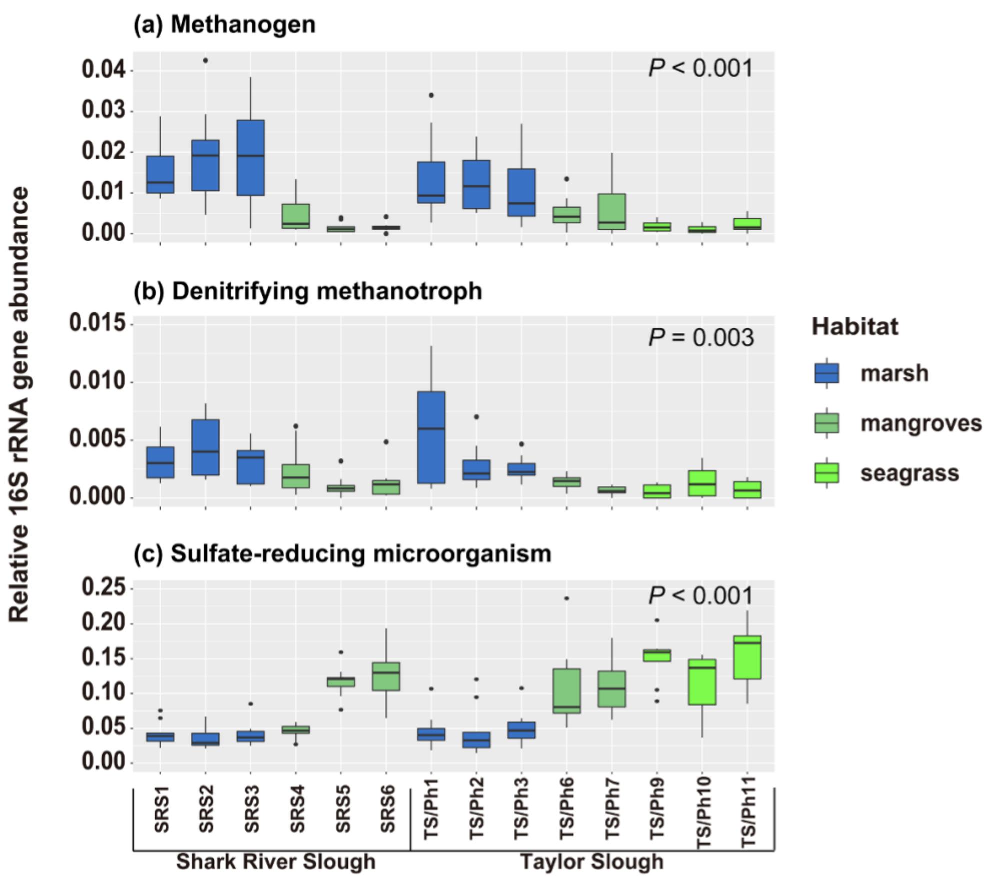


Figure 33. Relative abundances of selected prokaryotic functional guilds trace the freshwater-marine transition of methanogenic to sulfidogenic organic matter processing. Shown are relative abundances of (a) methanogens, (b) NC10 methanotrophs, (c) sulfur- and sulfate-reducing microorganisms, and (d) aerobic nitrifiers in Shark River and Taylor transects from February 2019 to October 2020. Main habitat types are color coded. See Zhao et al. 2022 *Science of the Total Environment*

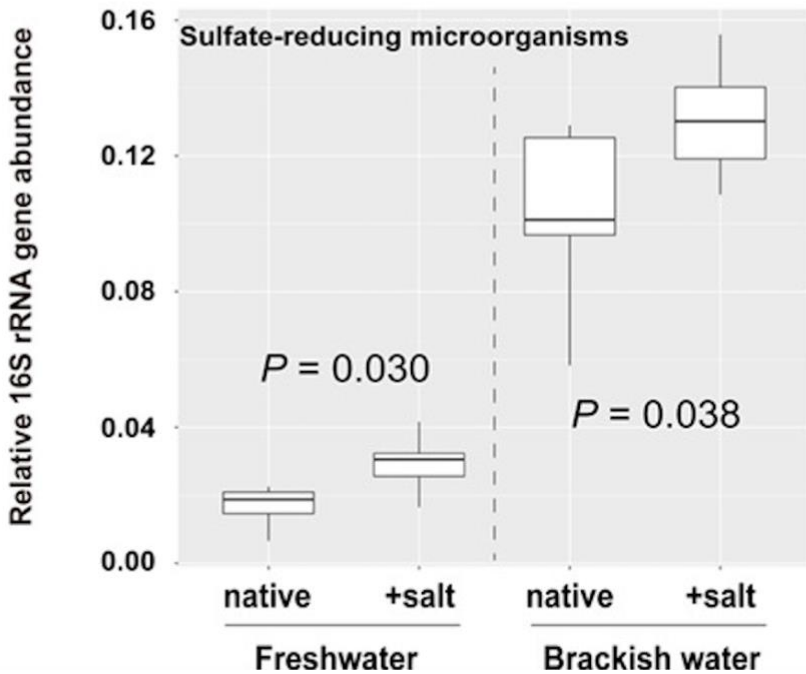


Figure 34. Relative abundances of 16S rRNA gene abundance of sulfate-reducing microorganisms in *in situ* experimental saltwater dosing wetlands in Everglades National Park. Wetlands were dosed monthly with elevated salinities (see Wilson et al. 2018 *Ecological Applications*, Servais et al. 2019 *Estuaries and Coasts*). See Zhao et al. 2022 *Science of the Total Environment*.

Vegetation:

- Accumulation rates of periphyton total inorganic carbon (TIC, 0.03-0.9 g m^{-2} d^{-1}) were highest in seagrass communities and TS/Ph marshes, lowest in SRS sloughs (**Fig. 35**).
- In TS/Ph, freshwater restoration is increasing yet salinity is increasing at the ecotone since 2020 (**Fig. 36**), and marsh surface water TP has increased since 2014 (**Fig. 37**).
- Sawgrass biomass and productivity are declining at freshwater sites (**Fig. 38**) and *Eleocharis* stem density is declining at the ecotone (TS/Ph-3; **Fig. 39**).
- Long-term mangrove biomass and productivity declined after Hurricane Irma and have recovered differently among sites and seasons (**Figs. 40-46**).
- Mangrove recovery from Hurricane Irma is spatiotemporally variable (**Figs. 47-49**).

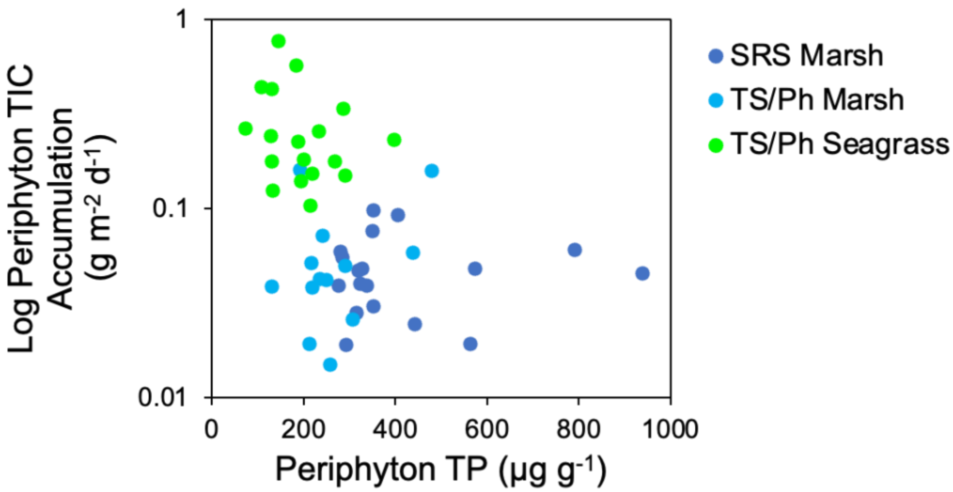


Figure 35. Inorganic carbon accumulation rates on artificial substrates at FCE marsh sites from 2001-2020 showing highest calcification rates where phosphorus availability is highest.

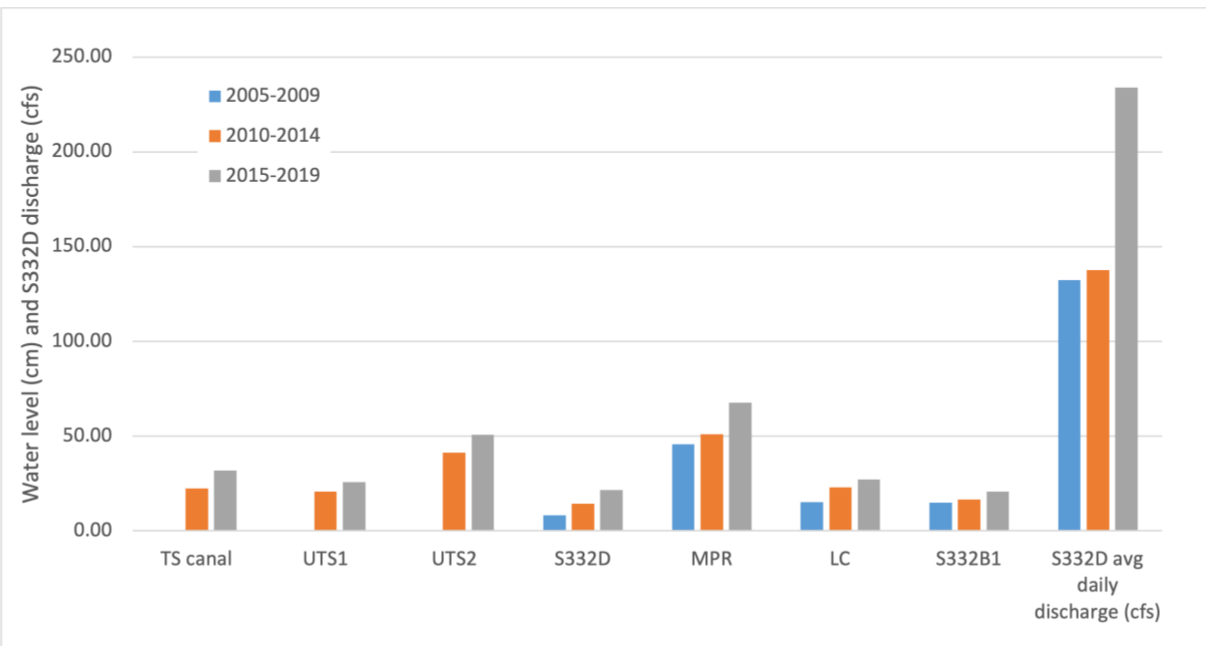


Figure 36. Average daily water level and S332D discharge at Taylor Slough freshwater marsh sites. S332D (TS/Ph-1), Main Park Road (TS/Ph-2), Lower Central (TS/Ph-3).

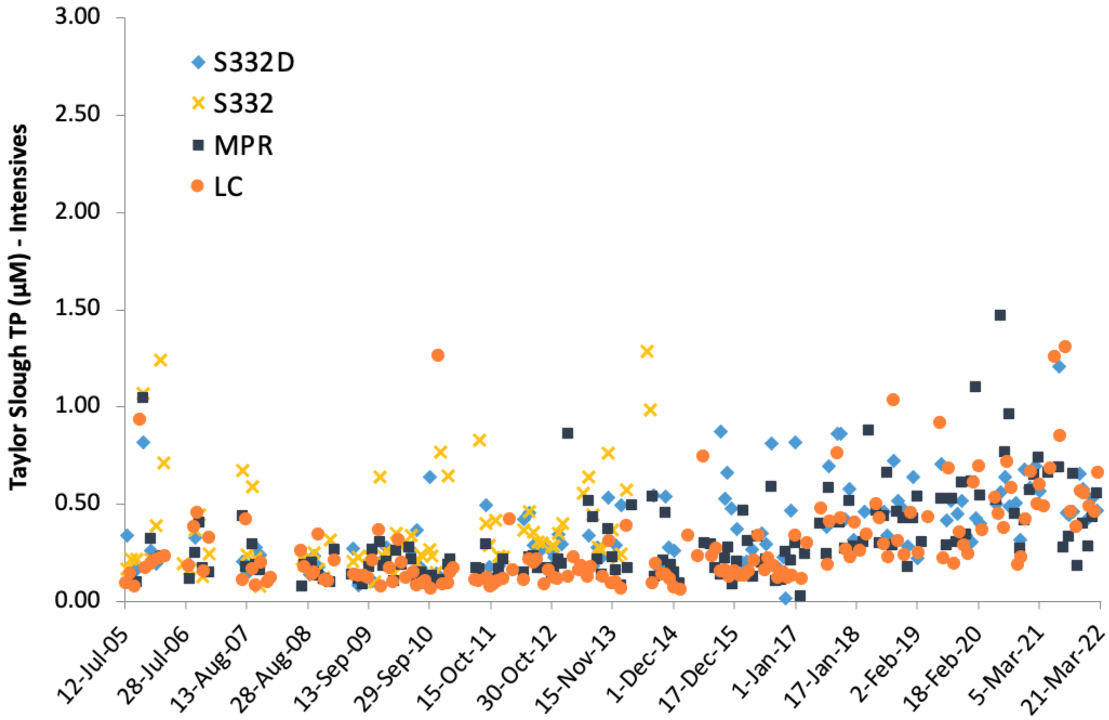


Figure 37. Surface water TP concentrations (intensive sampling) at TS/Ph-1, 2, and 3. S332D (TS/Ph-1), Main Park Road (TS/Ph-2), and Lower Central (TS/Ph-3).

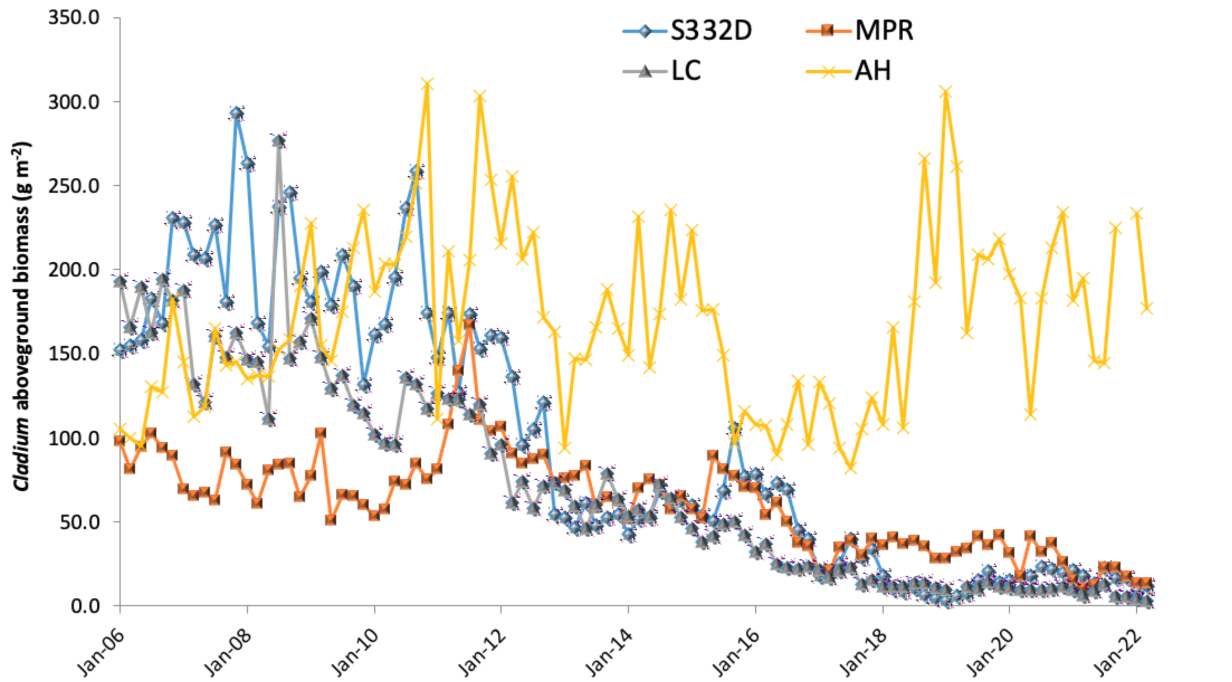


Figure 38. Long-term (2006-2022) *Cladium* aboveground biomass at Taylor Slough marsh sites. S332D (TS/Ph-1), Main Park Road (TS/Ph-2), Lower Central (TS/Ph-3), and Argyle Henry (TS/Ph-6).

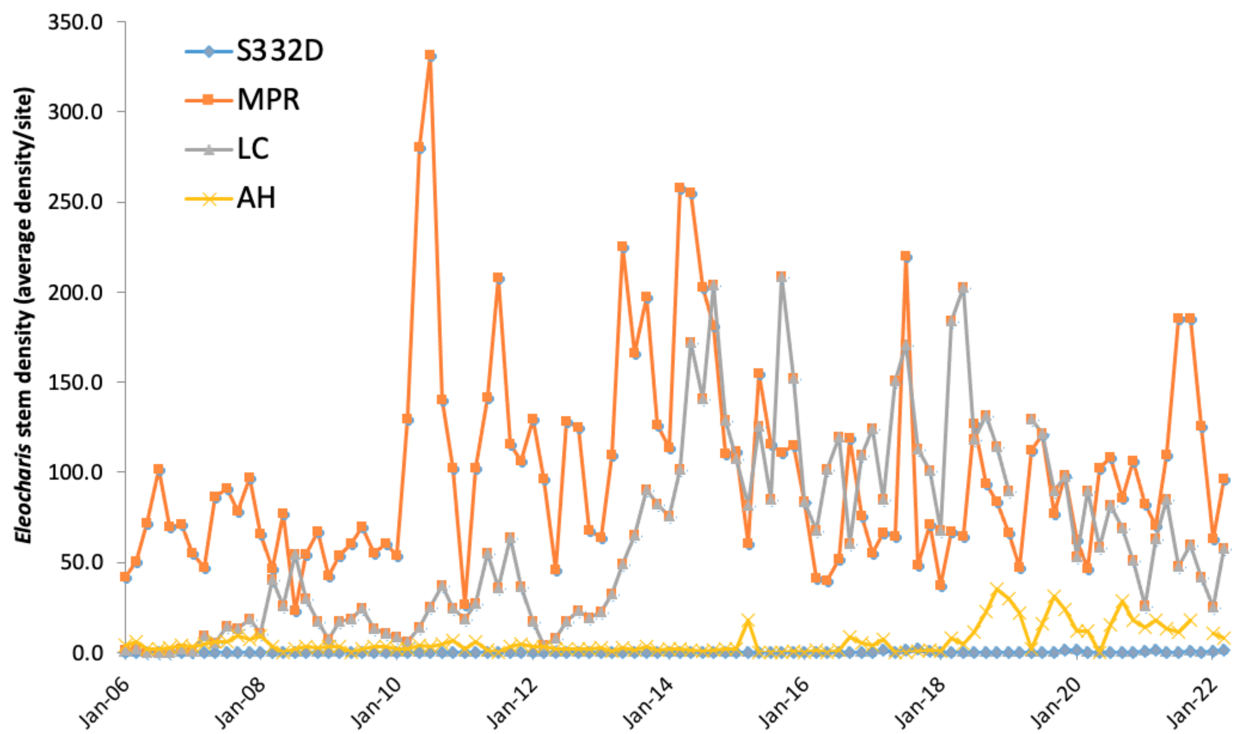


Figure 39. Long-term (2006-2022) *Eleocharis* stem density at Taylor Slough marsh sites. S332D (TS/Ph-1), Main Park Road (TS/Ph-2), Lower Central (TS/Ph-3), and Argyle Henry (TS/Ph-6).

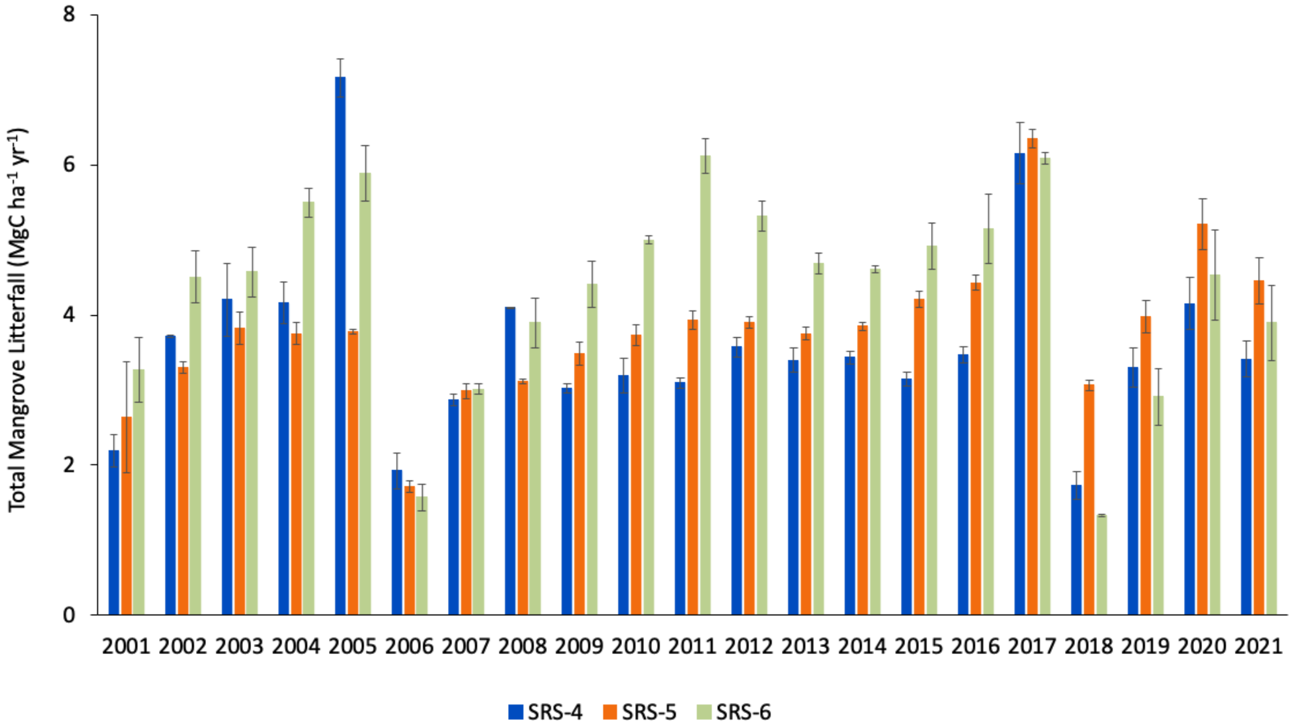


Figure 40. Long-term (2001-2021) variation in total annual litterfall production in riverine mangrove forests along Shark River estuary before and after the passage of Hurricanes Wilma (October 2005) and Irma (September 2017) across the FCE.

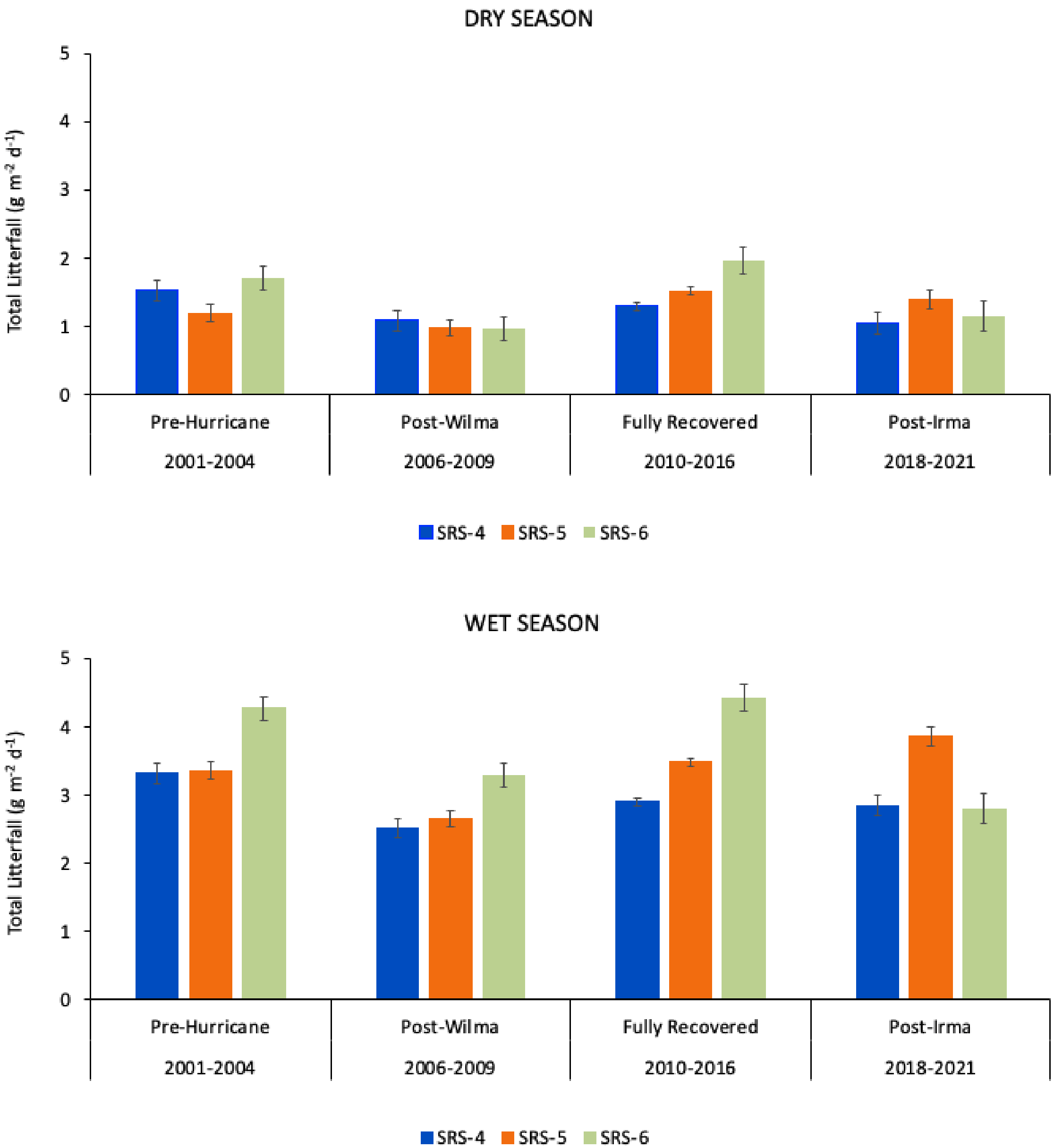


Figure 41. Long-term (2001-2021) seasonal variation in daily rates of litterfall production in riverine mangrove forests along Shark River estuary before and after the passage of Hurricanes Wilma (October 2005) and Irma (September 2017) across the FCE.

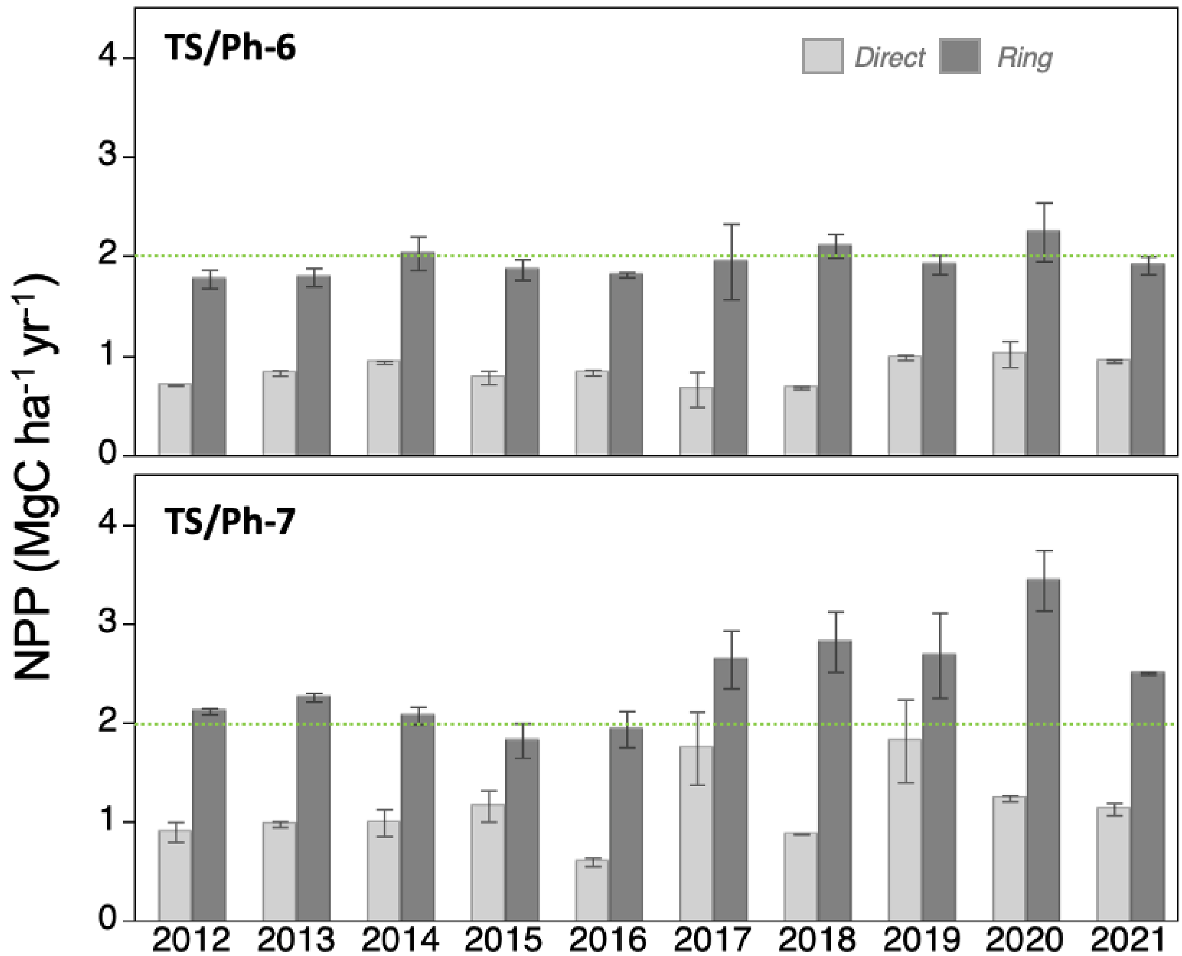


Figure 42. Long-term (2012-2021) variation in total annual leaf NPP rates of *R. mangle* dominated scrub mangrove forests along Taylor River estuary using a leaf tagging methods comparison (i.e., direct vs. rink markers).

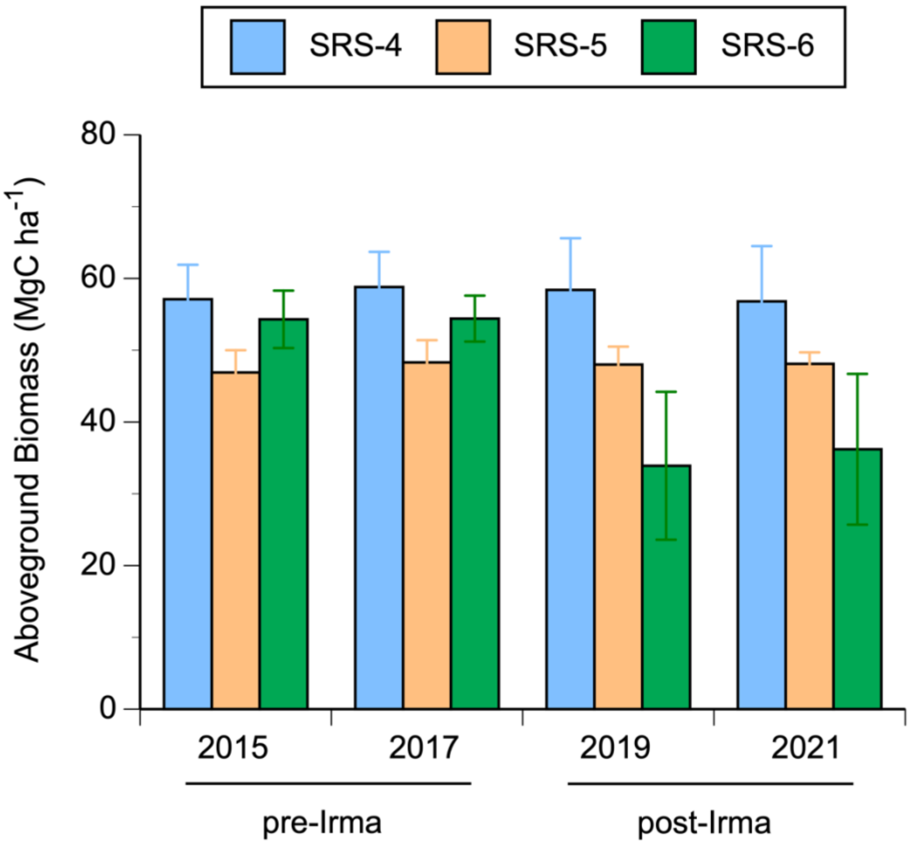


Figure 43. Long-term (2015-2021) changes in aboveground wood biomass in riverine mangrove forests along Shark River estuary before and after the passage of Hurricane Irma (September 2017) across the FCE. During 2017, sampling at all sites was conducted in May.

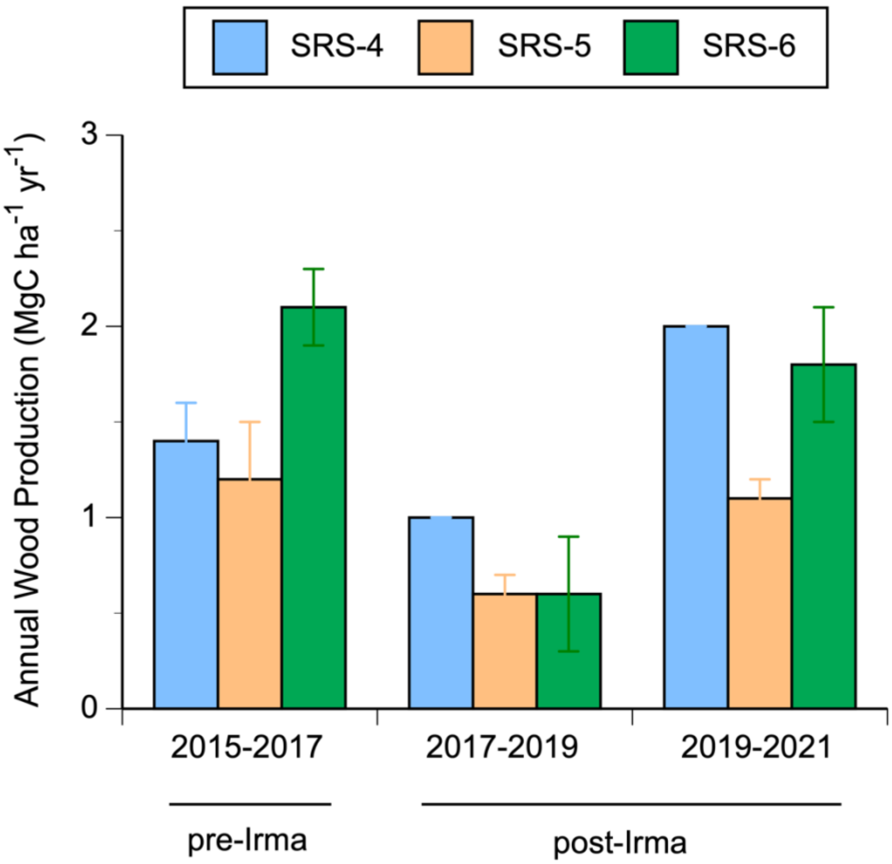


Figure 44. Long-term (2015-2021) variation in total annual wood production in riverine mangrove forests along Shark River estuary before and after the passage of Hurricane Irma (September 2017) across the FCE.

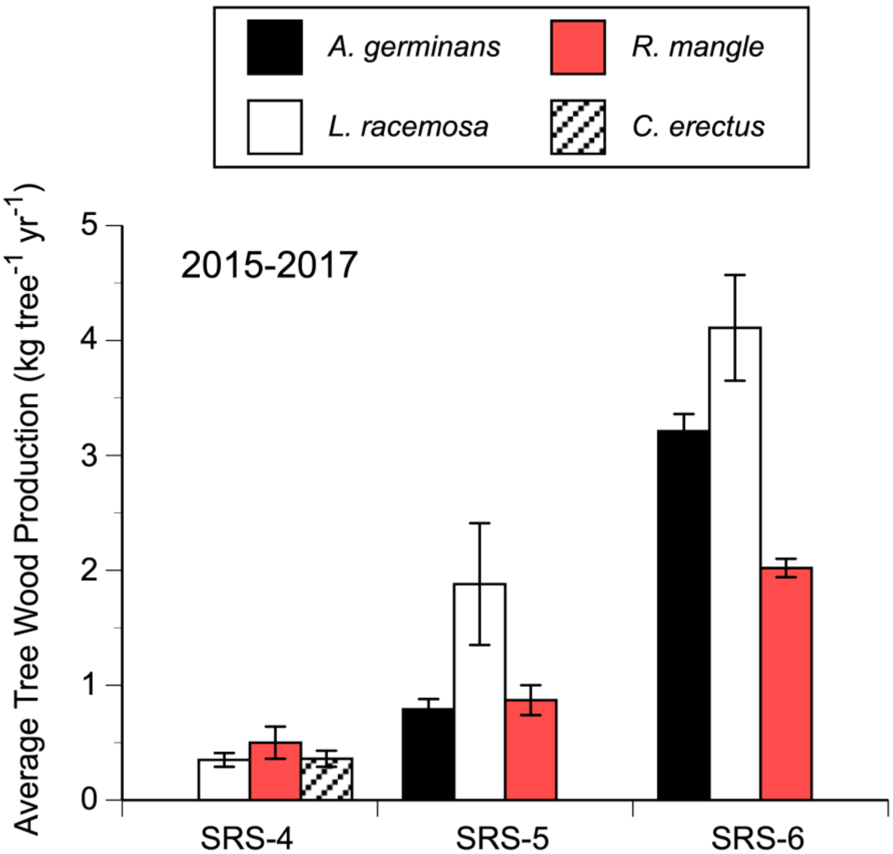


Figure 45. Average (2015-2017) annual wood production per species in riverine mangrove forests along Shark River estuary.

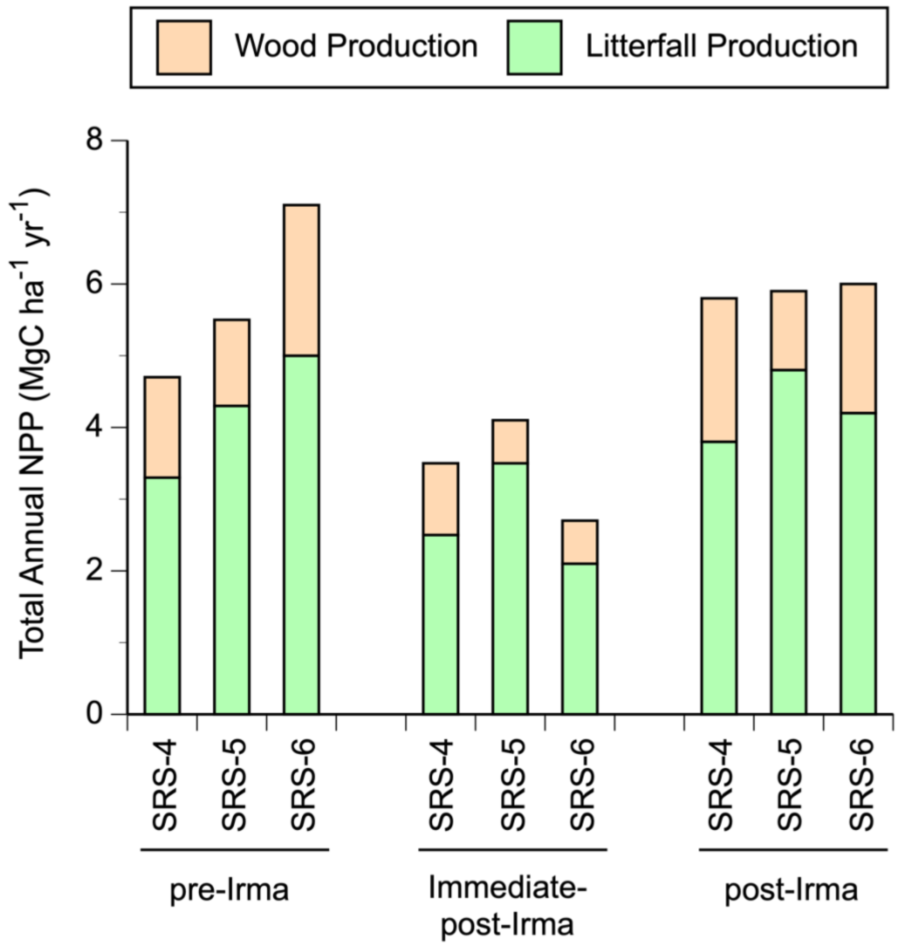


Figure 46. Long-term (2015-2021) variation in total (Litterfall + Wood Production) annual net primary productivity (NPP_T) in riverine mangrove forests along Shark River estuary before and after the passage of Hurricane Irma (September 2017) across the FC

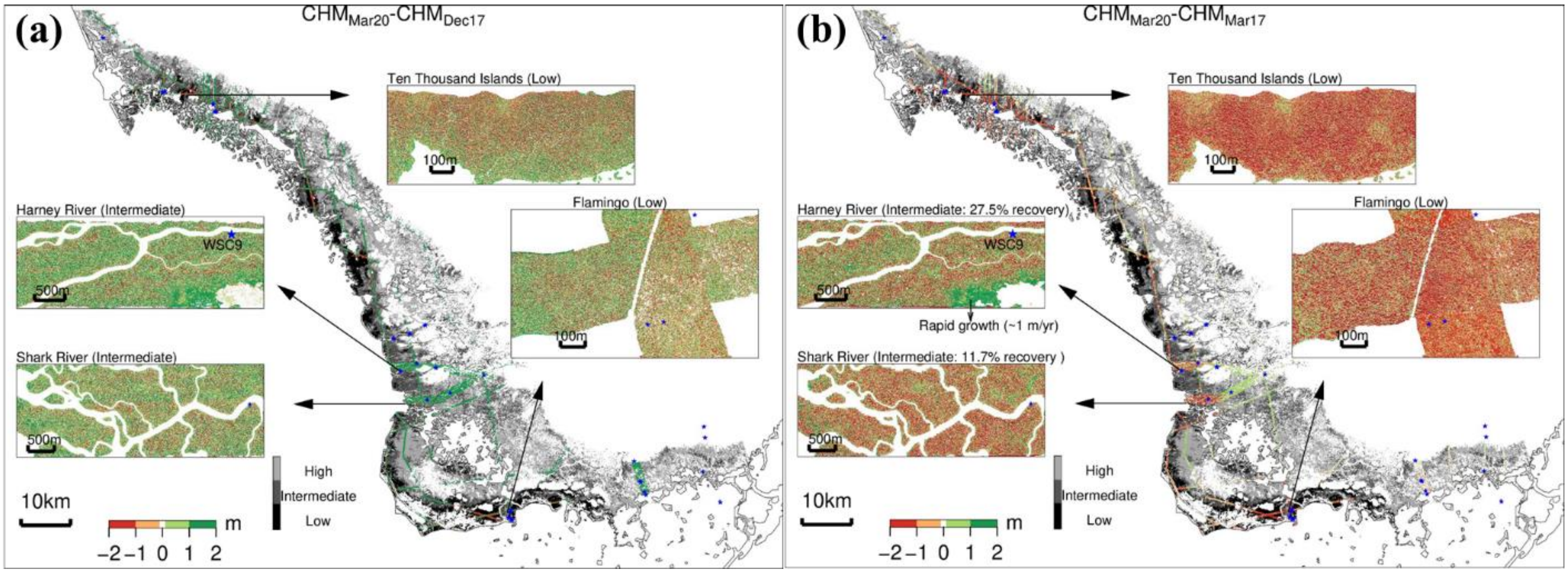


Figure 47. Canopy height regrowth and recovery of mangrove forests in ENP. (a) Canopy height regrowth from December 2017 to March 2020 showed similar patterns that were tracked with previous satellite observations from Lagomasino et al. (2021). (b) Canopy height recovery from March 2017 to March 2020 indicated a wide range of responses to Hurricane Irma.

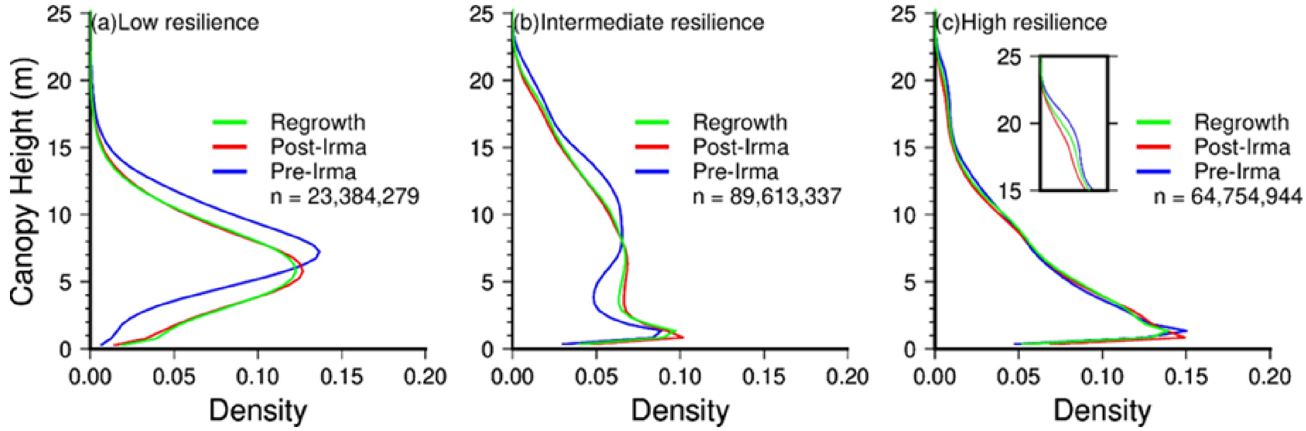


Figure 48. Canopy height frequency distribution models from G-LiHT derived Canopy Height Models (CHMs) in low (a), intermediate (b), and high (c) resilience areas. The bin size for the density distribution is 0.5 m. The “n” value is equal to the number of 1 x 1 m pixels within the CHM.

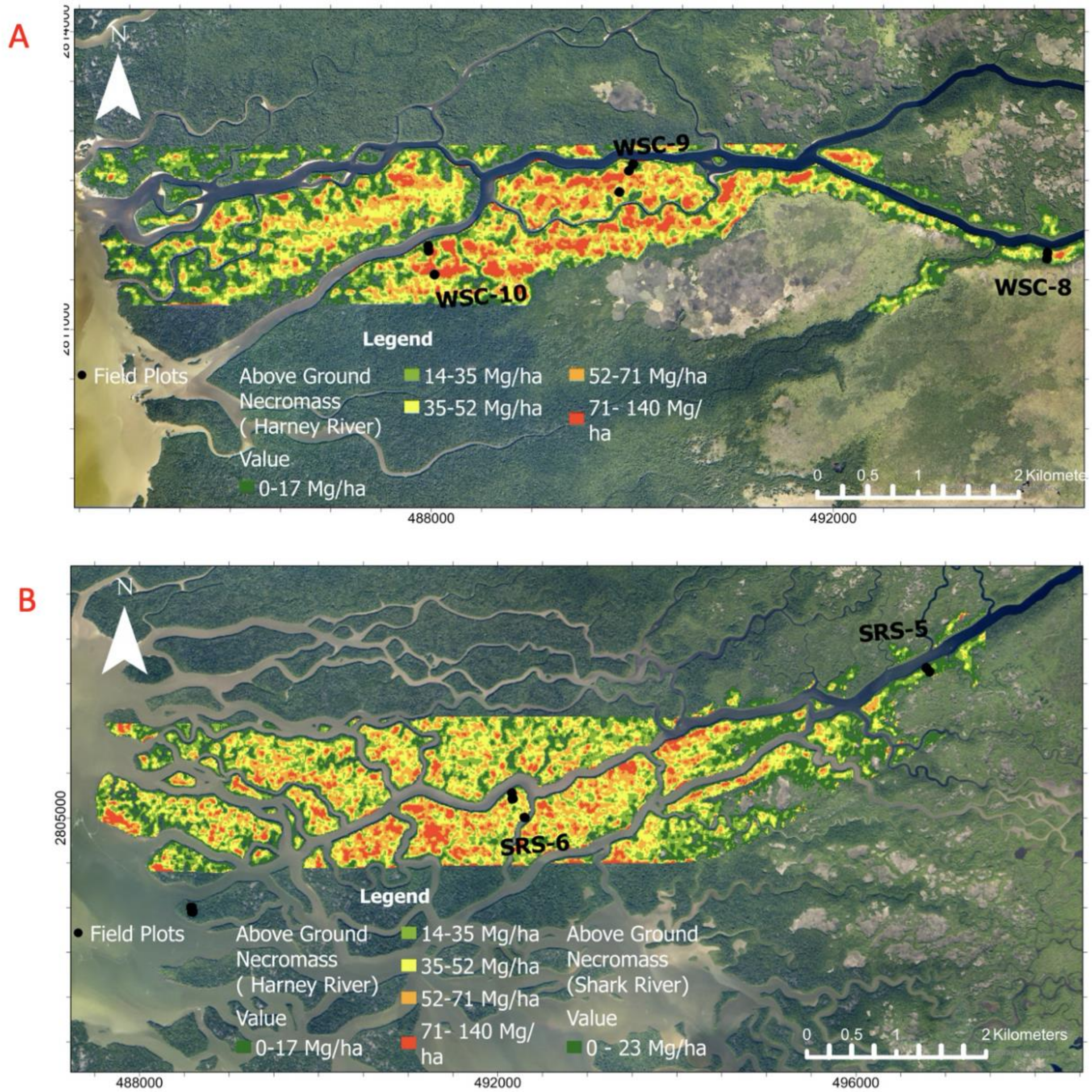


Figure 49. Spatial distribution of aboveground standing necromass in the Harney River (a) and Shark River (b) in southwestern Everglades after the passage of Hurricane Irma across the FCE.

Consumers:

- Snook movement numbers and timing vary annually (**Fig. 50**) based on river stage (**Figs. 51, 52**).
- Salinity and depth in marsh habitat most influence probability of occurrence or large-mouth bass (**Figs. 53-55**).
- Water temperature prior to sampling explained interannual variation in abundance and diversity of sunfish prey subsidies (**Figs. 56, 57**).

- Drought-resistant, invasive Asian swamp eels cause crayfish population collapse (**Fig. 58**).
- Isotopic mixing models of $\delta^{15}N$ and $\delta^{13}C$ identified upstream marsh and downstream marine sources of nutrients in coastal lakes (**Fig. 59**).
- Alligators forage in canals sites which have abundant prey year-round and bask in shallow sawgrass habitats (**Fig. 60**).
- Food webs in Florida Bay have changed in response to seagrass die-off with 18% increase in seagrass and 7% decrease in epiphyte contributions (**Fig. 61**).

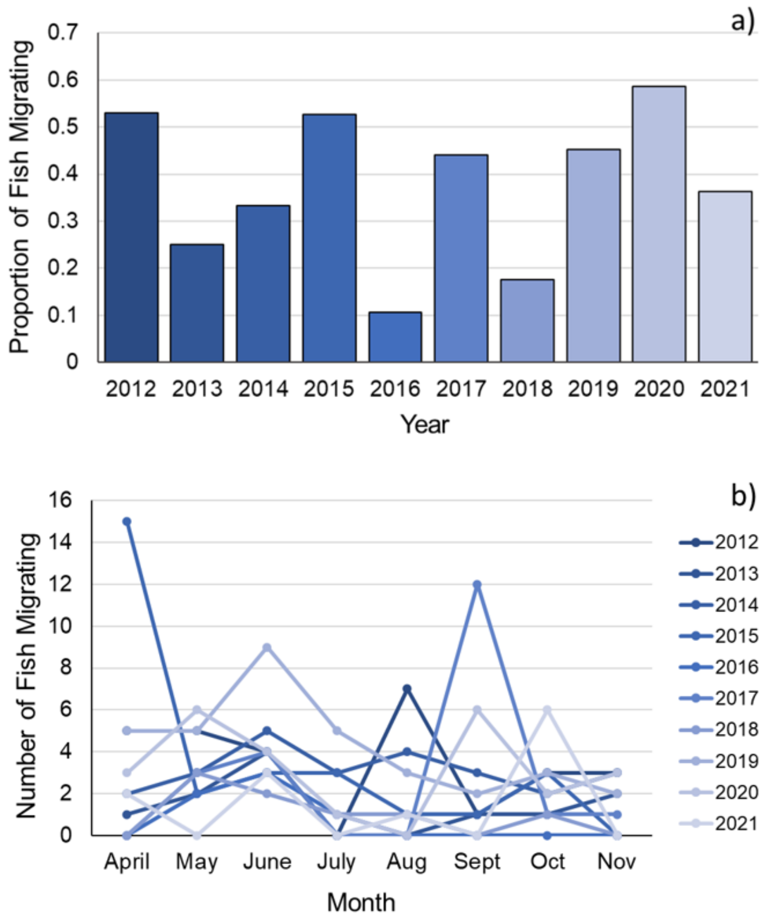


Figure 50. Illustration of the high degree of variability in both the proportion of tagged Common Snook migrating each year, and the timing of migration within each spawning season. Panel a) depicts the proportion of fish observed migrating in each year of the study, ranging from 11% in 2016 to 53% in 2012 and 2015. Panel b) illustrates the protracted migration period, with migrations occurring in all months of the spawning season. Each year is color coded and consistent between panels a) and b). Figure updated from Massie et al. (2022).

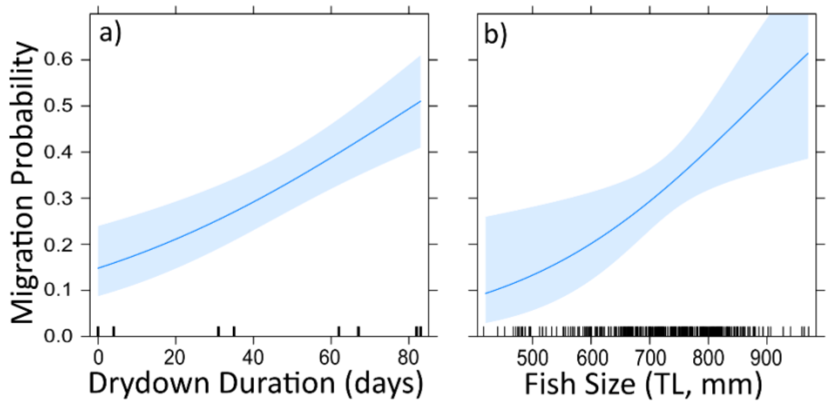


Figure 51. Plotted variables from Massie et al. (2022) for the best-fitting logistic regression model (Drydown Duration + Fish Size) for the annual migratory intensity of Common Snook bounded by a 95% confidence interval. Individual effects of each variable in the best model are assessed by holding the other variables at a fixed mean value.

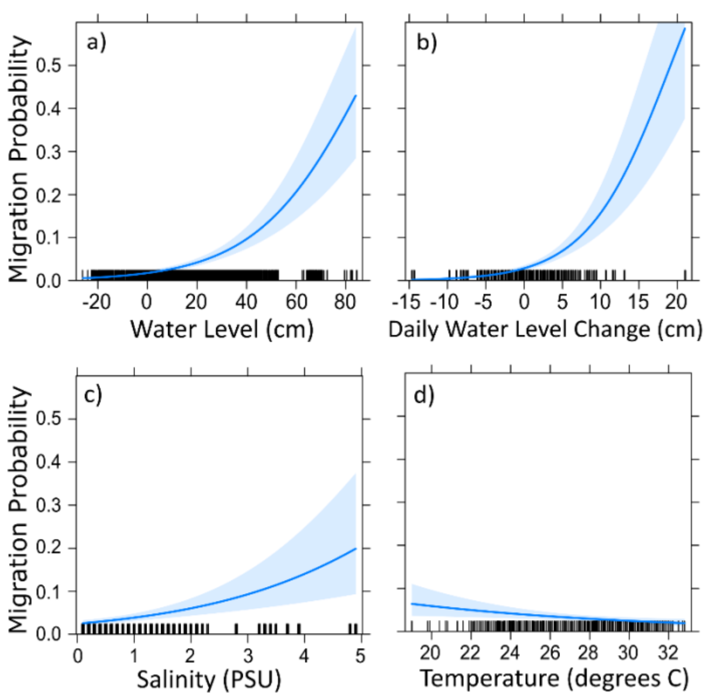


Figure 52. Plotted variables from Massie et al. (2022) for the best-fitting logistic regression model for the daily environmental cues predicting downstream migration timing for Common Snook during the spawning season bounded by a 95% confidence interval. Individual effects of each variable in the best model are assessed by holding the other variables at a fixed mean value.

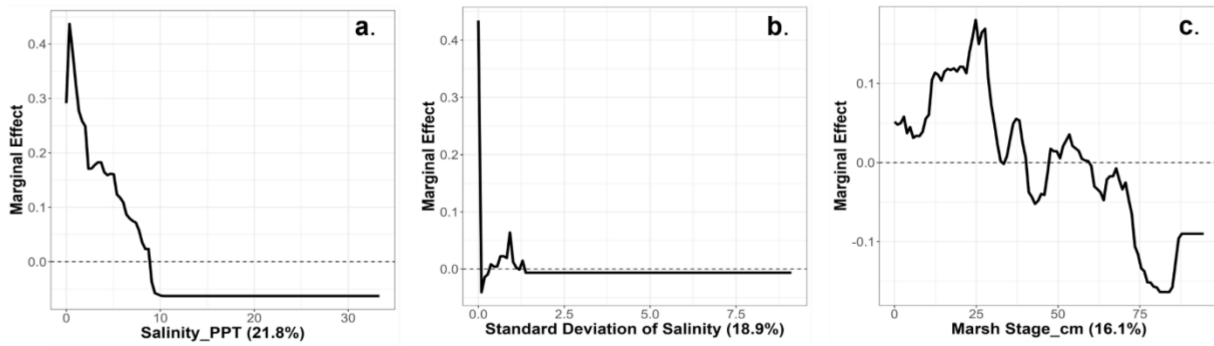


Figure 53. Marginal effect plots for the top three most important variables affecting Florida Largemouth Bass habitat use in BRT and their relative importance; salinity 21.8% (a), variation in daily salinity 18.9% (b), and marsh stage 16.1% (c).

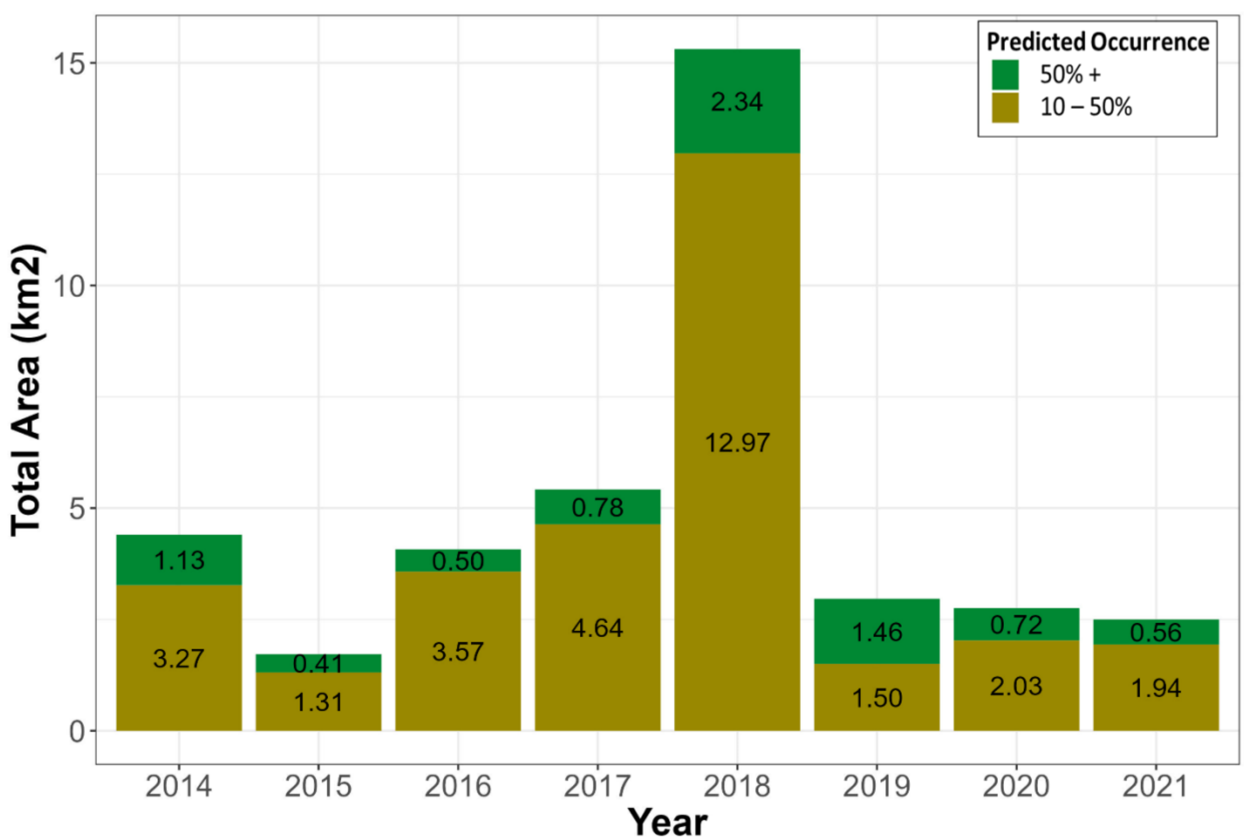


Figure 54. Total area used by Florida Largemouth Bass that are classified as conditional (10-50%) and core (> 50%) by year. Values are the cumulative sum for each class

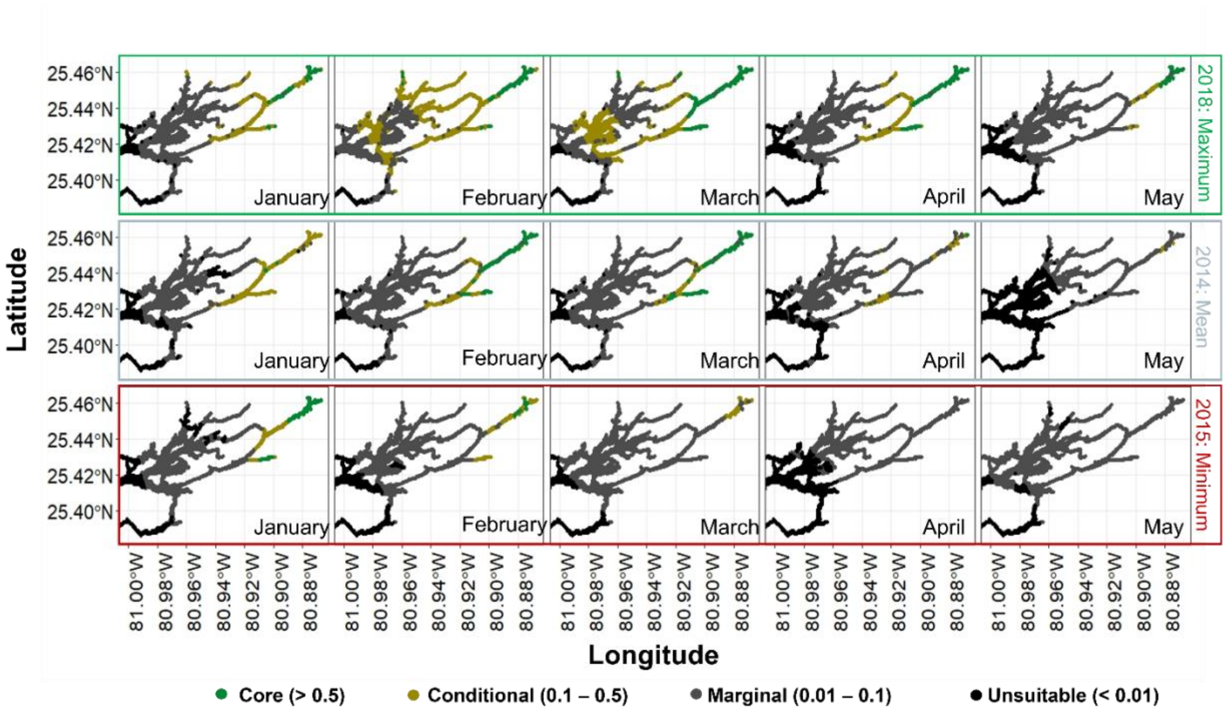


Figure 55. Florida Largemouth Bass habitat classifications based on BRT results by month to visualize the spatiotemporal variation under Maximum (2018), Minimum (2015), and Mean (2014) coverage years.

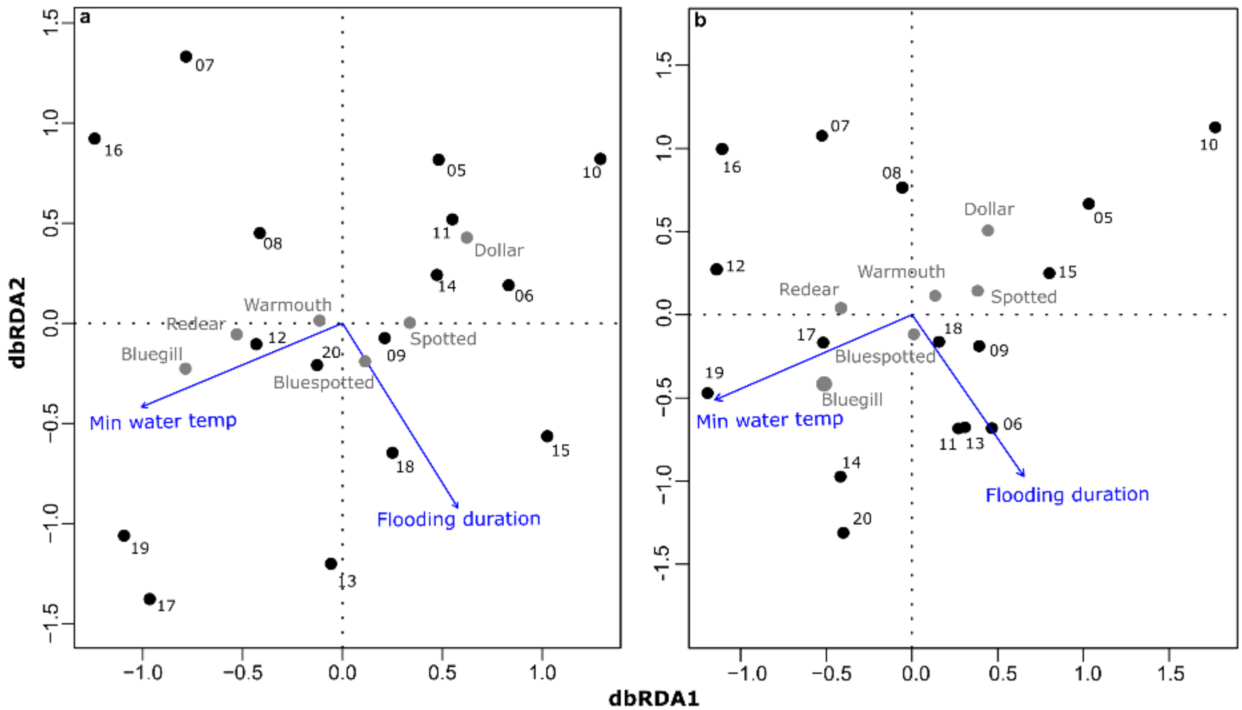


Figure 56. Distance-based redundancy analysis (dbRDA) ordination plot of multivariate peak dry season sunfish abundance (a) and biomass (b) data in each year of the study. Sampling years are represented by black points (20--), sunfish species scores are indicated with gray points, and environmental variable vectors of minimum temperature (within the prior 90 days) and flooding duration (days marsh water depth was greater than 30 cm in the prior wet season) represented as arrows. The minimum temperature was a significant predictor of community abundance and biomass composition ($p < 0.05$) while flooding duration had a weak effect ($0.1 > p > 0.05$).

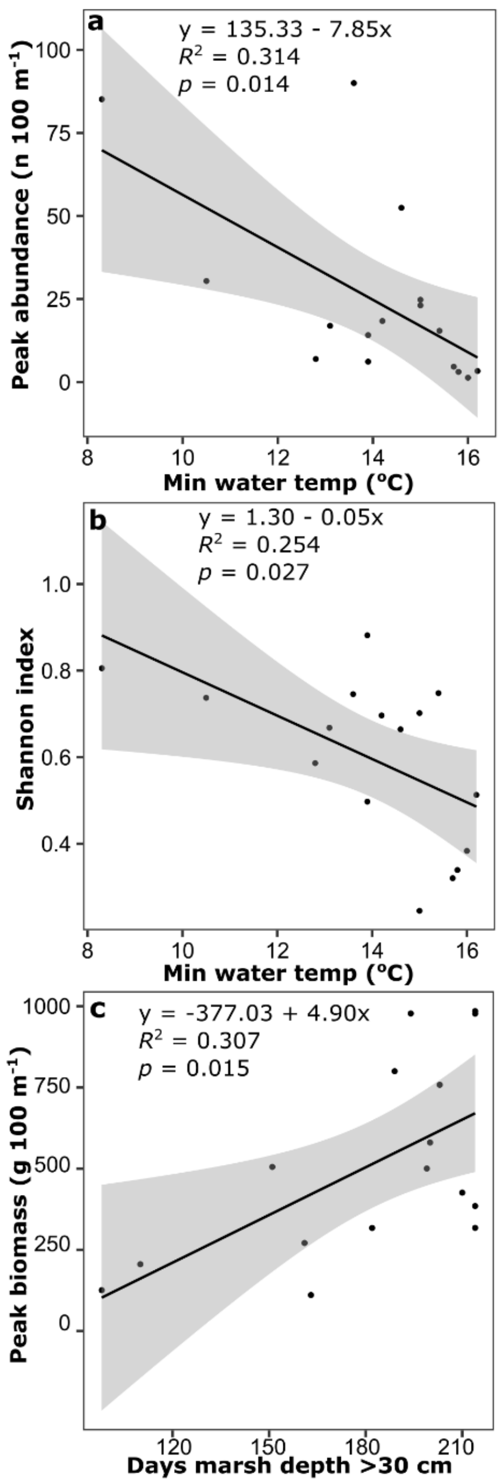


Figure 57. Regression results relating peak dry sunfish abundance per 100 m of river shoreline (a) and Shannon diversity index at peak abundance (b) in each year to the minimum water temperature within the prior 90 days and relating peak dry season sunfish biomass per 100 m of river shoreline (c) to flooding duration (number of days marsh depth was greater than 30 cm) during the prior year's wet season (June 1st to December 31st)

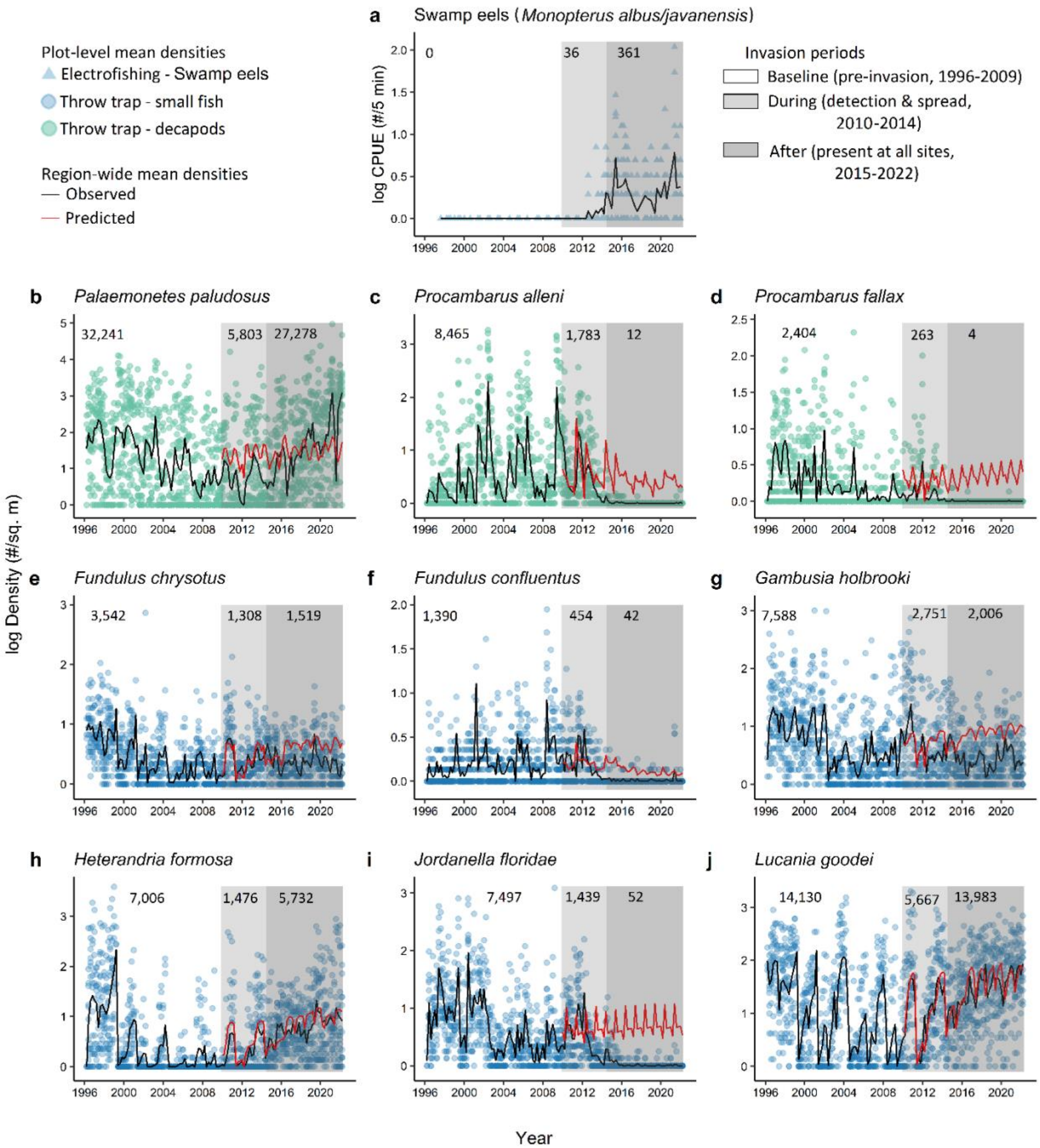


Figure 58. (a) Densities (catch-per-unit-effort [CPUE]; # / 5-min transect) of swamp eels caught by electrofishing in Taylor Slough of Everglades National Park from 1996–2022. (b–i) Densities (log-transformed # / m2) of the three most common decapods (b–d) and six most common small fishes (e–j) collected from throw traps in Taylor Slough of Everglades National Park from 1996–2022. The light shaded area represents the "during" period when swamp eels were spreading (Figs. 1, 2a) through Taylor Slough (2010–2014), while the dark shaded area represents the "after" period when swamp eels were established across Taylor Slough (2015–2022). The black line is the mean density of all plots during each sampling period; the red line is the mean density following the arrival of swamp eels predicted by the parameterized models of hydrologic conditions from prior to swamp eel arrival (1996–2009); error bars are excluded for clarity. Numbers within plots are the total abundance of each species during the three invasion periods.

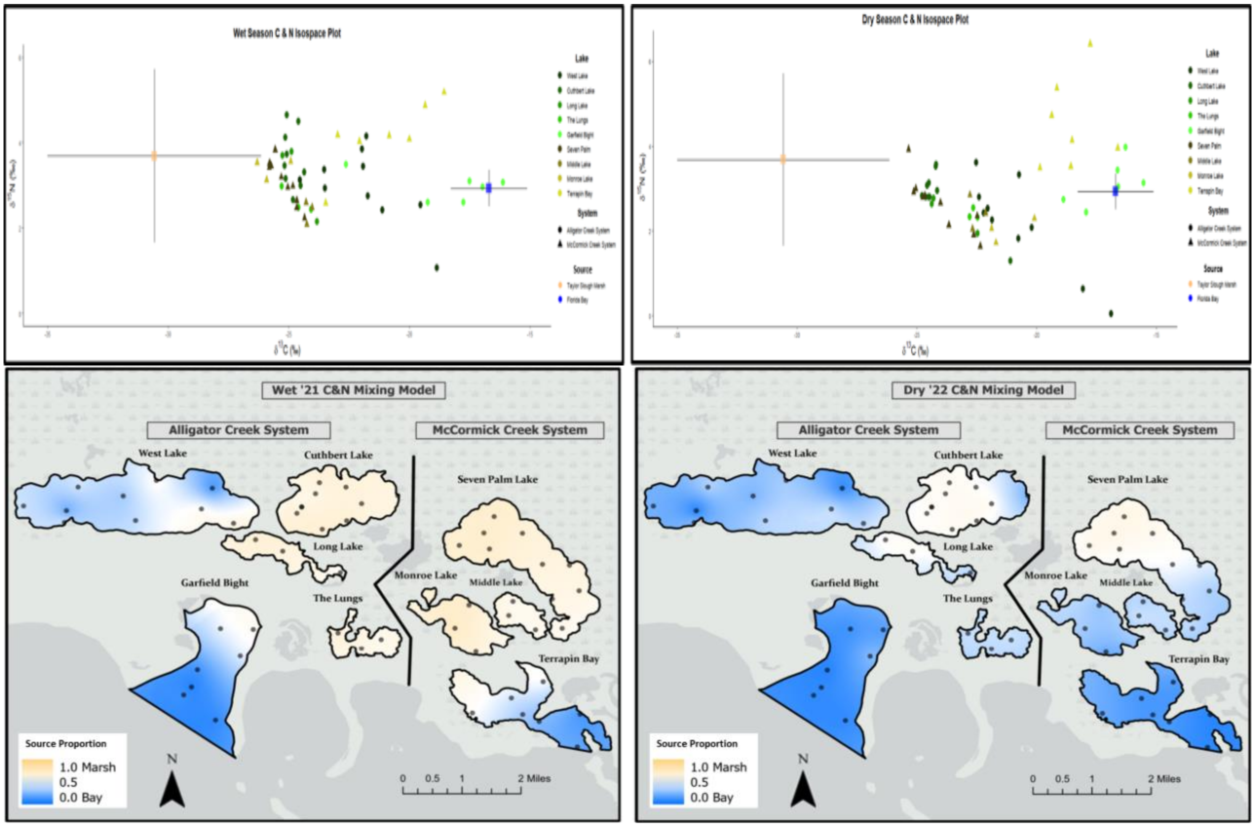


Figure 59. Ordinary kriging interpolations of mixing model analysis showing spatial variation in the mean proportion of nutrients entering the system from the upstream marsh and downstream bay across the wet and dry season. The $\delta^{15}N$ and $\delta^{13}C$ isospace for each season is shown above their respective map.

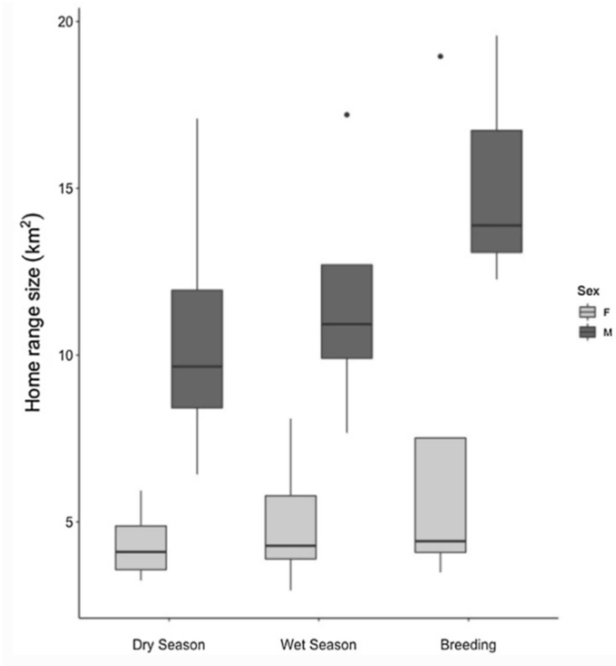


Figure 60. Home range size (area of the 95% utilization distribution) across the wet, dry and breeding seasons for males and female alligators.

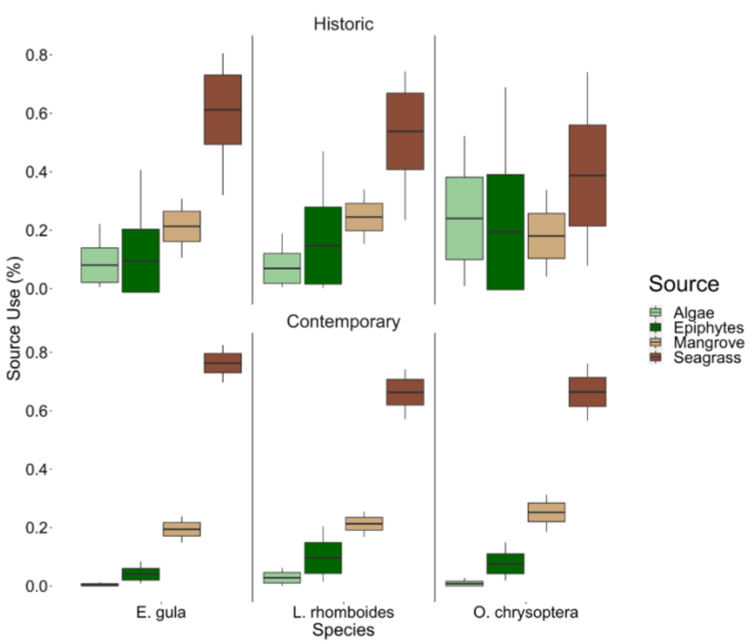


Figure 61. Proportion of primary production use by historic (a) and contemporary (b) consumer species. Green energy (live) pathways are in shades of green and brown energy (detrital) pathways are in shades of brown.

Carbon Fluxes and Ecosystem Trajectories:

- Freshwater marl prairies and marshes are a source of CH4 to the atmosphere (**Fig. 62**).
- Air temperature drives CH4 fluxes for freshwater wetlands regardless of season (**Fig. 63**).
- Revised estimate of global average soil OC stock to 20 cm depth of 15.4 Mg C ha−1 is lower than previously reported (**Fig. 64**).
- We are prioritizing areas for research infrastructure to enhance understanding of the CH4 flux potential of ecosystem types across the US (**Fig. 65**).
- Updated Everglades Landscape Model (ELM, v2.x -> v3.x), a regional spatial model that integrates hydrologic, biogeochemical, and biological process dynamics across multiple decades (**Fig. 66**).
- Water levels increased synchronously across the Southeast Saline Everglades (**Fig. 67**), which may impact C fluxes.

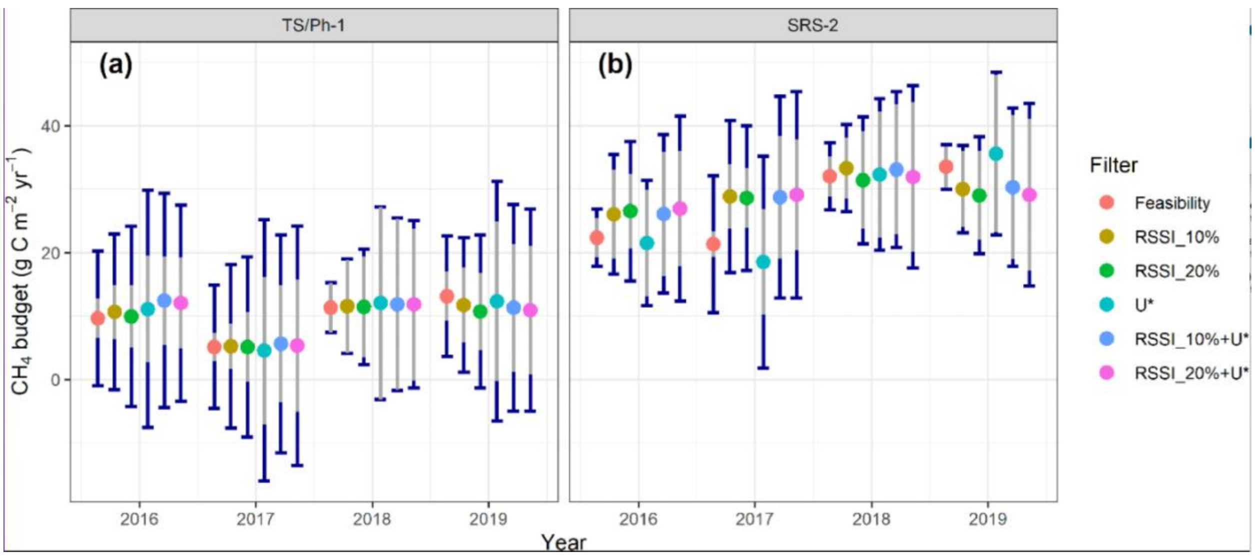


Figure 62. CH4 budget for Everglades freshwater wetlands sites at (a) TS/Ph-1 and (b) SRS-2 in g CH4 m−2 yr−1 by filtering treatment. The circle denotes the annual budget and the error bars show the prediction interval for the annual budget (± 1 standard error; gray section = proportion of error from unrestricted predictors model; dark blue section = proportion of error from restricted predictors model).

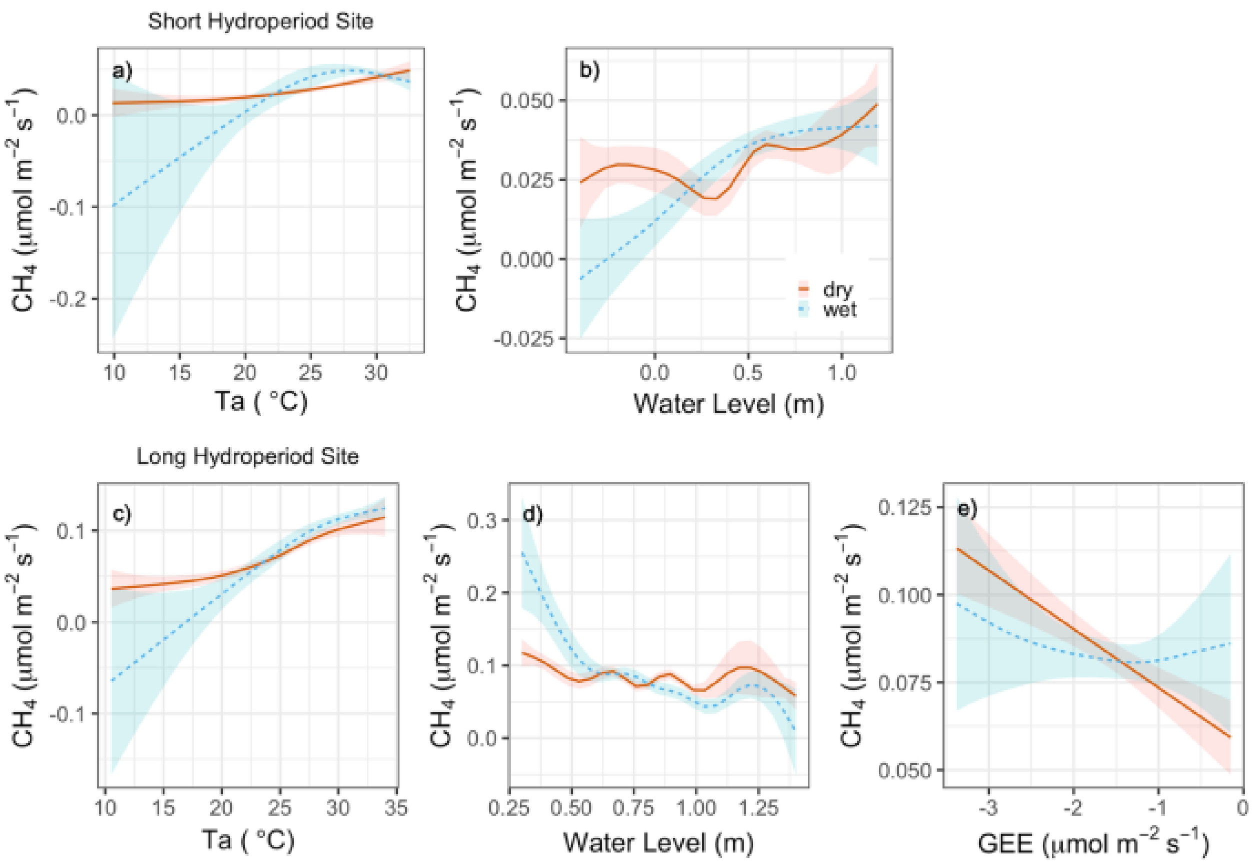


Figure 63. Predicted estimated marginal means from GAM models of CH4 drivers in TS/Ph-1 a, b and SRS-2 c–e, by: average daily: a and c air temperature (Ta (°C); dry: $p < 0.001$, wet: $p < 0.001$), b and d water level (m; dry: $p < 0.001$, wet: $p < 0.001$), and e gross ecosystem exchange (GEE (μmol m−2 s.−1); dry: $p < 0.001$, wet: $p = 0.61$; only significant in SRS-2).

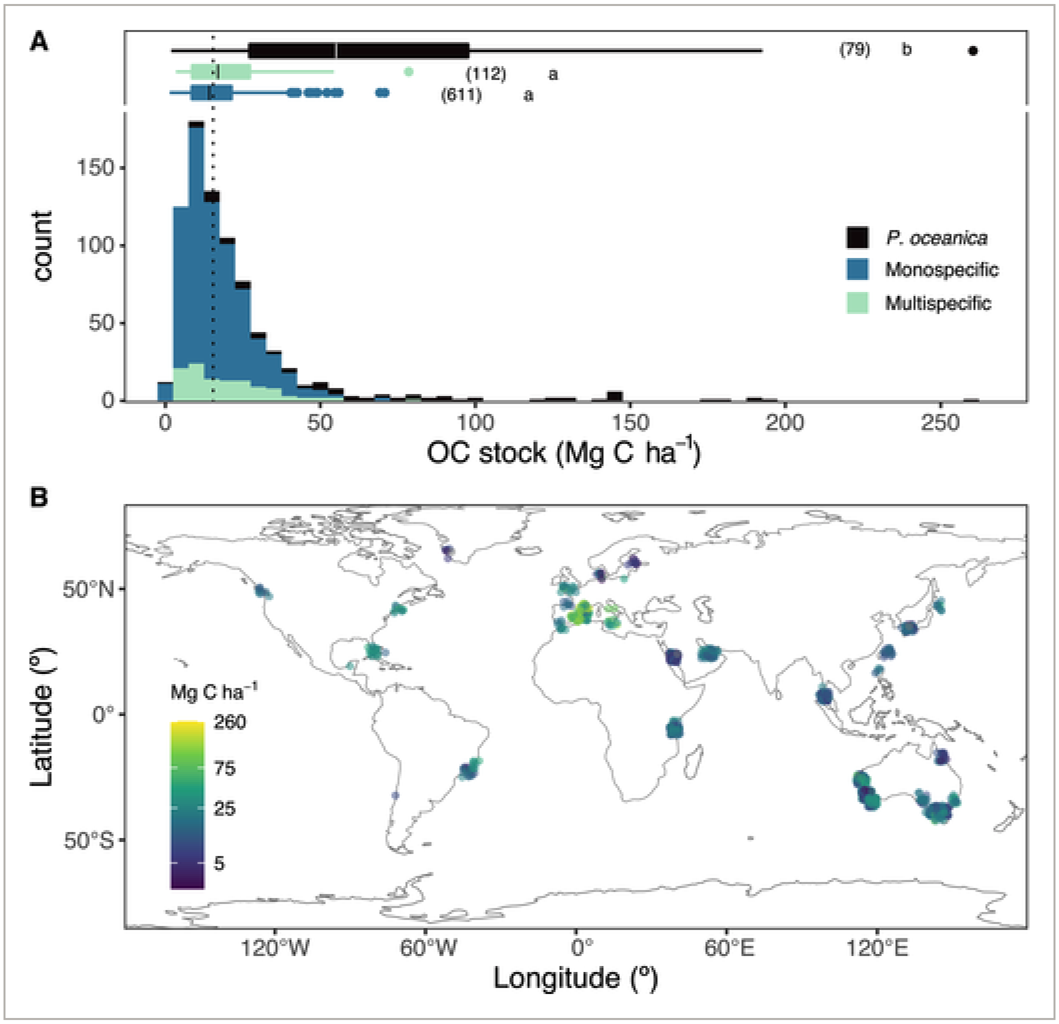


Figure 64. Influence of meadow type on organic carbon (OC) stocks and global map of OC stocks “hotspots.” (a) Histogram showing the distribution of OC stocks for each type of meadow considered by our model (*Posidonia oceanica*, monospecific, and multispecific). Note that the distribution of *P. oceanica* OC stocks is extremely skewed to the right, compared to the rest of monospecific and mixed meadows. Overlaid on the histogram, boxplots for each meadow type support model results, with *P. oceanica* meadows having higher OC stocks than the rest of monospecific and mixed meadows. Dotted vertical line illustrates the global median considering all samples together. Different lower-case letters next to each box correspond to Tukey Honestly Significant Difference post-hoc tests with *p*-value < 0.05. Number of cores for each group are given in brackets. (b) Geographical distribution of seagrass soil sections compiled in this study colored according to their OC stocks. The Mediterranean appears as the clearest hotspot of OC stocks, coherent with *P. oceanica* (endemic to the Mediterranean) being the seagrass with highest OC stocks. Note that points have some transparency, thus, the more solid the point looks, the greater the density of samples. Note that points have been jittered for improved visualization, as well.

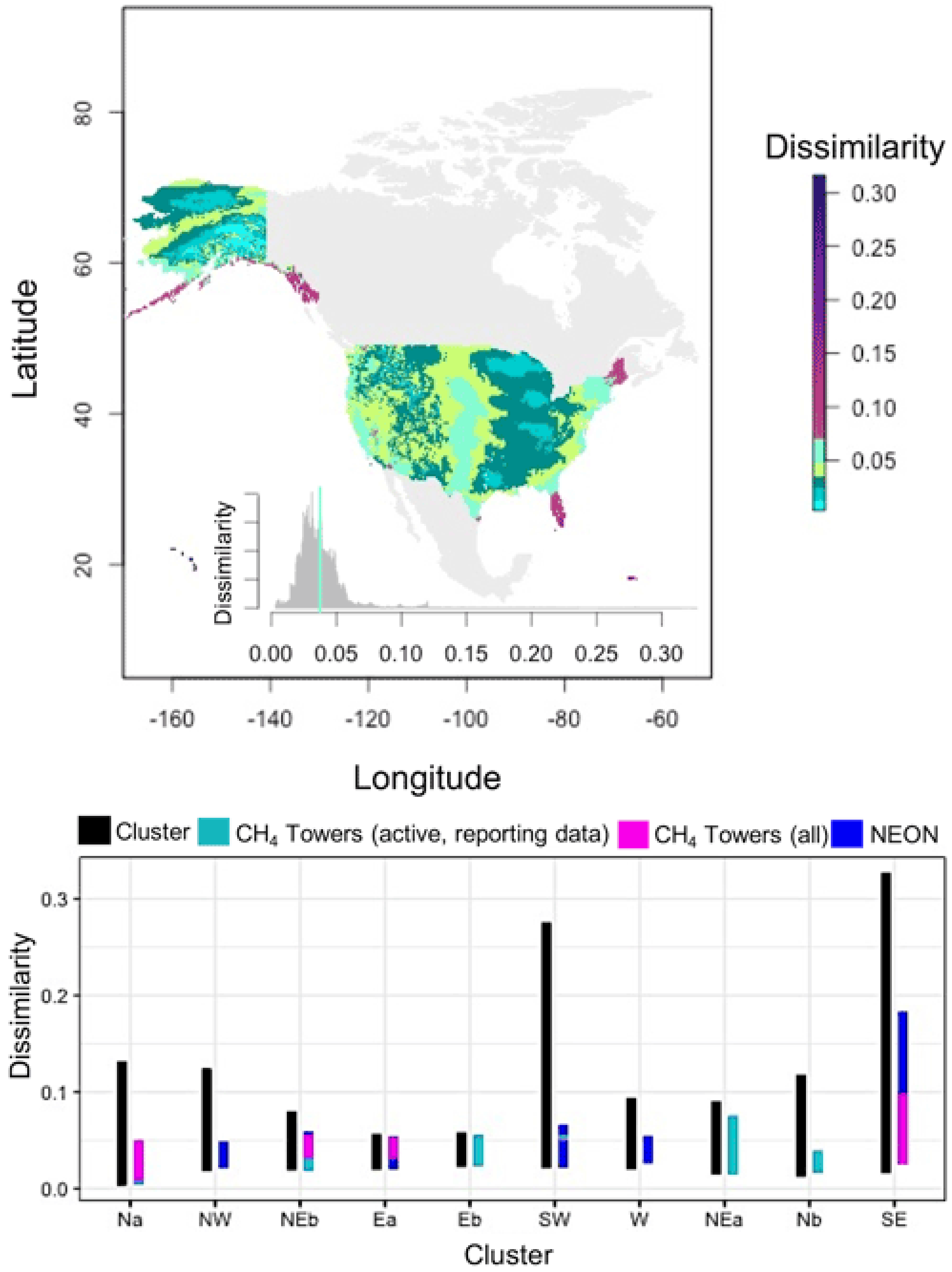


Figure 65. (a) Cluster dissimilarity for the US. Inset: the distributions of dissimilarity across all clusters shown in a histogram, in which the line denotes the mean dissimilarity across all clusters. (b) The range in dissimilarity for clusters (black bar), active CH4 towers providing CH4 data to AmeriFlux (cyan), all active CH4 towers (magenta), and for NEON towers (blue). The black lines show the range in dissimilarity observed for a cluster and greater overlap between the cluster range and the tower range is important for landscape representativeness.

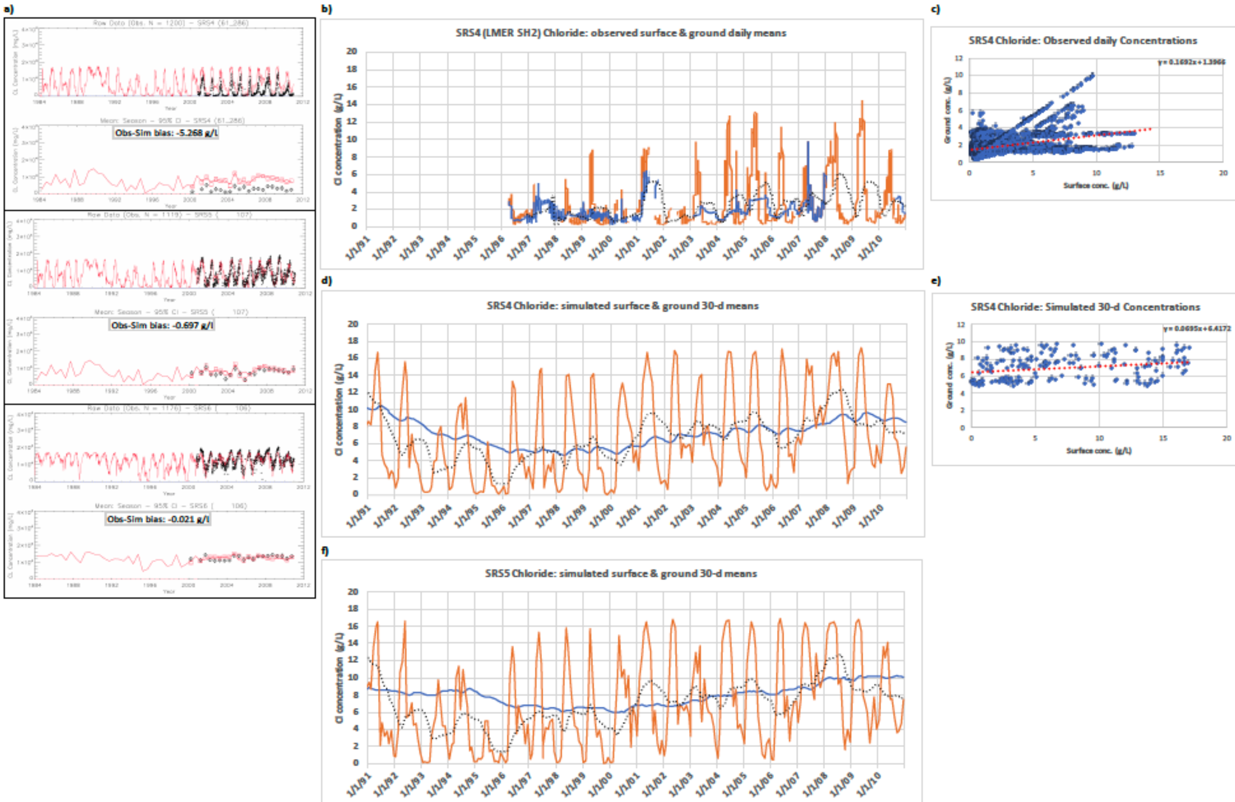


Figure 66. ELM-simulated and observed data of chloride concentrations in surface and ground waters, in the more estuarine section of FCE Shark River Slough transect. a) Daily and Seasonal simulated (red line) vs. (FCE) observed (black dots) surface water Cl concentrations at SRS 4, 5, and 6 sites; note that graphs have units of Cl mg/L (g/L = ppt), and scale is 1000x greater than ELM freshwater sites (evaluated in other documentation); b) SRS4 (LMER SH2 data) observed daily mean surface water (red line), daily mean ground water (blue line), and 1-yr running mean of surface water (black dots) Cl concentrations; c) SRS4 (LMER SH2 data) observed daily mean ground water vs surface water Cl concentrations; d) SRS4 simulated 30-d mean surface water (red line), 30-d mean ground water (blue line), and 1-yr running mean of surface water (black dots) Cl concentrations; e) SRS4 simulated 30-d mean ground water vs. surface water C concentrations; and f) SRS5 simulated 30-d mean surface water (red line), 30-d mean ground water (blue line), and 1-yr running mean of surface water (black dots) Cl concentrations.

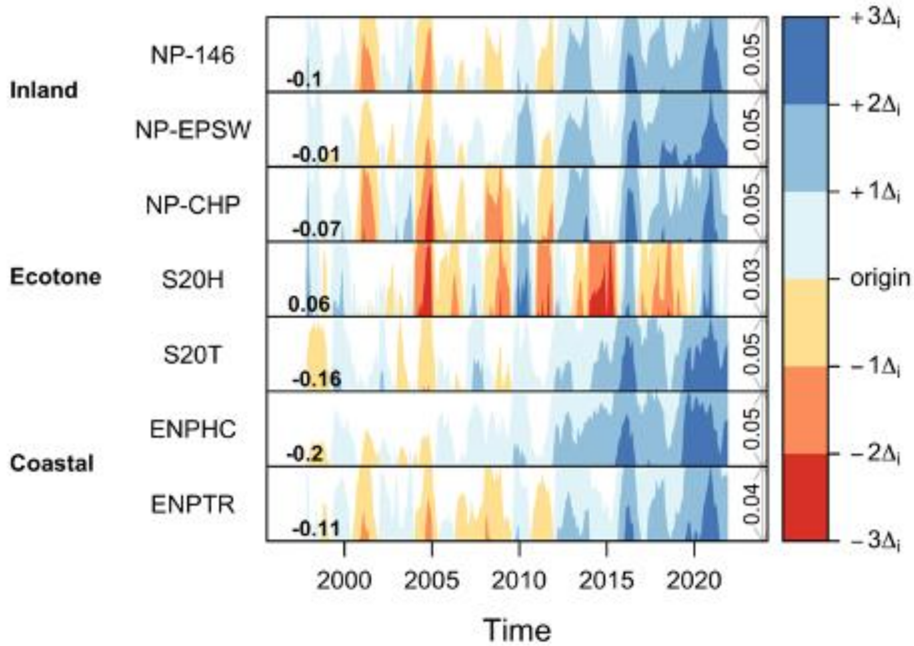


Figure 67. Time series of seasonally corrected trends in weekly mean water level (meters on the NAVD88 vertical datum for each station) for seven stations from Oct. 19, 1997 - Nov. 7, 2021. Stations are organized by locations that are furthest inland (marl prairie stations; NP-146 and NP-EPSW), followed by low productivity zone stations (NP-CHP, S20H, and S20T), and then coastal stations (ENPHC and ENPTR). Figure 2 shows the direction and magnitude of deviations from an origin point unique to each panel in the plot. The origin is the mean of the water level in the first 10-year period (1995 to 2005) unique to each series and is displayed in bold in the lower left-hand corner of each panel. Warm colors indicate negative deviation (decreasing water level) and cool colors indicate positive deviation (increasing water level) from the origin. Intensity of colors indicate magnitude of deviations, with the darkest colors indicating data that is more than two intervals from the origin point. Horizon scale interval is unique to each series based on a calculation of data spread. The horizon scale interval is displayed in the right-hand side of each panel in meters.

Key outcomes or other achievements

Climate Variability & Change:

- Higher level of agreement among stations for dry versus wet season with all the stations showing positive trends for dry season rainfall (3 significant, **Fig. 6**).
- Increasing August rainfall at all stations and decreasing October rainfall at all stations (**Table 3**). Results are consistent with prior findings of overall increased precipitation, increased wet season precipitation, and a shorter wet season duration.
- Miami has increasing trends that are not seen anywhere else (Jun, Jul, Dec), and has prolonged positive SPI values (anomalously high rainfall) since 1990. We are analyzing precipitation and temperature data which may be affected by anthropogenic (e.g. urban heating) drivers.

Table 3. Sen slope values from Mann-Kendall tests for South Florida stations from 1906-2021

SF	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Ft Pierce	0.01	0.11	0.04	0.06	-0.13	0.16	0.11	**0.38**	-0.03	-0.56	0.18	0.09	1.26
Ft Myers	0.07	0.04	0.03	0.05	-0.27	0.17	0.3	**0.69**	0.39	-0.25	0.08	0.12	**1.41**
West Palm Beach	-0.06	-0.03	-0.02	-0.07	-0.17	0.26	0.02	**0.7**	-0.09	**-1.07**	0.11	**0.2**	-0.16
Miami	-0.15	0.11	0.08	0.03	-0.28	**1.04**	**0.57**	**1.02**	**0.73**	-0.39	0.11	**0.16**	**2.96**
Key West	-0.02	0.04	0.04	0.13	-0.1	-0.1	0.23	0.26	0.14	**-0.47**	0.03	0.13	0.42

Hydrologic Connectivity:

- Coastal plant communities are at risk of destabilizing and turning into open water areas by 2040-2050 at the current rate of sea level rise.
- Over the long-term Taylor River has been a source of water and constituents to Florida Bay; but there are times, particularly during 3 dry-season months (March, April, May) when the salt flux is reversed (**Fig. 9d**).
- Salinity at upsteam locations in both Taylor (TS/Ph-3) and Shark (SRS-3) have shown marked increases since 2016, particularly in the dry season.

Social Landscape

Water Governance/Cultural & Economic Values:

- Developed understanding of broader social context within which synthesis science has been embedded.

- Preliminary explorations of how different modes of science have shaped Everglades research
- Preliminary synthesis work on justice implications for LTER science
- Preliminary estimates of benefits over costs of the ongoing Everglades restoration projects
- Preliminary understanding of how cultural and economic values of the Everglades ecosystem services might contribute to national discussion on climate change and South Florida urban resilience infrastructure

ECOLOGICAL LANDSCAPE

Vegetation & Geomorphic Gradients:

- Sea-level rise keeps pushing coastal creek expansion further inland while increasing creek densities, providing a higher connectivity of saline and brackish water into freshwater-dominated ecosystems.
- South Florida rates of sea-level rise are accelerating.
- A sediment deficit (e.g., recent rate of sea-level rise – rate of vertical sediment accretion) has been documented in south Florida coastal wetlands.
- Wetland response to future sea-level rise will include landward migration, habitat shifts, and conversion to mud flats or open water.

ECOSYSTEM STRUCTURE & FUNCTIONS

Abiotic Resources & Stressors:

- Hydrologic restoration is increasing the press of fresh water in degraded marshes, and storms and water management are increasing freshwater pulses. Sea-level rise is increasing the press of marine water, and marine storms are increasing marine-water pulses.
- Increased hydrologic presses and pulses are increasing water TP concentrations throughout the FCE.

Detritus & Microbes:

- Freshwater restoration pulses and tropical storm disturbances are altering the spatiotemporal patterns of DOC concentrations, DOM composition, and processing in coastal wetlands.
- Marl marshes and mangroves have higher bacterial and algal-based and lower terrestrial/humic contributions to DOM than peat-based wetlands. Long-term increases in hydrologic presses and pulses of fresh water are decreasing autochthonous and increasing terrestrial contributions to DOM in marshes and mangroves, and this pattern is strongest where hydrologic connectivity is highest.
- Bacterioplankton productivity is steadily increasing in peat and marl wetlands with increased fresh and marine water levels and hydrologic connectivity but appear unrelated to DOC concentrations; whereas episodic increases in

bacterioplankton productivity in seagrasses are linked to seagrass die-offs and pulsed increases in DOC concentrations.

- POC litter recalcitrance and P concentrations drive breakdown rates despite differences in environmental conditions among marshes, mangroves, and seagrasses.
- Water column microbial assemblages are similar among freshwater marshes but different among brackish marshes. Hydrologic pulses from tropical storms alter mangrove microbial communities but not marsh microbial communities.
- Soil prokaryotic and fungal microbial communities reflect methanogenic to sulfidogenic carbon processing pathway transition in the freshwater–marine gradient in the study area. Increased temporal variation of soil microbial communities track extended dry periods associated with rise of aerobic bacterial taxa. Influence of aerobic microorganisms and carbon processing is limited to the surface layer due to temporal variations in inundation and oxygen supply.

Vegetation:

- Periphyton contributes an average of 40 g TIC m^{-2} yr^{-1} to marl soil accretion with higher rates in the marl prairie and seagrass communities.
- Increases in freshwater delivery and stage are impacting seasonal trends in surface water salinity as far south as our upper ecotone (TS/Ph-3) marsh site. The long-term hydrologic change continues to decrease sawgrass biomass and productivity at TS/Ph marsh sites and decreased density of *Eleocharis* stems at the upper ecotone marsh site.
- Long-term mangrove litterfall rates reduced across Shark River sites due to canopy defoliation after Irma's impact, with annual rates 2-4 times lower during 2018 compared to the long-term pre-disturbance 2010-2016 rate. During 2020 and 2021, litterfall rates at all sites are similar compared to long-term (2010-2016) pre-disturbance rates (3.3-5.1 MgC ha^{-1} yr^{-1}), except at SRS-6 where rates (3.9-4.5 MgC ha^{-1} yr^{-1}) are still 0.8x lower compared to 2010-2016 rates at this site.
- Long-term leaf NPP in scrub mangroves in Taylor River indicated that NPP is higher at TS/Ph-7 than TS/Ph-6. The highest rates were measured during 2020 for both sites. High surface TP concentrations reported in Taylor River during 2020-2021 are likely contributing to increases in NPP rates of scrub mangroves relative to previous years.
- Long-term (2015-2021) mangrove AGB and wood production data suggest a significant decrease post-Irma at SRS-6, with a 38% decreased in AGB during 2019. In 2021, AGB increased at SRS-6 by 7% (36 MgC ha^{-1}) due to recruitment of juvenile saplings into adult cohorts.
- NASA G-LiHT airborne data before and after Hurricane Irma indicate that 77.0% of the survey area experienced canopy height loss three months after the storm, with the majority of canopy height loss occurring in the tallest mangrove forests. Mangrove canopy height increased by an average 0.26 m from Dec 2017 to Mar 2020, with most of the forest (84.7% of the survey area) experiencing canopy height regrowth. However, only 38.1% of the survey area had recovered to pre-storm canopy height by Mar 2020.

- Hurricane Irma significantly altered mangrove forest canopy structure, but recovery of vertical structure varied by resilience area, species composition, and canopy height, with regrowth rate higher in taller forests, particularly in near-coast mangroves where tidal connectivity and P-rich mineral sediments deposited by hurricanes contribute to recovery.

Consumers:

- We improved our understanding of the dependencies of SRS consumers (also recreational fisheries) on freshwater flows. The magnitude and timing of snook spawning migration are driven by the length of dry down and flow pulses respectively. Florida Largemouth Bass use of the ecotone is respondent to marsh freshwater flows and shows a threshold response.
- We are gaining a better understanding of the effects of invasive species on ecosystem function at freshwater marsh sites where invasive fishes have become an important component of aquatic communities.
- We are beginning to get a grasp on patterns in food web structure and function across our transects.

Carbon Fluxes and Ecosystem Trajectories:

- All towers remained operational 2021-2022.
- Three new towers were added to the network.
- Modified ELM code-data to support 64-bit systems and extended climate data rescaling and processing, with promising preliminary model performance improvements towards ELM v3.2.

Opportunities for training and professional development

K-12 Schoolyard Activities: In FCE IV, our Education and Outreach program is developing programming that addresses NSF's Strategic Plan Goal to "*advance the capability of the Nation to meet current and future challenges with K-12 programs and support the development of the next generation of researchers"* with the goals of: (1) providing mentoring to K-12 students and teachers through our new *LTeaE*R litter breakdown study and participatory science program, (2) facilitating presentation of their findings at science fairs, professional meetings, and annual FCE All Scientists Meetings, and (3) pursuing supplemental sources of funding to support high school and teacher participants.

***Mentoring to K-12 students and teachers**:* FCE continues to collaborate with the *FIUteach* program and *Everglades Foundation* to design and deliver professional development opportunities for teachers through our Research Experience for Teachers, *Miami Plastic Patrol,* and the *Everglades Environmental STEM High School Institute (E-STEM).*

Research Experience for Teachers (RET): Our RETs have continued to meet regularly as part of their ongoing research experience. In weekly group meetings, they discuss scientific papers, plan field collections, reflect, and share experiences with engaging students in their research. During the academic year, meetings are bi-weekly and field work is scheduled for teacher planning days and/or weekends. This design has created a community where the RETs are now working as a research team and have taken the lead on scheduling their field collections (without Oehm). They have also begun co-plan field trips where their students meet and work alongside students from other schools/classes.

FCE welcomed Mr. Jose Pavon as our new RET from Miami Senior High School this year. Pavon is studying the allelopathic effects of Australian pine (*Casuarina equisetifolia*) on litter breakdown in coastal mangroves of Biscayne Bay, FL. Veteran RET Beatriz Guimarães recently chose to shift focus in response to permitting constraints. Guimarães' new project aligns with FCE Ph.D. student and Everglades Foundation *ForEverglades Research Fellow* Melissa Paduani's work on microplastics. Guimarães and Pavon are now collaborating, using the same sampling sites and both collected baseline samples in late October.

In addition to Guimarães, FCE Ph.D. student Melinda Paduani is engaging other K-12 teachers in her microplastics work. Last year, 26 teachers participated in her *Miami Plastic Patrol* professional development and analyzed samples taken from Biscayne Bay. The data are being used in her research and helping her to characterize the amounts and kinds of microplastics in our waters. After the professional development, teachers receive a kit filled with supplies for implementing the project with their classes.

Facilitating presentations of K-12 findings: All current RETs are working together and with their students to present their results. In May, the RETs participated in the

LTER Network RET Spring Share Session where they connected with and presented their work to 9 other RETs distributed across four other LTER sites (ARC, LUQ, KBS, and VCR), from 9 different cities, and 8 states. In September, Whelan, Simpson-Soriano, and Guimarães traveled to the *LTER All Scientist Meeting* (ASM; Pacific Grove, CA) where they participated in the Education & Outreach Committee pre-conference, met their RETs counterparts from other sites, participated as panelists, and led break out groups in the *Research Experience for Teachers Across the Network* session.

RETs Whelan, Hernandez-Martinez, and Simpson-Soriano have begun analyzing their data in preparation for presenting at the *2023 FCE All Scientist Meeting*, drafting their DataNuggets (DataNuggets, 2022), and are working with their students to present results at the *2023 South Florida Regional Science and Engineering Fair*.

Pursuing Supplemental Sources of Funding: This year we secured additional sources of funding to support a new *Everglades Environmental STEM Institute (E-STEM)*. In collaboration with the Everglades Foundation, funding from the *Al & Janie Nahmad Family* and *The Batchelor Foundations, E-STEM* is providing 20-25 high school teachers with 8 days of professional development that includes three field experiences at the FIU Environmental Preserve, Everglades National Park, and Big Cypress National Preserve. *E-STEM* Teachers will be introduced to FCE research, trained in using the Everglades Literacy Curriculum, and work with our RETs in a collaborative research project to design and implement a hands-on modeling lesson. Program completers will receive a $1,000 stipend, professional development credit, and classroom supplies for implementing their own *E-STEM* projects.

In November, we were notified by NSF Program Officer Aruna Kilaru that the *Coastal Ecosystem-BIORETS (CE-BIORETS)* site has been approved for funding and that official notification will be sent in early December. The *CE-BIORETS* site aligns with FCE LTER research, the *Coastal Ecosystems REU Site (CE-REU)* and will engage an additional 24 K-12 teachers in coastal ecosystems research over the next three years.

The current *FCE Supplement-funded RETs* will help lead activities during the first year of the *CE-BIORETS* programs. Each *FCE-RET* is planning to offer a professional development session and to serve as a near peer mentor for incoming participants. The *CE-BIORETS* program will also strengthen our ability to support future *FCE-funded RETs* and will include in them in all programming aspects of the *CE-BIORETS* site.

Training of Undergraduates and Early Career Scientists: FCE scientists train and mentor all levels of early career scientists by recruiting from diverse communities and engaging them in all levels of our research. Our scientists are mentoring 18 Masters, 60 Ph.D. and 14 Post-Doctoral Scientists that are approximately 50% Female.

Each year, our program provides stipend support for two FCE-funded REUs, up to eight *Coastal Ecosystems (CE)*-funded REUs, and three Everglades Foundation-funded *John Marshall (EF-Marshall) REUs*. This year, 18 of our scientists provided 28 semester units of mentoring to 16 undergraduates. All participants, regardless of funding source, were included as members of *CE-REU* Site, developed projects that study the greater Everglades ecosystem, and participated in cohort-building, networking opportunities, social events, and weekly field trips. At the end of July, the REU participants presented their results at the annual *CE-REU Site Symposium*, were invited to the annual *FCE All Scientists Meeting*, and encouraged to present at a national and/or international conferences.

Since last reporting, Beth Simmons has joined the FCE Education and Outreach working group. Now serving as the *FCE Undergraduate Program Coordinator* and *CE-REU Site Co-PI*, Simmons brings extensive experience to the team as the former LTER Education and Outreach Coordinator that has worked at two other sites (CCE and PAL). In her current role, she directs the *FCE REU Collective* by coordinating mentoring efforts and providing logistical support to 2 FCE-, 3 EF-Marshall, and 8 CE- funded REUs.

Graduate Students: FCE scientists are dedicated to mentoring our large graduate student organization by engaging them in all aspects of the FCE program. Our graduate students: are included and participate as members of our working groups; present their work at our annual meetings; assist with the mentoring of new graduate students, teachers, undergraduates, and high school students; and are mentored in communicating their research results to both the public and scientific audiences. This year, 23 of our graduate students have been recognized for their outstanding work with 27 awards totaling over $150,000.

Our post-doctoral and junior faculty members are included in site leadership roles through the Internal Executive Committee and are involved in the co-production of research with senior faculty mentors.

Communicating results to communities of interest

The FCE Communications Team, consists of the PI, Program Manager, Education & Outreach Coordinator, and collaborator Dr. Steve Davis (Everglades Foundation Chief Science Officer). Working together, the team coordinates communications through regular updates in the *News from the Sloughs* monthly newsletter, press releases social media, our *Wading Through Research* student blog, public events and exhibits, and an annual partnership impact report.

Our scientists have received regular coverage in both traditional news and social media. Over the last year, 32 of our researchers have been discussed in 62 media events, on 47 calendar days since our last report. This news media has been distributed across 42 local, national, and international media outlets including: *NPR*; *Disney XD; Fox Weather; Miami Herald; International Business News; National Geographic; Nat Geo Wild; Popular Science; Eurasia Review and Inside Climate News.* We also maintain our social media presence with regular contributions to

Facebook (FB), Twitter, *Wading Through Research* student blog, and monthly *News from the Sloughs* newsletter.

The FCE-LTEaRts program has established a new partnership between Dr. Evelyn Gaiser and Native Miamian Artist Rick Cohen. The resulting *Diatomaceous Dreams* exhibit focuses on found-object assemblage sculptures inspired by diatoms and has been exhibited at Biscayne National Park's *Dante Fascell Visitor Center Gallery* in 2021 and subsequent displayed at FIU's *Glenn Hubert Library* in *Exhibits from the Bay*. In a panel discussion accompanying the *Hubert* exhibit, Dean and FCE Collaborator Heithaus moderated a discussion between Gaiser and Cohen on how blending the arts and sciences can help us create a more inspiring future.

In April, Simmons coordinated "*One Night in the Everglades*" book reading and illustration workshop with Joyce Mihran Turley, nature illustrator for the book at the FIU *Bring Your Child to Work Day* event. Mihran joined remotely from Colorado for three 1-hour sessions where she taught participants the basics of illustration and how to "to combine your skills in art with their love for science." A bi-lingual read-aloud from FIUteach undergraduates helped children translate the text as they learned the steps involved in transforming shapes to look like a Florida panther. FCE Researcher and Dean of FIU's College of Arts, Sciences, and Education also joined to talk about how the oceans and the Everglades are intimately connected with over 60 participants in attendance.

FCE also continues to collaborate with EcoArtist Xavier Cortada and other partners in the arts. Cortada's initial collaboration with Dr. Evelyn Gaiser to produce "*Diatom*," (2014) continues to inspire his work. Most recently, *"THE ART OF DIATOMS" PRESENTATION AT THE DIATOM WEB ACADEMY 2021, {IN WATER}, and "Diatom Court" (2018) was unveiled as a permanent, site-specific, ceramic installation on the grou*nds of Pinecrest Gardens on Earth Day 2018. Cortada has joined Gaiser's "Creative Science Communication" class to speak to graduate students about his approach to participatory environmental science and discussed his work with diatoms (Diatom Court, Diatom Fountain, etc.). FCE Collaborator Tiffany Troxler has also been a guest speaker in Cortada's *Underwater HOA meeting* where she discussed the importance of mangroves and their connections to climate change and sea level rise.

Plans to accomplish goals during the next reporting period

Climate Variability & Change:
After publication of the state-wide long-term trend analysis, we will shift our analysis to investigate high resolution reanalysis and coupled model output (ERA5 HighResMIP, Cordex). Downscaling and regional ocean modeling research continues with L. Cherubin.

Hydrologic Connectivity:
We plan to further investigate the sources of DIP in surface water and groundwater in Taylor and Shark Sloughs using oxygen isotopes. We will also analyze surface water and groundwater for sodium/calcium ratios to decipher sources of salt, particularly in the upper reaches of Shark and Taylor Sloughs. We will continue to refine the use of remote sensing to estimate water levels across the FCE.

SOCIAL LANDSCAPE

Water Governance/Cultural & Economic Values: Carrying out research activities (conducting interviews and participant observation) will create qualitative and quantitative data that will be used to address H2a and H2b, and publish articles. This will also feed into synthesis products with other working groups in the FCE and synthesis products with scientists across the national LTER network.

ECOLOGICAL LANDSCAPE

Vegetation & Geomorphic Gradients:

- Complete vegetation mapping of the Shark-Harney-River system and the spatial analysis of vegetation patterns and patterns of change as a function to expanding creek length and density.
- Finalize the spatial analysis of mangrove community expansion in the southeastern coastal oligohaline prairies.
- Finalize the analysis of NESRS vegetation response to hydrological regime changes towards hydrological restoration at two spatial scales.
- Progress in spatial modeling of woody and herbaceous vegetation dominated ecosystem components.
- Finalize digital terrain and vegetation canopy models in Everglades National Park and Water Conservation Area 2A.

ECOSYSTEM STRUCTURE & FUNCTIONS

Abiotic Resources & Stressors:

- Synthesize salinity and P press and pulse drivers and their effects on integrated ecosystem structures and functions through integration of long-term datasets.

Detritus & Microbes:

- Finalize data analyses for microbial communities associated with litter breakdown
- Publish DOM PARAFAC model

Vegetation:

- Finalize integration of long-term hydrological, biogeochemical, and primary production data to determine trajectories of ecosystem structure and function in sawgrass communities.
- Finalize long-term analysis of leaf NPP rates in scrub mangroves at Taylor River sites.

- Complete analysis of Hurricane Irma impacts on mangrove structure, biomass, and total NPP to assess trajectories of recovery post-disturbance.
- Finalize mangrove vegetation mapping of standing aboveground biomass and necromass post-hurricane disturbance in the Shark and Harney Rivers.

Consumers:
Efforts next year will continue long-term data collection: consumer and prey community sampling via electrofishing and long lines, animal tracking via acoustic telemetry, and food web sampling via stable isotopes. We also expect to make progress in these four areas of research that are currently under development.

Brown, green, and everything in between: Evaluating seasonal variation in food web structure and function through stable isotope analysis
Manuscript preparation began on a two-year data set from FCE food web sampling efforts. We report results of stable isotope analysis for wet and dry season community structure from 2019-2020 across nine sites throughout the FCE. We highlight distinct differences in contributions from "brown" and "green" energetic pathways between seasons. The results strengthen our understanding of how food web structure fluctuates temporally, allowing us to better anticipate changes in the system over time. This is extremely relevant for response monitoring during large-scale freshwater restoration efforts in the region. Preliminary results for this paper can be seen in **Fig. 68**.

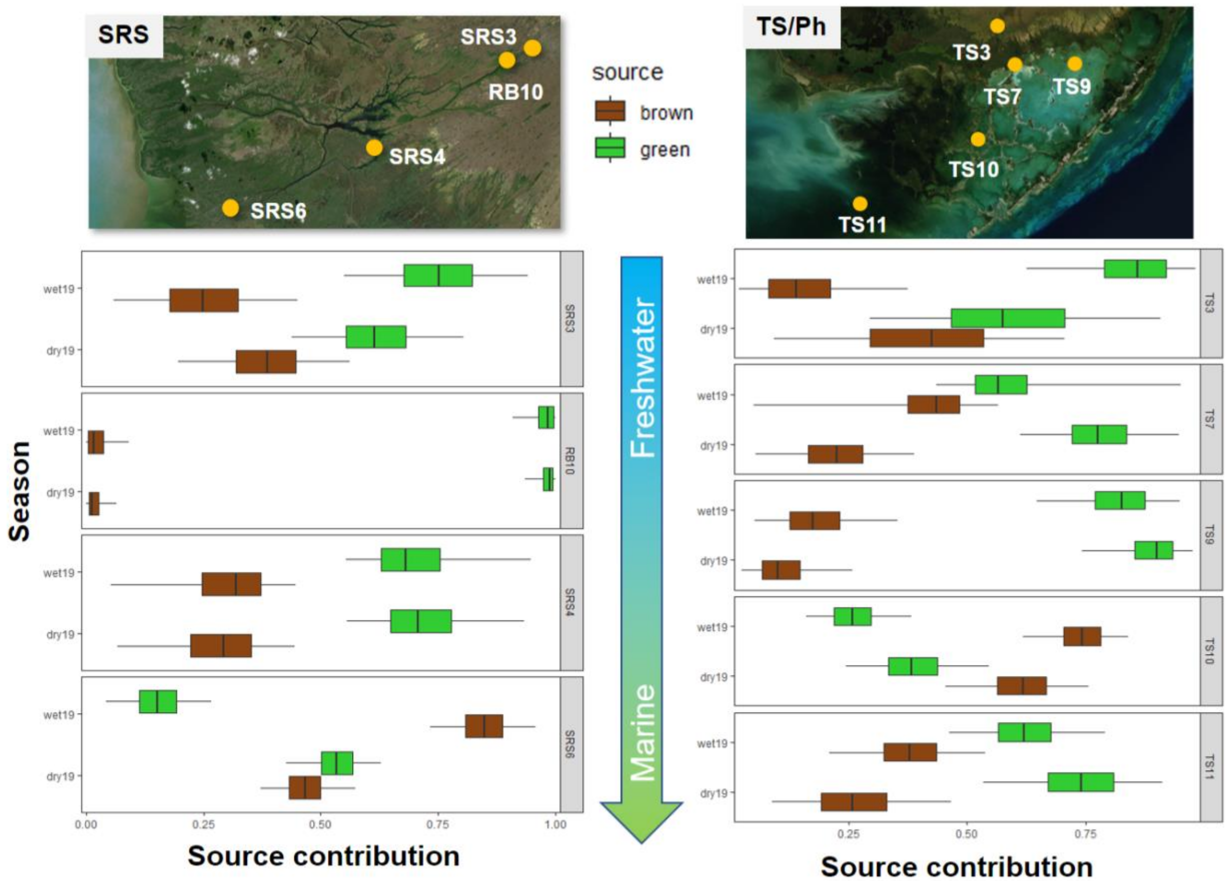


Figure 68. Bayesian mixing model outputs for basal resource contributions across seasons for FCE sites in Shark River and Taylor Slough. Brown boxplots show approximate contributions from brown energy pathways while green boxplots show contributions from green pathways. Sites are organized along a salinity gradient from freshwater to marine sites.

The role of resource matches and mismatches on the body condition of mobile consumers

We plan to build on our previous investigations of consumer/prey dynamics in Shark River (e.g., Rezek et al. 2020; Rehage et al. 2022; Massie et al. 2022) to examine how shifts in prey availability affect energetics for migratory fishes. To investigate how the timing and intensity of peak annual prey abundance affects the body condition of consumers, we will examine how seasonal coast-to-headwater movements of the recreationally important fish species (Common Snook, *Centropomus undecimalis*) align with the presence and density of key prey subsidies (sunfishes, *Lepomis* spp.) concentrated into river channels by marsh drying. We will analyze our long-term electrofishing datasets of Snook/prey abundance to examine how fluctuations in freshwater inflows to the coast influence the timing and magnitude of the marsh prey subsidies, how the body condition of Snook is affected by seasonal and interannual variation in prey availability, and how temporal variations in condition affect migratory patterns and reproduction for this recreationally and economically important species.

Consumer nutrient transport by fishes and their role in Everglades nutrient budgets

We plan to address three questions:

- What is the magnitude of fish-derived nutrients delivered to the Shark River ecotone?
- What are the drivers of inter-annual variability in these contributions?
- Do fish nutrient contributions at the ecotone alleviate nutrient limitation and increase basal resource production?

Hyper-oligotrophic conditions throughout Everglades National Park (ENP) suggest that the nutrient contributions of mobile taxa may be an important component of local nutrient budgets, especially when animals aggregate in space and time. The diel foraging migrations of wading bird colonies in central ENP have been shown to fertilize oligotrophic tree islands with 500 times more nutrients than other important passive mechanisms. Research in southern ENP has shown that dramatic shifts in marsh stage height associated with seasonal precipitation patterns lead to similar aggregations of fishes as marsh taxa seeking refuge from desiccation migrate into permanently inundated creeks at the marsh-mangrove ecotone. The concentrating effects of marsh prey (e.g., small fishes and invertebrates) has been shown to have important trophic implications for marsh consumers (i.e., Florida Largemouth Bass, Florida Gar, and Bowfin) similarly seeking refuge from marshes, and for Common Snook tracking the resulting prey flux from downstream, estuarine environments (**Fig. 2**). Trophic interactions between migrants in the oligotrophic ecotone should result in resource contributions via nutrients excreted and egested as waste, but their contributions to the ecotone have not been examined.

Invasion dynamics and trophic role at the ecotone

We have begun evaluating the magnitude of the Peacock Eel (*Macrognathus siamensis*) invasion in the Everglades and determining the level of threat their introduction and spread may pose for native communities. We seek to answer the following questions:

- What is the current abundance and biomass of Peacock Eels in the Florida Everglades and how have their population trends changed since their establishment?
- What environmental factors influence Peacock Eel population trends?
- What is the isotopic niche of Peacock Eels in the Everglades and how does it compare to that of native species occupying the same guild?

To address these questions, we will quantify the abundance and biomass of Peacock Eels, document their population trends over time (**Fig. 69**), evaluate the influence of environmental conditions on their abundance (e.g., temperature, salinity, dissolved oxygen, depth, and bottom type), and investigate the effects of prior environmental conditions on interannual patterns of Peacock Eel abundance (**Fig. 70**). We will analyze biological tracer data (i.e., stable isotopes) using complex Bayesian mixing models and novel hypervolume analysis methods to assess isotopic niche overlap between Peacock Eels and native sunfish to determine the likelihood of competition between the two species.

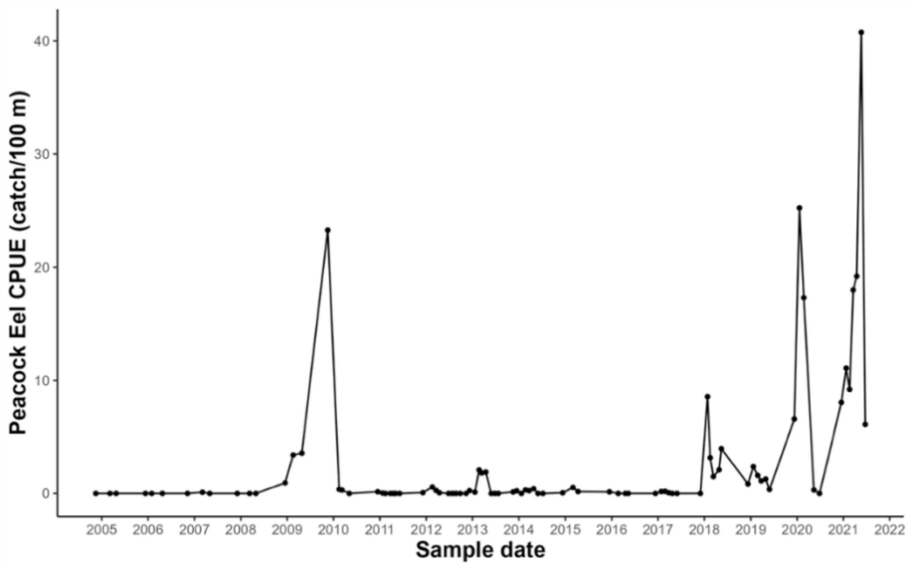


Figure 69. Figure one is the catch-per-unit-effort (CPUE) of Peacock Eels in the Shark River, Everglades National Park, since 2005.

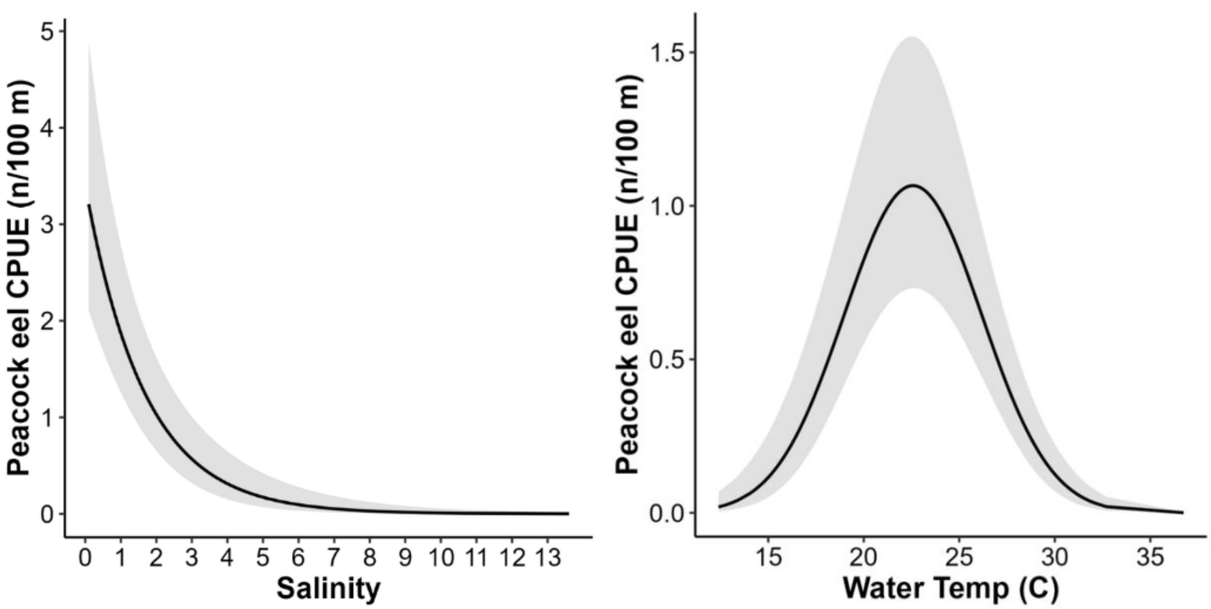


Figure 70. Regression results relating catch-per-unit-effort (CPUE) of Peacock Eels in the Shark River, Everglades National Park, and salinity (left) or water temperature (right).

Impacts

Impact on the development of the principal disciplines

Advancing ecology to make it more useful and relevant requires a fundamental shift in thinking from measuring and monitoring, to using data to anticipate change, make predictions, and inform management actions. The bulk of ecological forecasts are largely scenario-based projections focused on climate change response on multidecadal time scales, yet the timescales of environmental decision-making tends to require near-term (daily to decadal) data-initialized predictions, as well as projections that evaluate decision alternatives. Rapid changes in climate and land use are creating novel ecosystem states and coastal ecosystems are especially vulnerable to abrupt transformations from SLR and human development. In the Everglades, it is essential to link these changes to patterns in ecosystem function to understand vulnerability to shifts in salinity for freshwater wetlands and how this influences the emissions of greenhouse gases. This research is particularly important for coastal regions where live plants are vital for maintaining soil structure (i.e., elevation), and decreases in vegetation health can cause wetland C loss.

Currently, the dynamics of coastal wetlands are not well understood. Because of this, Earth System Models do not accurately predict greenhouse gas emissions under a changing climate and wetland model-data comparison studies have shown that uncertainty in model predictions of greenhouse gas emissions are due to (1) the seasonal effects of inundation, (2) the lack of representation of inundated plant processes, and (3) the need for greater representation of wetland subsurface biogeochemistry. This work will directly contribute to reducing known uncertainties through observational and experimental studies of the coupled cycling of CO_2 and hydrology.

This work will improve our understanding of gains and losses of C, providing a template for addressing major questions in ecology about the causes of abrupt ecosystem change. This work will also advance our understanding of coastal resilience to SLR. In support of the NSF Big Idea, “Understanding the rules of life”, the proposed work facilitates discoveries of causal and predictive interactions across scales for emergent plant species. This work will also foster collaboration and convergent research by considering multiple levels of organization and complexity in addressing key questions in the life sciences. Furthermore, providing support for NSF funded infrastructure supports the development of long-term datasets that are essential to understand how coastlines are changing.

- Understanding of hydrologic properties of wetland peats and how they change or not upon exposure to salt water.
- Further development and application of remote sensing techniques, such as SAR and InSAR, for wetland applications.
- Understanding how oxygen isotopes of dissolved inorganic phosphate can be used to decipher sources of phosphate in the Everglades.

- Understanding the mechanisms responsible for phosphorus release from carbonate aquifers exposed to saltwater intrusion.

FCE science has continued to develop and apply remote sensing techniques, as SAR and InSAR, for wetland applications.

FCE-supported research has contributed to key papers in geography (Grove and Rickards 2022; Cox et al 2022; Wakefield et al 2021) on new modes of science in the Anthropocene, and the shifting relations between science, society, environment. This is opening up new avenues for understanding the justice implications of integrated science.

FCE economics research is making impacts internationally. The framework developed for the FCE ecosystem services is being applied by ecological economists in India for their coast ecosystem.

Impact on other disciplines

Vorseth and Bhat developed, and received acceptance for, a proposal for a Special Session on Social Science Research for the Everglades Restoration, which is scheduled to be held as part of the Greater Everglades Ecosystem Restoration Conference, April 2023. Bhat, Vorseth and Chabba participated at various expert panel and stakeholder meetings of the Resilient305 project, a stakeholder-focused consultative research project to develop resilient infrastructure strategies for urban South Florida. We were able to provide our insights from the FCE project to discussions revolving around the South Florida urban resilience. Vorseth also participated at the Youth Engagement Round Table with Miami Dade Mayor's Office to discuss urban resilience practices in Miami Dade County.

FCE research into the geochemical reactions of carbonate aquifers exposed to saltwater intrusion is assisting the engineering design and development of the aquifer storage and recovery operations in the Comprehensive Everglades Restoration Program.

FCE researchers are supporting the BBSEER project development team and the BackBay Coastal Storm Risk refinement of locally preferred alternative.

Impact on the development of human resources

Broadening Participation
FCE is addressing the Big Idea of NSF INCLUDES and contributing to broadening participation of underrepresented communities in STEM fields with guidance from the NSF Strategic Plan (FY 2018-2022). Through our programs we provide access to

underrepresented students to conduct research with our scientists by recruiting from diverse populations at FIU, the nation's fourth largest university (n = 58,063) and largest Hispanic Serving Institution (n = 37,272; 64%). The leadership team of FCE is also diverse, with 7 women, 3 Hispanics, 1 Asian, 1 Non-Hispanic Black, and 3 LGBT members representing a membership where 20% and 27% of senior personnel, collaborators, and postdocs and 48% and 43% of graduate students identify as female and underrepresented ethnic groups, respectively. We honor the identity of all participants and maintain an atmosphere that represents and embraces diverse cultures, backgrounds and life experiences that reflect the multicultural nature of South Florida and the global society. We work with FIU's *STEM Transformation Institute* and the *Office to Advance Women, Equity & Diversity* to identify and implement best practices for retaining diversity across our membership through Diversity Advocacy training in mentoring, hiring, leadership, and advising.

In September, Simmons participated in a research mentor training offered by the *Center for Improvement of Mentored Experiences in Research (CIMER)*. This evidence-based, interactive approach was designed to help mentors develop skills for engaging in productive, culturally responsive, research mentoring relationships for optimizing the success of both mentors and mentees. Simmons has also participated in the NSF workshop *Learning about the ETAP System for REU Programs* with plans of leveraging it to broaden participation and recruit undergraduates from historically marginalized communities to participate in FCE.

The FCE RETs and CE-RET site target and recruit teachers from high needs schools to participate in our programs. Our relationship with Miami Dade County Public Schools (MDCPS) has alerted us to the severe disparities between schools in terms of the accessibility for teachers to connect with opportunities like these and that they can be critically transformative for their students. Working with our RETs, we are developing curriculum and providing students will opportunities that can positively impact those that have the most to gain. Focusing on schools with large, underrepresented populations (URM) and a high percentage of students on Free or Reduced Lunch (FRL). The current population of students impacted by our RETs is 93.7% URM with 77.4% on FRL (Table 1) and we are continuing with this trend

Table 1. FCE LTER 2022 RETs

RET	Subject	School	%URM	%FRL
Cristina Whelan	Biology, Env. Sci	BioTECH SHS	89.3	67.0
Beatriz Guimarães	Biology, Env. Sci	BioTECH SHS	89.3	67.0
Lacey Simpson	Biology	G. Holmes Braddock SHS	96.8	76.3
Amanda Hernandez	Biology	Miami Southridge SHS	94.9	86.7
Jose Pavon	Biology, Chemistry, Math	Miami SHS	98.0	90.2
		Average	**93.7**	**77.4**

through our Coastal Ecosystems BIORETS program (CE-BIORETS). For our first cohort, we have selected eight teachers from MDCPS from schools with a collective average of 97.2% URM and 88.1% of students on FRL (Table 2). These teachers will directly impact over 2000 students during their RET experience and will leave our program with the skills necessary for embedding authentic scientific inquiry into their curricula and the benefits of their new pedagogies that will multiply in the years beyond their experience.

Table 2. 2023 CE-RET Cohort

BIORET	School	% BLACK	% HISPANIC	% ASIAN	% ISLANDER	% AM-INDIAN	% MULTI	% WHITE	% URM	% FRL
Arce, Irvin	Miami Northwestern Senior	84.4	13	0.3	0.1	.	1.8	0.4	99.6	92.2
Campbell, Cecilia	BioTECH at Richmond Heights	6.8	81.7	0.8	.	.	0.8	9.9	90.1	67
Jimenez, Jose	Homestead Senior High School	39.6	56.9	0.3	.	.	0.8	2.3	97.6	91.1
Nelson, Marva	Norland Middle School	89.8	8.1	0.2	0.1	.	1.2	0.6	99.7	90.4
Phillips, Birgith	Hialeah Senior High School	5.0	92.8	0.1	.	.	0.1	2.1	98	87.1
Valdes, Walfrido	Miami Southridge Senior	32.7	60.8	1.1	0.1	0.2	1.8	3.4	96.7	86.7
Yoham, Gary	Miami Senior High School	3.8	93.8	0.4	.	.	0.2	1.7	98.2	90.2
Bravo, Katheen	Shenandoah Middle School	11.4	86.1	0.1	0.2	.	.	2.2	97.8	99.9
Average		34.2	61.7	0.4	0.1	0.2	1.0	2.8	97.2	88.1

The flux working group provided research experience for students from underrepresented groups. Support was provided for WIllian Sanchez, Nisha Ali, and Jenisha Oli in the Malone Disturbance Ecology Lab at FIU. Support was also provided for Zhuoran Yu who is co-advised by Starr and Staudhammer at the University of Alabama.

The project provided research, teaching and mentoring of graduate students and undergraduate students in FIU. All undergraduate and graduate students in the Hydrolab are Hispanic, and two of them are female. A High School student learned laboratory skills in water sample preparation.

Wakefield's *Practices for a Thawing World: Anthropocene Urban Survival Skills* workshop and guide are a prototype for identifying emergent forms of urban environmental know-how, materializing from within transforming environments, and a prototype co-produced pedagogical process that can be tailored to specific Anthropocene environmental alterations and local considerations, e.g. rising sea levels, invasive species, wildfires, etc. This training and field guide prototype were designed to respond to a specific local need, expressed by participants in futures scenario workshop I organized. But, connected with pedagogy Wakefield is developing at Life University, where she is in the process of designing a new undergraduate program focused on outdoor, experiential learning for the Anthropocene, they are also part of sketching a prototype of a new form of knowledge production and dissemination, one produced by, and for, the emerging realities of urban climate change, and the people grappling with them.

Four graduate students in the Earth System Sciences doctoral program are receiving extensive training in benefit-cost analysis of restoration projects and gathering appropriate hydro-ecological-economic data necessary for such analysis.

Graduate students are able to participate in local resource stakeholders meetings and make contributions to discussion on resilient urban infrastructure.

Impact on teaching and educational experiences

Members of the Rehage Lab (Trabelsi, Massie, Eggenberger, Viadero) hosted multiple groups of k-8 students in June 2022 as part of the FIU Camp Discover program. We described the multiple fisheries research projects currently underway in the FCE LTER to camp participants, how different tracking technologies can be used to monitor fish movements, and the importance of understanding animal movement for conservation and management of recreationally and ecologically important species. This event featured hands-on demonstrations of marked-recapture technologies such as implantation and scanning of passive implant transponders to identify individual fish.

This research has provided training opportunities for undergraduate students at FIU to experience field research opportunities in marine science, allowing for valuable experience in furthering their higher education in preparing for graduate school and beyond. This research has also served as the foundation for multiple graduate student doctoral dissertations. Faculty and their students have also gained a better understanding of the hydrologic conditions in the Everglades.

Participatory Science: FCE Participatory Science continues to support the *FCE Schoolyard LTeaER* project along with several new initiatives. These include the *Miami Plastic Patrol*, *FL Ae.aegypti Genome Group (FLAGG)*, *Citizen Science Climate Action Network (C-Scan)*, *Documenting Sea Level Rise*, *Shading Dade*, and *Epicollect 5-Sargassum*

The *FCE Schoolyard LTeaER* decomposition continues operate and is aligned with the research objectives of our *Detritus & Microbes* working group. Modeled after the *Tea Bag Index (TBI)* study (Keuskamp et al. 2013) the *LTeaER* project engages members across our community in a long-term decomposition study to test hypotheses about the drivers of organic matter transformation and contributes to the global *TBI* research project. *LTeaER* samples are deployed at each of our research sites in SRS and TS/Ph, and these data are being used by our REUs, RETs and FCE scientists alike.

FCE Ph.D. students Melinda Paduani and Helen Wagner-Coello have each launched new Participatory Science Projects. In Paduani's *Miami Plastic Patrol,* participants analyze Biscayne Bay water samples to identify and quantify the microplastics that are polluting our environment. These data are helping to collect important information that are being used towards improving our understanding about the amount and kinds of microplastics that are washing into our waterways.

In Wagner-Coello's *FLAGG* project, community surveillance of mosquito populations is contributing to the understanding of mosquito infestation around Florida through undergraduate-led egg collections. Over the past four years, Wagner-Coello has taught more than 750 students about the importance of mosquito control, how to conduct mosquito surveillance, and have deployed, collected, returned, and analyzed over 671 sampling devices. These data are being used to better understand driving forces behind the spatial variation in mosquito infestations across Miami-Dade County and the effects of environmental variables such as vegetation, elevation, temperature, and precipitation.

The *Citizen Science Climate Action Network (C-Scan)* led by Working Group Lead Dr. Tiffany Troxler is spearheading two FCE-aligned participatory projects. The *Documenting Sea Level Rise* (*DSLR)* project is a collaborative effort between *FIU's Sea Level Solutions Center (SLSC)* and the *Department of Journalism + Media (DOJM)* for recruiting students and citizens to assist with documenting the extent of flooding during the King Tides. In a similar collaboration *SLSC* and *DOJM* have joined forces with *Catalyst Miami*, a Miami-based non-profit that advocates for low-wealth communities throughout Miami-Dade County to deploy tiny heat-sensing iButtons around Miami-Dade County for the *Shading Dade* project. The devices are distributed across the most urbanized areas of Miami where residents are most likely to congregate, such as bus stops, in public parks, in parking garages and in other areas. These data are then used to create a map of average daily high and low temperature readings recorded around Miami-Dade County for studying urban heat island effects during hottest months between June and September.

In May, Ph.D. student Lowell Iporac introduced the *Epicollect5* app to concerned citizens in a workshop at the Deering Estate. The app is being used to monitor and gain a better understanding surrounding the *Sargassum* blooms in Biscayne and Florida Bays. During his session, Iporac taught participants how to identify species and led a hands-on activity in use of the *Epicollect5*.

Lastly, the results of FCE's retired *Coastal Angler Science Team (CAST)* participatory science project were published in *Transactions of the American Fisheries Society* (Pierce, et. al, 2021).

Impact on information resources that form infrastructure

FCE IM Team
There was a change in membership on the FCE Information Management (IM) team this year. FCE Information Manager Kristin Vanderbilt started a new position with the National Park Service in August 2022, and Gabriel Kamener was hired to replace her.

FCE Databases
The FCE Information Management System (FCE IMS) contains 195 datasets which are available on the FCE LTER's website (https://fcelter.fiu.edu/data/index.html) and in the EDI Data Repository. Seven datasets were added and 30 long-term datasets were updated between 03/01/2022 and 08/31/2022. All datasets are publicly accessible except when an embargo has been granted while a graduate student publishes on a dataset or where a dataset was not collected using FCE LTER funds. A table of titles and DOIs for FCE LTER datasets deposited in the EDI Data Repository is included as a supporting file in the Products section of this report.

Data Processing
FCE LTER uses the XLSX2EML Perl program, written and maintained by the Program Manager, to translate metadata from an Excel template to EML. This XLS2EML program works extremely well for datasets that have only a single data entity. For data packages with multiple entities, or new time-series data, the IM generates EML using EDI's EMLAssemblyline R package. For one-off data contributions, the IM recommends that researchers submit data and metadata to him using EDI's ezEML web-based metadata editor.

Data Use
Use of FCE LTER data is steady. A manual search of Google Scholar for DOI's from the EDI Data Repository detected 7 papers published since 3/1/2022 that contain 7 citations of FCE LTER datasets. Downloads of FCE datasets suggest that the data are being used more frequently than they are cited. The EDI Repository recorded 27,579 non-robot downloads of FCE datasets between 3/1/2022 and 8/31/2022. Seven datasets had approximately 3,300 downloads apiece, most of which are checksum requests from DataONE. A better estimate of downloads from PASTA is thus approximately 4,200 when unidentifiable user agents and repetitious DataONE requests are filtered out. This indicates considerable interest in FCE data.

Supporting local and LTER Network science
The FCE information management team (G. Kamener and M. Rugge) supports site and network level science by making high quality FCE data and metadata accessible through the FCE LTER website, the EDI Data Repository, and Network-level cross-site databases. Updates to long-term FCE datasets are regularly published on the FCE website and in EDI in compliance with the FCE Data Management Policy and LTER Data Release Policy. FCE is contributing meteorological data in the CUAHSI format to support the development of a new version of ClimDB, the cross-site climate database.

The Program Manager makes periodic updates to both the all-site bibliography and personnel databases.
The FCE information management team lends its expertise to FCE researchers and graduate students by offering assistance with metadata development, data submissions, individual project database design, writing data management plans, GIS and research graphics.

IT Infrastructure
The FCE information management system's staging and production web servers and PostgreSQL databases, as well as the FCE SFTP server, are currently running on Ubuntu virtual servers housed on FIU's Division of Information Technology's equipment. FCE also has a web server and database on virtual servers housed at the offsite Northwest Florida Regional Data Center (NWRDC) located on the campus of Florida State University in Tallahassee, Florida. If the servers on the FIU campus go down, then the website can be brought up using the servers at the NWRDC.

Other contributions
The FCE IM participated in Project EDDIE (Environmental Data-Driven Inquiry and Exploration) with FCE staff member Katherine Johnson to develop 2 classroom teaching modules (using FCE data) for advanced undergraduate or graduate students. The modules were published in August 2022 and explore diatom biodiversity in the Everglades and Caribbean wetlands and the relationship between periphyton and water quality in karstic wetlands.

Products

Publications

Journal Articles

Published

Cherubin, L.M., and R. Burgman. 2022. Effects of climate change and water management on West Florida Shelf's dynamics. Bulletin of Marine Science 98: 393-418. DOI: 10.5343/bms.2021.0054

Cox, S., K. Grove, and A. Barnett. 2022. Design-driven resilience and the limits of geographic critique. The Geographical Journal 188: 294-308. DOI: 10.1111/geoj.12437

Gaiser, E.E., J. Kominoski, D. McKnight, C.A. Bahlai, C. Cheng, S. Record, W.M. Wollheim, K.R. Christianson, M.R. Downs, P.A. Hawman, S.J. Holbrook, A. Kumar, D.R. Mishra, N.P. Molotch, R.B. Primack, A. Rassweiler, R.J. Schmitt, and L.A. Sutter. 2022. Long-term ecological research and the COVID-19 anthropause: A window to understanding social–ecological disturbance. Ecosphere 13: e4019. DOI: 10.1002/ecs2.4019

Gervasi, C.L., J. Massie, J. Rodemann, S. Trabelsi, R.O. Santos, and J.S. Rehage. 2022. Recreational angler contributions to fisheries management are varied and valuable: Case studies from South Florida. Fisheries 47: 469-477. DOI: 10.1002/fsh.10823

Gervasi, C.L., J. Nelson, P.K. Swart, R.O. Santos, R. Rezek, W.R. James, A.E. Jefferson, J.M. Drymon, J. Carroll, R. Boucek, and J.S. Rehage. 2022. Otolith stable isotope micro-sampling to discriminate poorly studied stocks: Crevalle Jack in the eastern Gulf of Mexico. Estuarine, Coastal and Shelf Science 278: 108130. DOI: 10.1016/j.ecss.2022.108130

Gervasi, C.L., R.O. Santos, R. Rezek, W.R. James, R. Boucek, C. Bradshaw, C. Kavanagh, J.K. Osborne, and J.S. Rehage. 2022. Bottom-up conservation: using translational ecology to inform conservation priorities for a recreational fishery. Canadian Journal of Fisheries and Aquatic Sciences 79: 47-62. DOI: 10.1139/cjfas-2021-0024

Grove, K., and L. Rickards. 2022. Contextualizing narratives of Geography's past, present, and future: Synthesis, difference, and cybernetic control. Environment and Planning F 1: 26-40. DOI: 10.1177/26349825221082166

Harir, M., K.M. Cawley, N. Hertkorn, G.C. Hays, and R. Jaffe. 2022. Molecular and spectroscopic changes of peat-derived organic matter following photo-exposure:

Effects on heteroatom composition of DOM. Science of The Total Environment 838: 155790. DOI: 10.1016/j.scitotenv.2022.155790

He, D., S.N. Ladd, J. Park, J.P. Sachs, B.R.T. Simoneit, J.M. Smoak, and R. Jaffe. 2022. Carbon and hydrogen isotopes of taraxerol in mangrove leaves and sediment cores: implications for paleo-reconstructions. Geochimica et Cosmochimica Acta 324: 262-279. DOI: 10.1016/j.gca.2022.02.018

Hogan, J.A., E. Castañeda-Moya, L. Lamb-Wotton, T. Troxler, and C. Baraloto. 2022. Water levels primarily drive variation in photosynthesis and nutrient use of scrub Red Mangroves in the southeastern Florida Everglades. Tree Physiology 42: 797-814. DOI: 10.1093/treephys/tpab151

Ishtiaq, K., T. Troxler, L. Lamb-Wotton, B.J. Wilson, S.P. Charles, S.E. Davis, J. Kominoski, D.T. Rudnick, and F.H. Sklar. 2022. Modeling net ecosystem carbon balance and loss in coastal wetlands exposed to sea-level rise and saltwater intrusion. Ecological Applications DOI: 10.1002/eap.2702.

James, W.R., R.O. Santos, J. Rodemann, R. Rezek, Z.F. Fratto, B. Furman, M.O. Hall, C.R. Kelble, J.S. Rehage, and J. Nelson. 2022. Widespread seagrass die-off has no legacy effect on basal resource use of seagrass food webs in Florida Bay, USA. ICES Journal of Marine Science 79: 1831-1842. DOI: 10.1093/icesjms/fsac112

James, W.R., R.O. Santos, J.S. Rehage, J.C. Doerr, and J. Nelson. 2022. E-scape: Consumer-specific landscapes of energetic resources derived from stable isotope analysis and remote sensing. Journal of Animal Ecology 91: 381-390. DOI: 10.1111/1365-2656.13637

James, W.R., V. Bautista, R. Rezek, J.S. Rehage, and R.O. Santos. 2022. A review of the potential impacts of commercial inshore pink shrimp fisheries on the recreational flats fishery in Biscayne Bay, FL, USA. Environmental Biology of Fishes DOI: 10.1007/s10641-022-01319-4

Kennedy, H., J.F. Pages, D. Lagomasino, A. Arias-Ortiz, P. Colarusso, J.W. Fourqurean, M.N. Githaiga, J. Howard, D. Krause-Jensen, T. Kuwae, P.S. Lavery, P.I. Macreadie, N. Marba, P. Masque, I. Mazarrasa, T. Miyajima, O. Serrano, and C.M. Duarte. 2022. Species traits and geomorphic setting as drivers of global soil carbon stocks in seagrass meadows. Global Biogeochemical Cycles 36: e2022GB007481. DOI: 10.1029/2022GB007481

Laas, P., K. Ugarelli, R. Travieso, S. Stumpf, E.E. Gaiser, J. Kominoski, and U. Stingl. 2022. Water column microbial communities vary along salinity gradients in the Florida Coastal Everglades wetlands. Microorganisms 10: 215. DOI: 10.3390/microorganisms10020215

Lamb, L.M., D. Gann, J. Velazquez, and T. Troxler. 2022. Detecting vegetation to open water transitions in a subtropical wetland landscape from historical panchromatic aerial photography and multispectral satellite imagery. Remote Sensing 14: 3976. DOI: 10.3390/rs14163976

Leyva, D., R. Jaffe, J. Courson, J. Kominoski, M.U. Tariq, F. Saeed, and F.A. Fernandez-Lima. 2022. Molecular level characterization of DOM along a freshwater-to-estuarine coastal gradient in the Florida Everglades. Aquatic Sciences 84: 63. DOI: 10.1007/s00027-022-00887-y

Malone, S.L., J. Zhao, J. Kominoski, G. Starr, C.L. Staudhammer, P.C. Olivas, J.A. Cummings, and S. Oberbauer. 2022. Integrating aquatic metabolism and net ecosystem CO2 balance in short- and long-hydroperiod subtropical freshwater wetlands. Ecosystems 25: 567-585. DOI: 10.1007/s10021-021-00672-2

Malone, S.L., Y. Oh, K.A. Arndt, G. Burba, R. Commane, A.R. Contosta, J.P. Goodrich, H. Loescher, G. Starr, and R. Varner. 2022. Gaps in network infrastructure limit our understanding of biogenic methane emissions for the United States. Biogeosciences 19: 2507-2522. DOI: 10.5194/bg-19-2507-2022

Massie, J., R.O. Santos, R. Rezek, W.R. James, N. Viadero, R. Boucek, D.A. Blewett, A.A. Trotter, P.W. Stevens, and J.S. Rehage. 2022. Primed and cued: long-term acoustic telemetry links interannual and seasonal variations in freshwater flows to the spawning migrations of Common Snook in the Florida Everglades. Movement Ecology 10: 48. DOI: 10.1186/s40462-022-00350-5

Nocentini, A., J. Kominoski, J.J. O'Brien, and J. Redwine. 2022. Fire intensity and ecosystem oligotrophic status drive relative phosphorus release and retention in freshwater marshes. Ecosphere 13: e4263. DOI: 10.1002/ecs2.4263

Parkinson, R., and S. Wdowinski. 2022. Accelerating sea-level rise and the fate of mangrove plant communities in South Florida, U.S.A. Geomorphology 412: 108329. DOI: 10.1016/j.geomorph.2022.108329

Patrick, C. et al. 2022. A general pattern of trade-offs between ecosystem resistance and resilience to tropical cyclones. Science Advances 8: eabl9155. DOI: 10.1126/sciadv.abl9155

Pintar, M.R., N.J. Dorn, J. Kline, and J.C. Trexler. 2023. Hydrology-mediated ecological function of a large wetland threatened by an invasive predator. Science of The Total Environment 857: 159245. DOI: 10.1016/j.scitotenv.2022.159245

Reed, D.C., R.J. Schmitt, A.B. Burd, D.E. Burkepile, J. Kominoski, K.J. McGlathery, R.J. Miller, J. Morris, and J.C. Zinnert. 2022. Responses of coastal ecosystems to climate change: Insights from long-term ecological research. BioScience 72: 871-888. DOI: 10.1093/biosci/biac006

Rehage, J.S., R. Boucek, R.O. Santos, J. Massie, N. Viadero, and R. Rezek. 2022. Untangling flow-ecology relationships: Effects of seasonal stage variation on Common Snook aggregation and movement rates in the Everglades. Estuaries and Coasts 45: 2059-2069. DOI: 10.1007/s12237-022-01065-x

Rezek, R., W.R. James, V. Bautista, I. Zink, J.S. Rehage, and R.O. Santos. 2022. Temporal trends of Biscayne Bay pink shrimp fisheries catch, economic indicators, and potential interactions with South Florida recreational flats fisheries. Environmental Biology of Fishes DOI: 10.1007/s10641-022-01314-9

Ross, M.S., S. Stoffella, R. Vidales, J.F. Meeder, D.C. Kadko, L.J. Scinto, S.C. Subedi, and J. Redwine. 2022. Sea-level rise and the persistence of tree islands in coastal landscapes . Ecosystems 25: 586-602. DOI: 10.1007/s10021-021-00673-1

Ruehl, C., M.R. Pintar, and J.C. Trexler. 2022. Predator-permanence hypothesis in time: Community dynamics in a seasonally flooded wetland. Freshwater Science 41: 549-696. DOI: 10.1086/721960

Staudhammer, C.L., S.L. Malone, J. Zhao, Z. Yu, G. Starr, and S. Oberbauer. 2022. Methane emissions from subtropical wetlands: An evaluation of the role of data filtering on annual methane budgets. Agricultural and Forest Meteorology 321: 108972. DOI: 10.1016/j.agrformet.2022.108972

Strickland, B.A., K.R. Gastrich, J. Beauchamp, F.J. Mazzotti, and M.R. Heithaus. 2022. Effects of hydrology on the movements of a large-bodied predator in a managed freshwater marsh. Hydrobiologia 849: 861-878. DOI: 10.1007/s10750-021-04764-x

Sullivan, K.L., E.E. Gaiser, and H. Swain. 2022. Dissolved organic carbon as a driver of seasonal and multiyear phytoplankton assembly oscillations in a subtropical monomictic lake. Limnology and Oceanography 67: S416-S429. DOI: 10.1002/lno.12004

Wakefield, S., D. Chandler, and K. Grove. 2022. The asymmetrical anthropocene: resilience and the limits of posthumanism. cultural geographies 29: 389-404. DOI: 10.1177%2F14744740211029278

Xiong, L., D. Lagomasino, S.P. Charles, E. Castañeda-Moya, B. Cook, J. Redwine, and L. Fatoyinbo. 2022. Quantifying mangrove canopy regrowth and recovery after Hurricane Irma with large-scale repeat airborne lidar in the Florida Everglades. International Journal of Applied Earth Observation and Geoinformation 114: 103031. DOI: 10.1016/j.jag.2022.103031

Yu, Z., C.L. Staudhammer, S.L. Malone, S. Oberbauer, J. Zhao, J.A. Cherry, and G. Starr. 2022. Biophysical factors influence methane fluxes in subtropical freshwater wetlands using eddy covariance methods. Ecosystems DOI: 10.1007/s10021-022-00787-0. DOI: 10.1007/s10021-022-00787-0

Zhang, B., S. Wdowinski, and D. Gann. 2022. Space-based detection of significant water-depth increase induced by Hurricane Irma in the Everglades wetlands using Sentinel-1 SAR backscatter observations. Remote Sensing 14: 1415. DOI: 10.3390/rs14061415

Zhang, B., S. Wdowinski, D. Gann, S.-H. Hong, and J.P. Sah. 2022. Spatiotemporal variations of wetland backscatter: The role of water depth and vegetation characteristics in Sentinel-1 dual-polarization SAR observations. Remote Sensing of Environment 270: 112864. DOI: 10.1016/j.rse.2021.112864

Zhao, J., S. Chakrabarti, R.M. Chambers, P. Weisenhorn, R. Travieso, S. Stumpf, E. Standen, H.O. Briceno, T. Troxler, E.E. Gaiser, B. Dhillon, J. Kominoski, and W. Martens-Habbena. 2023. Year-around survey and manipulation experiments reveal differential sensitivities of soil prokaryotic and fungal communities to saltwater intrusion in Florida Everglades wetlands. Science of The Total Environment 858: 159865. DOI: 10.1016/j.scitotenv.2022.159865

Zhao, X., V.H. Rivera-Monroy, C. Li, I. Vargas-Lopez, R.V. Rohli, Z. Xue, E. Castañeda-Moya, and C. Coronado-Molina. 2022. Temperature across vegetation canopy-water-soil interfaces is modulated by hydroperiod and extreme weather in coastal wetlands. Frontiers in Marine Science 9: 52901. DOI: 10.3389/fmars.2022.852901

In Press

Feher, L.C., M.J. Osland, K.L. McKee, K.R.T. Whelan, C. Coronado-Molina, F.H. Sklar, K.W. Krauss, R.J. Howard, D.R. Cahoon, J.C. Lynch, L. Lamb-Wotton, T.G. Troxler, J.R. Conrad, G.H. Anderson, W.C. Vervaeke, and T.J. Smith III. Accepted. Soil elevation change in mangrove forests and marshes of the Greater Everglades: a regional synthesis of surface elevation table-marker horizon (SET-MH) data. Estuaries and Coasts.

Flood, P.J., W.F. Loftus, and J.C. Trexler. In Press. Fishes in a seasonally pulsed wetland show spatiotemporal shifts in diet and trophic niche but not shifts in trophic position. Food Webs. DOI: 10.1016/j.fooweb.2022.e00265

Gann, D. and J. Richards. In Press. Scaling of Classification Systems - Effects of Class Precision on Detection Accuracy from Medium Resolution Multispectral Data. Landscape Ecology.

Halpern, B.S., C. Boettiger, M.C. Dietze, J.A. Gephart, P. Gonzalez, N.B. Grimm, P.M. Groffman, J. Gurevitch, S.E. Hobbie, K.J. Komatsu, K.J. Kroeker, H.J. Lahr, D.M. Lodge, C.J. Lortie, J.S.S. Lowndes, F. Michelli, H.P. Possingham, M.H.

Ruckelshaus, C. Scarborough, C.L. Wood, G.C. Wu, and L. Lancaster. In Press. Priorities for synthesis in ecology and environmental science. Ecosphere.

Conference Papers and Presentations

Ajavon, A.J., W.R. James, J. Rodemann, J.S. Rehage, and R.O. Santos. 2022. The influence of seagrass succession on nekton biomass distribution in Florida Bay. Joint Aquatic Sciences Meeting (JASM), Grand Rapids, Michigan, May 20, 2022.

Alwakeel, J., and R.M. Price. 2022. Determining groundwater inputs into Everglades coastal estuarine lakes using hydrological and geochemical budget methods. Geological Society of America, Denver, Colorado, October 11, 2022.

Anderson, K.J., and J. Kominoski. 2022. How are increases in marine and fresh water changing coastal wetland DOC? 2022 LTER All Scientists Meeting, Asilomar, California, September 19, 2022 - September 23, 2022.

Anderson, K.J., J. Kominoski, A. Nocentini, and S. Hoffman. 2022. Nutrient limitation interacts with carbon sources and hydrology to drive dissolved organic matter in wetlands. 2022 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, March 2, 2022.

Anderson, K.J., J. Kominoski, A. Nocentini, S. Hoffman, and M.A. Smith. 2022. Nutrient limitation interacts with carbon sources and hydrology to drive dissolved organic matter in wetlands. Joint Aquatic Sciences Meeting (JASM), Grand Rapids, Michigan, May 17, 2022.

Armitage, A.R., J.E. Thompson, C.A. Weaver, J. Kominoski, and S.C. Pennings. 2022. The role of interacting disturbances on the expansion and contraction of subtropical mangroves. Association for the Sciences of Limnology and Oceanography, Ocean Sciences Meeting, Virtual, February 24, 2022 - March 4, 2022.

Bhat, M.. 2022. Ecosystem Services Valuation: Methodological Issues and The Case of the Florida Everglades. Bay of Bengal Program Inter-Governmental Organization (BOBP-IGO) Working Group Meeting, Chennai, India, October 7, 2022.

Burgman, R., and L.M. Cherubin. 2022. Effects of climate change and water management on West Florida Shelf's dynamics. 2022 LTER All Scientists Meeting, Asilomar, California, September 19, 2022 - September 23, 2022.

Burgman, R.. 2022. Effects of climate change and water management on West Florida Shelf's dynamics. American Geophysical Union Annual Meeting, Chicago, Illinois and Virtual, December 14, 2022.

Castañeda-Moya, E., D. Lagomasino, J. Kominoski, T. Troxler, and J.P. Sah. 2022. Effects of Hurricane Irma on mangrove forest structure in the Florida Everglades, USA. Mangrove Congress of America, Merida, Mexico, October 10, 2022 - October 14, 2022.

Chavez, S., S. Wdowinski, D. Lagomasino, E. Castañeda-Moya, L. Fatoyinbo, B. Cook, R.P. Moyer, K. Radabaugh, J.M. Smoak, T. Troxler, and E.E. Gaiser. 2022. Use of remote sensing to determine damage and recovery of mangrove forests in the Everglades following hurricane disturbances. 2022 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, March 2, 2022.

Chavez, S., S. Wdowinski, E. Castañeda-Moya, D. Lagomasino, T.E. Fatoyinbo, B. Cook, R.P. Moyer, K. Radabaugh, T. Troxler, and E.E. Gaiser. 2022. Use of remote sensing to determine damage and recovery of mangrove forests in the Everglades following hurricane disturbances. Ecological Society of America Annual Meeting 2022, Montreal, Canada, August 16, 2022.

Chen, S., R. Hale, K. Capps, J. Kominoski, K. Hopkins, A. Roy, J.L. Morse, A. Quick, D. Cross, C. Pendergast, C. Rizzie, and L. Ortiz Munoz. 2022. Spatial and temporal variation in DOM in urban streams of the eastern United States. Joint Aquatic Sciences Meeting (JASM), Grand Rapids, Michigan, May 16, 2022.

Cordoba, N., and R.M. Price. 2022. Hydraulic conductivity and pore water nutrient concentrations of mangrove and sawgrass peat under varying salinity conditions in Shark River Slough. 2022 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, March 2, 2022.

Delaria, E., R.A. Hannun, G.M. Wolfe, B. Poulter, L.R. Lait, P.A. Newman, K.L. Thornhill, R. Szot, C. Pruett, S. Blum, and Q. Ying. 2022. First airborne flux measurements of greenhouse gas exchange over the Everglades during BlueFlux. American Geophysical Union Annual Meeting, Chicago, Illinois and Virtual, December 14, 2022.

Deprado, L., and R.M. Price. 2022. Nutrient release from coastal aquifers of varying lithology undergoing saltwater intrusion. Geological Society of America, Denver, Colorado, October 11, 2022.

DeVito, L., and T. Troxler. 2022. Peat Collapse: Carbon fluxes, flocculent transport, and environmental signature. 2022 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, March 2, 2022.

Donate, N., L. Toll-Roque, D. Salazar Amoretti, and O. Valverde-Barrantes. 2022. Effects of sea level rise on the root chemistry of Chamaecrista lineata var. Keyensis. 2022 LTER All Scientists Meeting, Asilomar, California, September 19, 2022 - September 23, 2022.

Flood, P.J., B.A. Strickland, J. Kline, W.F. Loftus, and J.C. Trexler. 2022. Fish invasions restructure aquatic food webs and trophic dynamics. Ecological Society of America Annual Meeting 2022, Montreal, Canada, August 18, 2022.

Flood, P.J., W.F. Loftus, and J.C. Trexler. 2022. Fishes show spatiotemporal shifts in diet and trophic niche not associated with shifts in trophic position. Joint Aquatic Sciences Meeting (JASM), Grand Rapids, Michigan, May 16, 2022.

Flower, H., M. Rains, J.Z. Zhang, and D.B. Lewis. 2022. Saltwater intrusion and phosphorus desorption: The first geochemical model of seawater-induced phosphorus release from calcite. Geological Society of America, Denver, Colorado, October 11, 2022.

Gaiser, E.E., and N.J. Dorn. 2022. Wet season fauna and primary production in Florida Everglades. RECOVER Science Coordination Meeting, Virtual, January 2022.

Gaiser, E.E., J.C. Trexler, J. Kline, F. Tobias, and G. Kamener. 2022. Restoring connectivity while maintaining oligotrophy: Long-term signals of legacy nutrient spiraling and recovery in wetland algal mats. Joint Aquatic Sciences Meeting (JASM), Grand Rapids, Michigan, May 20, 2022.

Gaiser, E.E., P. Kleindl, and T. Fish. 2022. Enacting LTER science through federal agency partnerships. 2022 LTER All Scientists Meeting, Asilomar, California, September 19, 2022 - September 23, 2022.

Gaiser, E.E.. 2022. Panel Presentation: Sea level rise, peat soils, and the future of the Everglades. Everglades Coalition Conference, Duck Key, Florida, January 6, 2022 - January 8, 2022.

Gann, D., J.H. Richards, B.M. Harris, and J. Redwine. 2022. Effects of fire regime on detection of wetland vegetation change using bi-season spectral data. American Geophysical Union Annual Meeting, Chicago, Illinois and Virtual, December 15, 2022.

Gonzalez, B., S.L. Malone, M.G. McLeod, and A. Richey. 2022. Differences in water level synchrony between recent El Niño–Southern Oscillation (ENSO) events. 2022 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, March 2, 2022.

Grove, K.. 2022. Resilience, Everglades Restoration, and Racial Science in the Anthropocene. Emerging Futures research group, University of Bergen, Bergen, Norway, June 15, 2022.

Hale, R., K. Capps, K. Hopkins, J. Kominoski, J.L. Morse, A. Roy, S. Chen, A. Quick, A. Blinn, D. Cross, B.T. Folk, L. Ortiz Munoz, C. Pendergast, and C. Rizzie. 2022. Scales and drivers of variability in dissolved organic carbon across diverse urban watersheds. Joint Aquatic Sciences Meeting (JASM), Grand Rapids, Michigan, May 16, 2022.

Hoffman, S., J. Kominoski, K.J. Anderson, A. Nocentini, E.E. Gaiser, and J. Redwine. 2022. Freshwater rehydration increases primary production and mobilizes legacy phosphorus in Everglades marshes. 2022 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, March 2, 2022.

Hoffman, S., J. Kominoski, K.J. Anderson, A. Nocentini, E.E. Gaiser, and J. Redwine. 2022. Freshwater rehydration increases primary production and mobilizes legacy phosphorus in Everglades marshes. Joint Aquatic Sciences Meeting (JASM), Grand Rapids, Michigan, May 18, 2022.

Hogan, J.A., E. Castañeda-Moya, L. Lamb-Wotton, T. Troxler, and C. Baraloto. 2022. Water levels primarily drive variation in photosynthesis and nutrient use of scrub Red Mangroves in the southeastern Florida Everglades. 2022 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, March 2, 2022.

Hormiga, S., and E.E. Gaiser. 2022. Coastal carbon flux: Periphyton contributions and diatom indicators. 2022 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, March 2, 2022.

James, W.R.. 2022. Testing for overlap in juvenile tarpon emigration from coastal ponds in Southwest Florida. Bonefish & Tarpon Trust 7th International Science Symposium & Flats Expo, Palm Beach Gardens, Florida, November 4, 2022.

Kleindl, P., A. Wachnicka, and E.E. Gaiser. 2022. The role of benthic periphyton mats in regulating macrophyte communities in a marl prairie wetland. 2022 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, March 2, 2022.

Kleindl, P., A. Wachnicka, and E.E. Gaiser. 2022. The role of benthic periphyton mats in regulating macrophyte communities in a marl prairie wetland. 2022 LTER All Scientists Meeting, Asilomar, California, September 19, 2022 - September 23, 2022.

Kominoski, J., B.A. Ball, T. Bell, G. Gerrish, P.E. Gutierrez-Fonseca, K. Hall, P.M. Medeiros, and J.A. Rudgers. 2022. Ecological sensitivities to pulse dynamics and antecedent climate: insights from across US LTER sites. Ecological Society of America Annual Meeting 2022, Montreal, Canada, August 17, 2022.

Kominoski, J., C. Patrick, W.H. McDowell, and B.A. Stauffer. 2022. Coordinating storms and data streams: Hurricane Ecosystem Response Synthesis (HERS-RCN) . Joint Aquatic Sciences Meeting (JASM), Grand Rapids, Michigan, May 16, 2022.

Lamb-Wotton, L., and T. Troxler. 2022. A new, coastal peat marsh surface elevation table-marker horizon (SET-MH) network for monitoring elevation change in the

Florida Coastal Everglades. 2022 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, March 2, 2022.

Lamb-Wotton, L., J. Velazquez, D. Gann, and T. Troxler. 2022. Detecting vegetation to open water transitions in a subtropical wetland landscape from historical panchromatic aerial photography and multi-spectral satellite imagery. American Geophysical Union Annual Meeting, Chicago, Illinois and Virtual, December 15, 2022.

Linenfelser, J., J.S. Rehage, and R.O. Santos. 2022. Tracing the source of nutrients entering North Central Florida Bay: A stable isotope approach. 2022 LTER All Scientists Meeting, Asilomar, California, September 19, 2022 - September 23, 2022.

Malone, S.L., Y. Oh, R. Commane, A.R. Contosta, and R. Varner. 2022. Methane emission potential across subtropical, temperate, and arctic ecosystems. 2022 LTER All Scientists Meeting, Asilomar, California, September 19, 2022 - September 23, 2022.

Malone, S.L.. 2022. Climate change and sea level rise deepen the social divide in south Florida: managing landscapes for an equitable future. New Horizons in Conservation Conference, Virtual, March 29, 2022.

Massie, J., R.O. Santos, R. Rezek, W.R. James, N. Viadero, R. Boucek, D.A. Blewett, A.A. Trotter, P.W. Stevens, and J.S. Rehage. 2022. Primed and cued: Linking interannual and seasonal variations in freshwater flows to the spawning migrations of Common Snook in the Florida Coastal Everglades. 2022 LTER All Scientists Meeting, Asilomar, California, September 19, 2022 - September 23, 2022.

Massie, J., R.O. Santos, R. Rezek, W.R. James, N. Viadero, R. Boucek, D.A. Blewett, A.A. Trotter, P.W. Stevens, and J.S. Rehage. 2022. Primed and Cued: Linking interannual and seasonal variations in freshwater flows to the spawning migrations of Common Snook in the Florida Everglades. 42nd Annual Meeting of the Florida Chapter of the American Fisheries Society, Haines City, Florida, April 5, 2022 - April 7, 2022.

Massie, J., R.O. Santos, R. Rezek, W.R. James, N. Viadero, R. Boucek, D.A. Blewett, A.A. Trotter, P.W. Stevens, and J.S. Rehage. 2022. Primed and Cued: Linking interannual and seasonal variations in freshwater flows to the spawning migrations of Common Snook in the Florida Everglades. 2022 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, March 2, 2022.

Massie, J., R.O. Santos, R. Rezek, W.R. James, N. Viadero, R. Boucek, P.W. Stevens, and J.S. Rehage. 2022. Examining the role of hydrologic variation in the seasonal migrations and disturbance-driven movements of Common Snook in the Florida

Everglades. Oregon Chapter of the American Fisheries Society 2022 Annual Meeting , Virtual, March 3, 2022.

McLeod, M.G., and S.L. Malone. 2022. Proposal: Fire history and climate drive patterns of post-fire recovery in Everglades upland ecosystems. 2022 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, March 2, 2022.

McLeod, M.G., D. Gann, M.S. Ross, and S.L. Malone. 2022. Fire history and climate drive patterns of post-fire recovery in Everglades upland ecosystems. 2022 LTER All Scientists Meeting, Asilomar, California, September 19, 2022 - September 23, 2022.

Montenegro, K., J. Kominoski, K. Whelan, and M.C. Prats. 2022. Quantifying how increased marine hydrologic inputs affect coastal mangrove soil accretion and elevation. 2022 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, March 2, 2022.

Montenegro, K., J. Kominoski, K. Whelan, and M.C. Prats. 2022. Quantifying how increased marine hydrologic inputs affect coastal mangrove soil accretion and elevation. Joint Aquatic Sciences Meeting (JASM), Grand Rapids, Michigan, May 20, 2022.

Onwuka, I., L.J. Scinto, and D. Fugate. 2022. Surrogate measurements of suspended sediment concentrations to determine hydrodynamic effects on water quality in an Everglades canal in Florida USA. Joint Aquatic Sciences Meeting (JASM), Grand Rapids, Michigan, May 20, 2022.

Onwuka, I., L.J. Scinto, and D. Fugate. 2022. Surrogate measurements of suspended sediment concentrations to determine hydrologic effects on water quality in an Everglades canal in Florida USA. 2022 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, March 2, 2022.

Ortiz Munoz, L., J. Kominoski, C. Rizzie, S. Chen, and A. Quick. 2022. Urban dissolved organic carbon and aquatic metabolism vary with land-use and seasons. Joint Aquatic Sciences Meeting (JASM), Grand Rapids, Michigan, May 16, 2022.

Palomino, S., S. Wdowinski, and S. Li. 2022. Evaluation and comparison of the new generation of spaceborne laser altimeters for surface water level measurements in wetlands. American Geophysical Union Annual Meeting, Chicago, Illinois and Virtual, December 15, 2022.

Palomino, S., S. Wdowinski, B. Zhang, and H. Liao. 2022. Space-based multi-sensor monitoring system of surface water level changes in wetlands. NISAR Science Community Workshop, Pasadena, California, August 30, 2022.

Parkinson, R., and S. Wdowinski. 2022. Accelerating sea-level rise and the fate of mangrove plant communities in South Florida, U.S.A. 2022 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, March 2, 2022.

Paz, V.A., B.A. Strickland, A. Beal, J.J. Kiszka, K.R. Gastrich, M. Sabando, R. Schinbeckler, A. Jonas, J.M. Eirin-Lopez, and M.R. Heithaus. 2022. Spatial variation in trophic interactions of bottlenose dolphins (Tursiops truncatus) within the Florida Coastal Everglades assessed with stable isotope. Society of Marine Mammal Conference, West Palm Beach, Florida, August 1, 2022 - August 5, 2022.

Paz, V.A., J.J. Kiszka, M.R. Heithaus, K.R. Gastrich, A. Beal, J.M. Eirin-Lopez, B.A. Strickland, M. Sabando, and R. Schinbeckler. 2022. Spatial variation in trophic interactions of bottlenose dolphins in estuarine habitats of the Florida Coastal Everglades. Ecological Society of America Annual Meeting 2022, Montreal, Canada, August 15, 2022.

Poulter, B., D.E. Butman, A. Chatterjee, A. Feldman, R.B. Jackson, W.A. Kurz, A. Michalak, J.B. Miller, J. Tremper Randerson, S.E. Tank, H. Tian, G.N. Murray-Tortarolo, R. Vargass, J. Wang, K. Wickland, C.A. Williams, L. Windham-Myers, and Z. Zhang. 2022. The greenhouse gas budget of North America 2010-2019: Results from the Second Regional Carbon Cycle and Processes study (RECCAP2). American Geophysical Union Annual Meeting, Chicago, Illinois and Virtual, December 14, 2022.

Poulter, B.. 2022. The earth in living color: NASA's Surface Biology and Geology Designated Observable. American Geophysical Union Annual Meeting, Chicago, Illinois and Virtual, December 12, 2022.

Prajapati, P., S.L. Malone, T. Troxler, and E. Castañeda-Moya. 2022. Methane emissions from mangroves in the Everglades based on the eddy covariance measurements. 2022 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, March 2, 2022.

Price, R.M., J.S. Herman, and D.E. Ogurcak. 2022. A summary of water-rock interactions in carbonate coastal aquifers affected by saltwater intrusion. Geological Society of America, Denver, Colorado, October 11, 2022.

Quick, A., A. Roy, R. Hale, K. Capps, K. Hopkins, J. Kominoski, and J.L. Morse. 2022. Variability in dissolved organic carbon across urban streams in Boston, Massachusetts. Northeast Aquatic Biologists Conference, Portland, Maine, March 2, 2022.

Quick, A., A. Roy, R. Hale, K. Capps, K. Hopkins, J. Kominoski, J.L. Morse, S. Chen, and C. Rizzie. 2022. Seasonal trends in dissolved and particulate organic carbon across urban streams in Boston, USA . Joint Aquatic Sciences Meeting (JASM), Grand Rapids, Michigan, May 16, 2022.

Rehage, J.S.. 2022. Drugs in our flats: Exposure of South Florida and Caribbean bonefish to pharmaceuticals. Bonefish & Tarpon Trust 7th International Science Symposium & Flats Expo, Palm Beach Gardens, Florida, November 5, 2022.

Restrepo, V., E. Castañeda-Moya, J. Kominoski, and E. Solohin. 2022. Post-hurricane mangrove regeneration along subsidy-stress in the FCE. 2022 LTER All Scientists Meeting, Asilomar, California, September 19, 2022 - September 23, 2022.

Richey, A., and S.L. Malone. 2022. Proposal: Salinity effect on carbon uptake rates in a low productivity saline ecotone wetland. 2022 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, March 2, 2022.

Richey, A., J. Kominoski, P.C. Olivas, and S.L. Malone. 2022. Water level and surface salinity trends in the Everglades freshwater-saline ecotone. 2022 LTER All Scientists Meeting, Asilomar, California, September 19, 2022 - September 23, 2022.

Rodemann, J., R.O. Santos, W.R. James, and J.S. Rehage. 2022. Finding a home in a fragmented world: Multiscale habitat selection of Spotted Seatrout in an area of seagrass recovery. 42nd Annual Meeting of the Florida Chapter of the American Fisheries Society, Haines City, Florida, April 5, 2022 - April 7, 2022.

Rugemalila, D., J.P. Sah, S. Stoffella, S. Castaneda, K. Castrillon, J. Heffernan, and M.S. Ross. 2022. Effect of hydrology and fire legacies on vegetation species composition within the Ridge and Slough landscape across the Everglades ecosystem. 2022 LTER All Scientists Meeting, Asilomar, California, September 19, 2022 - September 23, 2022.

Santos, R.O.. 2022. The Biscayne Bay commercial shrimp harvest and its potential ecological impacts on recreational fish species. Bonefish & Tarpon Trust 7th International Science Symposium & Flats Expo, Palm Beach Gardens, Florida, November 4, 2022.

Shannon, T., and E.E. Gaiser. 2022. Drivers of benthic algal metacommunities and their functional resilience. 2022 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, March 2, 2022.

Shannon, T., and E.E. Gaiser. 2022. Drivers of benthic algal metacommunities and their functional resilience. GLEON 2022 All Hands' Meeting, Lake George, New York, November 1, 2022.

Shannon, T., and E.E. Gaiser. 2022. Experimental assessment of functional redundancy and resilience of benthic algal metacommunities. 2022 LTER All Scientists Meeting, Asilomar, California, September 19, 2022 - September 23, 2022.

Simpson, L., and H. Wagner. 2022. Is there a significant difference in decomposition rates in a plot of cattails vs a plot of sawgrass? 2022 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, March 2, 2022.

Smith, M.A., J. Kominoski, and K.J. Anderson. 2022. Carbon fluxes across ecosystem interfaces: Sources, cycling, and fate. Joint Aquatic Sciences Meeting (JASM), Grand Rapids, Michigan, May 20, 2022.

Smith, M.A., J. Kominoski, and K.J. Anderson. 2022. Investigating long-term spatiotemporal variation in dissolved organic matter composition in subtropical coastal wetlands . Joint Aquatic Sciences Meeting (JASM), Grand Rapids, Michigan, May 20, 2022.

Viadero, N., J. Massie, C. Eggenberger, W.R. James, R. Rezek, R.O. Santos, and J.S. Rehage. 2022. Between dry rock and a salty place: How hydrology influences the habitat use of Florida Largemouth Bass. 2022 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, March 2, 2022.

Viadero, N., J.S. Rehage, and R.O. Santos. 2022. Between Dry Rock and a Salty Place: How Hydrology influences the Habitat use of Florida Largemouth bass. 42nd Annual Meeting of the Florida Chapter of the American Fisheries Society, Haines City, Florida, April 5, 2022 - April 7, 2022.

Vorseth, C., M. Bhat, and A. Stainback. 2022. Tight Lines and Survey Designs: Estimating the recreational economic value of Lake Okeechobee and the Northern Estuaries. 2022 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, March 2, 2022.

Vorseth, C.. 2022. Tight Lines and Survey Designs: A Comprehensive Recreational Economic Valuation of Lake Okeechobee and the Northern Estuaries. Department of Earth and Environment Symposium, Florida International University, Miami, Florida, February 2022.

Wagner, H., G. Perez, J. Quinones, M. Ramon, K. Lopez, A. da Costa da Silva, A. Bellantuono, and M. DeGennaro. 2022. Mosquito population dynamics within Miami-Dade County households: the use of community-based mosquito surveillance programs to facilitate infestation, genetic, and sense of community research. 2022 LTER All Scientists Meeting, Asilomar, California, September 19, 2022 - September 23, 2022.

Wagner, H., M. Ramon, G. Perez, J. Quinones, A. da Costa da Silva, A. Bellantuono, S.L. Malone, and M. DeGennaro. 2022. Proposal: Addressing mosquito population dynamics in South Florida with geographic distribution and genomic variation analysis using a community-based mosquito surveillance program. 2022 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, March 2, 2022.

Wakefield, S.. 2022. Practices for a Thawing World: Anthropocene Urban Survival Skills. Emerging Futures research group, University of Bergen, Bergen, Norway, June 15, 2022.

Wakefield, S.. 2022. The Limits of Urban Resilience in Miami Beach, FL. Association of American Geographers Annual Meeting, New York New York, February 25, 2022.

Wdowinski, S., B. Zhang, and H. Liao. 2022. Multi-sensor monitoring system of surface water level changes in the Everglades. Everglades National Park, Homestead, Florida.

Whelan, C., S. Lyons, S. Moreno, and G. Palacio. 2022. A comparison of decomposition rates along a hydrological gradient in a rehydrated forested wetland. 2022 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, March 2, 2022.

White, M., J.S. Rehage, W.R. James, R.O. Santos, and R. Rezek. 2022. When worlds collide: multi-directional movement of fishes and their ecological importance. 42nd Annual Meeting of the Florida Chapter of the American Fisheries Society, Haines City, Florida, April 5, 2022 - April 7, 2022.

Zhang, B., D. Gann, K. Smith, S. Wdowinski, C. Lin, S. Chavez, and J.Z. Zhang. 2022. Space-based mapping of mangrove canopy height with multi-sensor remote sensing observations and deep learning techniques. Joint Aquatic Sciences Meeting (JASM), Grand Rapids, Michigan, May 18, 2022.

Zhang, B., D. Gann, K. Smith, S. Wdowinski, C. Lin, S. Chavez, and J.Z. Zhang. 2022. Spatiotemporal variations of wetland backscatter: The role of water depth and vegetation characteristics in Sentinel-1 dual-polarization SAR observations. NISAR Science Community Workshop, Pasadena, California, August 31, 2022.

Zhang, B., K. Smith, S. Wdowinski, C. Lin, D. Gann, S. Chavez, and J.Z. Zhang. 2022. Space-based mapping of mangrove canopy height with multi-sensor observations and deep learning techniques. IEEE International Geoscience and Remote Sensing Symposium, Virtual, July 21, 2022.

Zhang, B., S. Wdowinski, D. Gann, S.-H. Hong, and J.P. Sah. 2022. Spatiotemporal variations of wetland backscatter: The role of water depth and vegetation characteristics in Sentinel-1 dual-polarization SAR observations. American Geophysical Union Annual Meeting, Chicago, Illinois and Virtual, December 15, 2022.

Zhang, Z., B. Poulter, J.R. Melton, W.J. Riley, D.J. Beerling, P. Ciais, N. Gedney, A. Gustafson, P.O. Hopcroft, A. Ito, A.K. Jain, F. Joos, T. Kleinen, T. Li, P.A. Miller, X. Liu, J. Muller, C. Peng, S. Peng, Z. Qin, H. Tian, X. Xu, Y. Yao, Y. Xi, Q. Zhu, W.

Zhang, Q. Zhu, and Q. Zhuang. 2022. Global methane budget 2000-2020: Wetland model synthesis. American Geophysical Union Annual Meeting, Chicago, Illinois and Virtual, December 15, 2022.

Zhao, J., S.L. Malone, S. Oberbauer, C.L. Staudhammer, and G. Starr. 2022. Investigating the inundation effect on carbon balance of an Everglades freshwater wetland: A combination of field observations and mesocosm experiments. American Geophysical Union Annual Meeting, Chicago, Illinois and Virtual, December 15, 2022.

Dissertations and Theses

Master's Theses

Cordoba, Nicole. 2022. Hydrologic Properties of Mangrove and Sawgrass Peat in Shark River Slough, Everglades, Florida. Master's thesis, Florida International University.

Linenfelser, Joshua. 2022. Tracing the source of nutrients entering North Central Florida Bay: A Stable isotope approach. Master's thesis, Florida International University.

Viadero, Natasha. 2022. Between dry rock and a salty place: Freshwater species in a coastal environment facing climate change. Master's thesis, Florida International University.

Yu, Zhuoran. 2022. Biophysical factors and water dynamics impact methane fluxes in Everglades freshwater marshes. Master's thesis, University of Alabama.

Ph.D. Dissertations

Flood, Peter. 2022. Spatial and temporal trophic dynamics and energy fluxes in response to ecosystem engineering and invasive species. Ph.D. dissertation, Florida International University.

Gervasi Bloom, Carissa. 2022. Observation to Action: A Stakeholder Driven Analysis and Assessment of a Data-Limited Fishery. Ph.D. dissertation, Florida International University.

Jordan, Deidra. 2022. A Multi Taxa Metagenomic Evaluation of the Everglades Soil Microbiome and the Impact of Salinity on Community Structure and Biogeochemical Cycles with a Soil Forensic Application. Ph.D. dissertation, Florida International University.

Paz, Valeria. 2022. Investigating Trophic Interactions, Habitat Use, and Pollution Loads of Bottlenose Dolphins (Tursiops Truncatus) in the Florida Coastal Everglades. Ph.D. dissertation, Florida International University.

Zhang, Boya. 2022. Hydrological and Ecological Synthetic Aperture Radar (SAR) Applications for the Everglades Wetland Ecosystem. Ph.D. dissertation, Florida International University.

Other publications

Massie, J., and J. Rehage. 2022. Hurricane Irma gives us confidence that if we fix it, they will come. Science Insider magazine. Publication of The Everglades Foundation, Palmetto Bay.

Massie, J. 2022. Waves of invasion: Non-native Peacock Eels in the Florida Everglades. Reefs to Rivers, official blog of the Florida Chapter of the American Fisheries Society.

Websites

Florida Coastal Everglades LTER Program Website
https://fcelter.fiu.edu/
The Florida Coastal Everglades LTER Program Website provides includes FCE research findings, data, publications, personnel, education & outreach activities, news, photos, videos, and information about the FCE Student Group.

Predator Tracker
http://tracking.fiu.edu/
The Predator Tracker website has information about the Predator Tracker application and a link to download the application. Predator Tracker is a stand alone application based on a kiosk at the Museum of Discovery and Science in Ft. Lauderdale. The application allows one to learn how researchers at Florida International University track and study big predators in the Shark River Estuary in Everglades National Park and explore their predator tracking data.

Wading Through Research
http://floridacoastaleverglades.blogspot.com/
A blog created by FCE graduate students which focuses on the experiences of graduate students conducting research in the Everglades.

Other products

Databases
The FCE Information Management System (FCE IMS) contains 195 datasets which are available on the FCE LTER's website (https://fcelter.fiu.edu/data/index.html) and in the EDI Data Repository. Datasets include climate, consumer, primary production, water quality, soils, and microbial data as well as other types of data. A table of FCE LTER

data sets in the EDI Data Repository with DOIs for each dataset is included as a supplementary document in the Appendix.

Software or Netware
R package: “landscapeScaling” (2022). Gann, D.
The purpose of the “landscapeScaling” package is to provide methods and functions to upscale categorical raster data. https://github.com/gannd/landscapeScaling

Educational aids or Curricula
Johnson, K. and Kamener, G. 2022. Exploring diatom biodiversity in the Everglades and Caribbean wetlands. A Project EDDIE classroom teaching module which uses FCE data. The module is available at https://serc.carleton.edu/eddie/teaching_materials/modules/diatombiodiversity_wetlands.html

Kamener, G. and Johnson, K. 2022. Exploring the relationship between periphyton and water quality in karstic wetlands. A Project EDDIE classroom teaching module which uses FCE data. The module is available at https://serc.carleton.edu/eddie/teaching_materials/modules/periphyton_waterquality_wetland.html

Participants & Other Collaborating Organizations

Participants

Name	Most Senior Project Role
Kominoski, John	PD/PI
Fourqurean, James	Co PD/PI
Gaiser, Evelyn	Co PD/PI
Grove, Kevin	Co PD/PI
Rehage, Jennifer	Co PD/PI
Bhat, Mahadev	Faculty
Burgman, Robert	Faculty
Castaneda, Edward	Faculty
Chambers, Randy	Faculty

Name	Most Senior Project Role
Crowl, Todd	Faculty
Dorn, Nathan	Faculty
Gann, Daniel	Faculty
Heithaus, Michael	Faculty
Kiszka, Jeremy	Faculty
Malone, Sparkle	Faculty
Martens-Habbena, Willm	Faculty
Nelson, James	Faculty
Oberbauer, Steven	Faculty
Oehm, Nicholas	Faculty
Olivas, Paulo	Faculty
Osburn, Chris	Faculty
Parkinson, Randy	Faculty
Price, Rene	Faculty
Raymond, Peter	Faculty
Rezek, Ryan	Faculty
Richards, Jennifer	Faculty
Santos, Rolando	Faculty
Simmons, Beth	Faculty
Starr, Gregory	Faculty
Staudhammer, Christina	Faculty
Stingl, Uli	Faculty
Trexler, Joel	Faculty
Troxler, Tiffany	Faculty

Name	Most Senior Project Role
Wakefield, Stephanie	Faculty
Wdowinski, Shimon	Faculty
Guimar√£es, Beatriz	K-12 Teacher
Hernandez, Amanda	K-12 Teacher
Pavon, Jose	K-12 Teacher
Simpson, Lacey	K-12 Teacher
Whelan, Cristina	K-12 Teacher
Bernardo, Melissa	Postdoctoral (scholar, fellow or other Postdoctoral position)
Charles, Sean	Postdoctoral (scholar, fellow or other Postdoctoral position)
Gillespie, Breahna	Postdoctoral (scholar, fellow or other Postdoctoral position)
James, W. Ryan	Postdoctoral (scholar, fellow or other Postdoctoral position)
Krause, Johannes	Postdoctoral (scholar, fellow or other Postdoctoral position)
Laas, Peeter	Postdoctoral (scholar, fellow or other Postdoctoral position)
Palomino, Sebastian	Postdoctoral (scholar, fellow or other Postdoctoral position)
Smith, Matthew	Postdoctoral (scholar, fellow or other Postdoctoral position)
Solohin, Elena	Postdoctoral (scholar, fellow or other Postdoctoral position)
Solomon, Kelsey	Postdoctoral (scholar, fellow or other Postdoctoral position)
Strickland, Bradley	Postdoctoral (scholar, fellow or other Postdoctoral position)

Name	Most Senior Project Role
Ying, Qing	Postdoctoral (scholar, fellow or other Postdoctoral position)
Zhang, Boya	Postdoctoral (scholar, fellow or other Postdoctoral position)
Zhao, Jun	Postdoctoral (scholar, fellow or other Postdoctoral position)
Daniels, Andre	Other Professional
Gastrich, Kirk	Other Professional
Johnson, Katie	Other Professional
Kamener, Gabriel	Other Professional
Pezoldt, Austin	Other Professional
Poulter, Benjamin	Other Professional
Redwine, Jed	Other Professional
Rugge, Michael	Other Professional
Shoemaker, Barclay	Other Professional
Standen, Emily	Other Professional
Tobias, Franco	Other Professional
Trabelsi, Shakira	Other Professional
Travieso, Rafael	Other Professional
Zhao, Junbin	Other Professional
Bautista, Valentina	Technician
Bremen, Ryan	Technician
Choi, Chang Jae	Technician
Distrubell, Andy	Technician
Dominguez, Gustavo	Technician

Name	**Most Senior Project Role**
Enright, Brooke	Technician
Garcia, Sofia	Technician
Hoffman, Sophia	Technician
Lundsten, Vanessa	Technician
Reinsel, Madeline	Technician
Reisa, Caitlin	Technician
Rizzie, Christopher	Technician
Sandquist, Madison	Technician
Stumpf, Sandro	Technician
Tytlar, Sara	Technician
Unger, Steven	Technician
Cook, Mark	Staff Scientist (doctoral level)
Fitz, Carl	Staff Scientist (doctoral level)
Ishtiaq, Khandkar	Staff Scientist (doctoral level)
Julian, Paul	Staff Scientist (doctoral level)
Lorenz, Jerry	Staff Scientist (doctoral level)
Van Dam, Bryce	Staff Scientist (doctoral level)
Vanderbilt, Kristin	Staff Scientist (doctoral level)
Acevedo Delrio, Santiago	Staff Scientist (research assistant)
Alwakeel, Julian	Graduate Student (research assistant)
Anderson, Kenneth	Graduate Student (research assistant)
Biswas, Himadri	Graduate Student (research assistant)
Castillo, Nicholas	Graduate Student (research assistant)
Chavez, Selena	Graduate Student (research assistant)

Name	Most Senior Project Role
Cordoba, Nicole	Graduate Student (research assistant)
Deprado, Lorenzo	Graduate Student (research assistant)
DeVito, Lauren	Graduate Student (research assistant)
Eggenberger, Cody	Graduate Student (research assistant)
Emery, Meredith	Graduate Student (research assistant)
Flood, Peter	Graduate Student (research assistant)
Garcia Barcia, Laura	Graduate Student (research assistant)
Garriga, Marbelys	Graduate Student (research assistant)
Gervasi, Carissa	Graduate Student (research assistant)
Gewirtzman, Jonathan	Graduate Student (research assistant)
Hormiga, Samantha	Graduate Student (research assistant)
Kahmann, Grace	Graduate Student (research assistant)
Kleindl, Paige	Graduate Student (research assistant)
Lamb-Wotton, Luke	Graduate Student (research assistant)
Linenfelser, Joshua	Graduate Student (research assistant)
Lopes, Christian	Graduate Student (research assistant)
Massie, Jordan	Graduate Student (research assistant)
Mcleod, Madeline	Graduate Student (research assistant)
Mesa, Ximena	Graduate Student (research assistant)
Montenegro, Kevin	Graduate Student (research assistant)
Moore, Courtney	Graduate Student (research assistant)
Olivera, Rigoberto	Graduate Student (research assistant)
Ortiz, Liz	Graduate Student (research assistant)
Paduani, Melinda	Graduate Student (research assistant)

Name	Most Senior Project Role
Paz, Valeria	Graduate Student (research assistant)
Restrepo, Veronica	Graduate Student (research assistant)
Reyes, Jessika	Graduate Student (research assistant)
Richey, Amanda	Graduate Student (research assistant)
Rodemann, Jonathan	Graduate Student (research assistant)
Sample, William	Graduate Student (research assistant)
Shannon, Thomas	Graduate Student (research assistant)
Sosa, Brandon	Graduate Student (research assistant)
Stingl, Shanna	Graduate Student (research assistant)
Sturges, James	Graduate Student (research assistant)
Turner, Jessica	Graduate Student (research assistant)
Viadero, Natasha	Graduate Student (research assistant)
Vorseth, Chloe	Graduate Student (research assistant)
Wagner, Helen	Graduate Student (research assistant)
White, Mackenzie	Graduate Student (research assistant)
Wright, Ashli	Graduate Student (research assistant)
Alfonos, Keily	Undergraduate Student
Battifora, Raquelle	Undergraduate Student
Hemsi, Sophia	Undergraduate Student
Jack, Vishal	Undergraduate Student
Lara, Melaney	Undergraduate Student
Mendez, Eber	Undergraduate Student
Mularo, Evan	Undergraduate Student
Samara, Yamilla	Undergraduate Student

Name	Most Senior Project Role
Meija, Valeria	High School Student
Donate, Nicole	Research Experience for Undergraduates (REU)
Padron, Lauren	Research Experience for Undergraduates (REU)

Collaborating Organizations

Bonefish and Tarpon Trust
Miami, Florida

Coastal Carolina University
Conway, South Carolina

College of William & Mary
Williamsburg, Virginia

The Deering Estate
Miami, Florida

East Carolina University
Greenville, North Carolina

Eckerd College
St. Petersburg, Florida

EcoLandMod, Inc.
Fort Pierce, Florida

Everglades Foundation
Palmetto Bay, Florida

Everglades National Park
Homestead, Florida

Florida Gulf Coast University
Fort Myers, Florida

Florida State University
Tallahassee, Florida

Georgia Southern University
Statesboro, Georgia

Georgia Tech
Atlanta, Georgia

Helmholtz-Zentrum Hereon
Geesthacht, Germany

Life University
Marietta, Georgia

Louisiana State University
Baton Rouge, Louisiana

Miami-Dade County Public Schools
Miami-Dade County, Florida

Mote Marine Laboratory
Sarasota, Florida

NASA Goddard Space Flight Center
Greenbelt, Maryland

National Audubon Society - Tavernier Science Center
Tavernier, Florida

National Park Service - South Florida/Caribbean Network Inventory and Monitoring Program
Palmetto Bay, Florida

National Science Foundation
Alexandria, Virginia

National Tropical Botanical Gardens
Coconut Grove, Florida

North Carolina State University
Raleigh, North Carolina

Oak Ridge National Laboratory
Oak Ridge, Tennessee

Oklahoma State University
Stillwater, Oklahoma

The Pennsylvania State University
University Park, Pennsylvania

Sanibel-Captiva Conservation Foundation
Sanibel, Florida

South Florida Water Management District
West Palm Beach, Florida

Tulane University
New Orleans, Louisiana

UNAVCO
Boulder, Colorado

University of Alabama
Tuscaloosa, Alabama

University of California, Los Angeles
Los Angeles, California

University of Central Florida
Orlando, Florida

University of Florida
Gainesville, Florida

University of Hawaii at Manoa
Honolulu, Hawaii

University of Louisiana at Lafayette
Lafayette, Louisiana

University of South Carolina
Columbia, South Carolina

University of South Florida
Tampa, Florida

University of South Florida St. Petersburg
St. Petersburg, Florida

University of Wisconsin
Madison, Wisconsin

U.S. Geological Survey
Reston, Virginia

Yale University
New Haven, Connecticut

Appendix: FCE LTER Data Packages in the EDI Repository

DOI	Authors	Title
10.6073/pasta/705982cd2283522fd897664bbd65aef2		NOAA Daily Surface Meteorologic Data at NCDC Everglades Station (ID-082850) (FCE LTER), South Florida from February 1924 to 2017
10.6073/pasta/38f75cb0611aa740d3b2717c4c06cc75		NOAA Daily Surface Meteorologic Data at NCDC Flamingo Ranger Station (ID-083020) (FCE), South Florida, USA, January 1951 - ongoing
10.6073/pasta/2b0c8f68ad01dcd49e528ba385d6847d		NOAA Daily Surface Meteorologic Data at NCDC Miami International Airport Station (ID-085663), South Florida, USA, January 1948 - ongoing
10.6073/pasta/67830b52b0e38010f9811a7386eb4ee0		NOAA Daily Surface Meteorologic Data at NCDC Royal Palm Ranger Station (ID-087760) (FCE LTER), South Florida, USA, May 1949 - ongoing
10.6073/pasta/dd507279ead6dab518823bdcafec8071		NOAA Daily Surface Meteorologic Data at NCDC Tavernier Station (ID-088841) (FCE), South Florida from June 1936 to May 2009
10.6073/pasta/49adea692415666d289eac906be41b57	Briceno, Henry	Surface Water Quality Monitoring Data collected in South Florida Coastal Waters (FCE LTER), Florida, USA, June 1989-ongoing

DOI	Authors	Title
10.6073/pasta/fbf6aabf1ca59dede0a3989bc950f34c	Briceno, Henry	Microbial Sampling from Shark River Slough and Taylor Slough, Everglades National Park, South Florida, USA (FCE LTER), January 2001 - ongoing
10.6073/pasta/e09a8f2b997f5e777255cbb890bb39fa	Heithaus, Michael; Matich, Philip; Rosenblatt, Adam	Large consumer isotope values, Shark River Slough, Everglades National Park (FCE LTER), Florida, USA, May 2005 - ongoing
10.6073/pasta/79e8ef59e5b93b2ff59321e0a93118ae	Heithaus, Michael; Matich, Philip; Rosenblatt, Adam	Temperatures,salinities, and dissolved oxygen levels in the Shark River Slough, Everglades National Park (FCE LTER) , from May 2005 to May 2014
10.6073/pasta/12d2803ebfe3b12c4cfdd8b91fd9df00		NOAA Monthly Mean Sea Level Summary Data for the Key West, Florida, Water Level Station (FCE) (NOAA/NOS Co-OPS ID 8724580) from 01-Jan-1913 to Present
10.6073/pasta/b07ae4ab29f525b7a9924382904e581b	Gaiser, Evelyn; Scinto, Leonard	Biogeochemical data collected from Northeast Shark Slough, Everglades National Park (FCE LTER) from September 2006 to September 2008
10.6073/pasta/276054adea704280741114O9e8231305	Anderson, William	Pond Cypress C-111 Basin, Everglades (FCE), South Florida Dendroisotope Data from 1970 to 2000
10.6073/pasta/208fe755e7f7e097c3d07066f26fad43	Trexler, Joel	Consumer Stocks: Fish, Vegetation, and other Non-physical Data from Everglades National Park (FCE LTER), South Florida, USA from February 2000 to April 2005

DOI	Authors	Title
10.6073/pasta/bc7e38fe4b8f5f976f1adb9e6395a8f8	Trexler, Joel	Consumer Stocks: Physical Data from Everglades National Park (FCE), South Florida from February 1996 to April 2008
10.6073/pasta/b0e2ae3fb140447717b8dd9fdc3f4ac5	Trexler, Joel	Consumer Stocks: Fish Biomass from Everglades National Park (FCE), South Florida from February 2000 to April 2005
10.6073/pasta/4c6f16f6825cc77204ef76f21e86b75a	Trexler, Joel	Consumer Stocks: Fish Biomass from Everglades National Park (FCE), South Florida from February 1996 to March 2000
10.6073/pasta/7ff817fdf10aac0ad84a64acd6ca1c95	Trexler, Joel	Consumer Stocks: Wet weights from Everglades National Park (FCE), South Florida from March 2003 to April 2008
10.6073/pasta/cb1409728ddb1d071a405f9afc0d9309	Price, Rene	Rainfall Stable Isotopes collected at Florida International University-MMC (FCE LTER), Miami Florida, from October 2007 to Present
10.6073/pasta/8b6e429fb37dbeaeaa22f962af725a42	Boyer, Joseph; Dailey, Susan	Overnight Shark River Surveys from Shark River Slough, Everglades National Park (FCE), South Florida from October 2001 to March 2002
10.6073/pasta/bfbf714b3ba522be424f0b5678886a13	Gaiser, Evelyn; Childers, Daniel	Water Quality Data (Porewater) from the Shark River Slough, Everglades National Park (FCE LTER), Florida, USA, January 2001 - ongoing

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10.6073/pasta/22a6080ef350e24b8fc6c0e17b1054fc	Gaiser, Evelyn; Childers, Daniel	Sawgrass Above and Below Ground Total Nitrogen and Total Carbon from the Shark River Slough, Everglades National Park (FCE LTER), September 2002 - ongoing
10.6073/pasta/d7758e39f342d5d1876c2bb1512992bd	Gaiser, Evelyn; Childers, Daniel	Sawgrass Above and Below Ground Total Phosphorus from the Shark River Slough, Everglades National Park (FCE LTER), Florida, USA, September 2002 - ongoing
10.6073/pasta/91b8b1f55986af8a3ee20f19576e7b42	Gaiser, Evelyn; Childers, Daniel	Water Quality Data (Extensive) from the Shark River Slough, Everglades National Park (FCE LTER), Florida, USA, October 2000 - ongoing
10.6073/pasta/4c6a5c2382bf376c8872560fc32be14e	Gaiser, Evelyn; Childers, Daniel	Water Quality Data (Grab Samples) from the Shark River Slough, Everglades National Park (FCE LTER), May 2001 - ongoing
10.6073/pasta/bf0caa75c37ed0abebfbe950ea43ed13	Troxler, Tiffany	Water Quality Data (Extensive) from the Taylor Slough, Everglades National Park (FCE LTER), Florida, USA, April 1996 - ongoing
10.6073/pasta/b024b21f2d0da5e4fab07ca403d06d90	Troxler, Tiffany; Childers, Daniel	Water Quality Data (Grab Samples) from the Taylor Slough, Everglades National Park (FCE LTER), from May 2001 to Present

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10.6073/pasta/986977091d9ff18aac52ea1c4886e64b	Troxler, Tiffany; Childers, Daniel	Water Quality Data (Extensive) from the Taylor Slough, just outside Everglades National Park (FCE), from August 1998 to December 2006
10.6073/pasta/cd96927a753e84af3d9d2a07b02fa322	Troxler, Tiffany; Childers, Daniel	Water Quality Data (Grab Samples) from the Taylor Slough, just outside Everglades National Park (FCE), for August 1998 to November 2006
10.6073/pasta/1c4f9019e3dc4306b17a067f455430ad	Troxler, Tiffany; Childers, Daniel	Water Quality Data (Porewater) from the Taylor Slough, just outside Everglades National Park (FCE), from August 1998 to October 2006
10.6073/pasta/c142808f3d583c826e7b1f0c123a8cb9	Troxler, Tiffany	Water Quality Data (Extensive) from the Taylor Slough, Everglades National Park (FCE LTER), South Florida from July 1999 to Present
10.6073/pasta/03561dc06de5538d50e5fbd6ccb2c025	Troxler, Tiffany	Water Quality Data (Grab Samples) from the Taylor Slough, Everglades National Park (FCE), South Florida from September 1999 to Present
10.6073/pasta/d4e923e473d693cce2a896d82348e112	Troxler, Tiffany; Childers, Daniel	Water Quality Data (Porewater) from the Taylor Slough, Everglades National Park (FCE), South Florida from September 1999 to December 2006

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10.6073/pasta/efe73edf89298dbdf92af812e7f0070e	Troxler, Tiffany; Childers, Daniel	Sawgrass Above and Below Ground Total Phosphorus from the Taylor Slough, Everglades National Park (FCE LTER), South Florida for March 2002 to Present
10.6073/pasta/53e28bcee44aeda5c0dc960c86236b56	Troxler, Tiffany; Childers, Daniel	Sawgrass Above and Below Ground Total Nitrogen and Total Carbon from the Taylor Slough, Everglades National Park (FCE LTER), South Florida for March 2002 to Present
10.6073/pasta/29a1dafbccef39ca0aed12191b30ae73	Gaiser, Evelyn; Childers, Daniel	Sawgrass above ground biomass from the Shark River Slough, Everglades National Park (FCE LTER), South Florida, USA, November 2000 - ongoing
10.6073/pasta/e6640b978d38e54d88f2231ebc7db92d	Troxler, Tiffany; Childers, Daniel	Sawgrass above ground biomass from the Taylor Slough, just outside Everglades National Park (FCE), South Florida from October 1997 to December 2006
10.6073/pasta/0d36bd9d8d5ab6df4a43df27942dcf68	Troxler, Tiffany; Childers, Daniel	Sawgrass above ground biomass from the Taylor Slough, Everglades National Park (FCE LTER), Florida, USA, August 1999 - ongoing
10.6073/pasta/6cd7783c4871eaf3527ab177deacd035	Troxler, Tiffany; Childers, Daniel	Periphyton Net Primary Productivity and Respiration Rates from the Taylor Slough, just outside Everglades National Park (FCE), South Florida from December 1998 to December 2004

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10.6073/pasta/903576c777c0b7dc6bf87cd86f9fbc05	Troxler, Tiffany; Childers, Daniel	Soil Physical Data from the Shark River Slough, Everglades National Park (FCE), from November 2000 to January 2007
10.6073/pasta/81e0fc75f420c948340b17715a4d78a5	Troxler, Tiffany; Childers, Daniel	Soil Physical Data from the Taylor Slough, just outside Everglades National Park (FCE), from October 1998 to October 2006
10.6073/pasta/ac54452865f50d6ca972a4c196522e4f	Troxler, Tiffany; Childers, Daniel	Soil Physical Data from the Taylor Slough, within Everglades National Park (FCE), from September 1999 to November 2006
10.6073/pasta/6040a745baed01378e215c8070d0126d	Troxler, Tiffany; Childers, Daniel	Soil Characteristic and Nutrient Data from the Taylor Slough, within Everglades National Park (FCE), from March 2002 to April 2004
10.6073/pasta/716b5fb8be1c66ab42ffbe5386774426	Price, Rene; Childers, Daniel	Precipitation from the Shark River Slough, Everglades National Park (FCE LTER), South Florida, USA, November 2000 - ongoing
10.6073/pasta/3193b02e99a16f874ef3e1b63ca295e2	Troxler, Tiffany; Childers, Daniel	Water Levels from the Taylor Slough, Everglades National Park (FCE LTER), South Florida from April 1996 to 2012
10.6073/pasta/ee33480b08eb2bbfd283852efe2b614c	Childers, Daniel; Price, Rene	Water Levels from the Shark River Slough, Everglades National Park (FCE LTER), South Florida from October 2000 to Present

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10.6073/pasta/6581a4898452afd4bc1f6665b44aeb4f	Troxler, Tiffany; Childers, Daniel	Precipitation from the Taylor Slough, just outside Everglades National Park (FCE), South Florida from August 2000 to December 2006
10.6073/pasta/2bb421d19f71704ed7476ca128bacb72	Troxler, Tiffany; Childers, Daniel	Water Levels from the Taylor Slough, just outside the Everglades National Park (FCE), South Florida from October 1997 to December 2006
10.6073/pasta/9014da3b5b4170d95b7b427cf818887e	Troxler, Tiffany; Childers, Daniel	Precipitation from the Taylor Slough, Everglades National Park (FCE LTER), South Florida from July 2000 to Present
10.6073/pasta/637e2c1db863fe950bafad48beb81cd1	Troxler, Tiffany; Childers, Daniel	Water Levels from the Taylor Slough, Everglades National Park (FCE LTER), South Florida from August 1999 to Present
10.6073/pasta/b244a3eb610cdfb419088f2ebab00d34	Jaffe, Rudolf	Monthly monitoring of Fluorescence, UV, Humic and non-Humic Carbon, Carbohydrates, and DOC for Shark River Slough, Taylor Slough, and Florida Bay, Everglades National Park (FCE LTER) for January 2002 to August 2004
10.6073/pasta/6d2e26bc8c8cd2322981d22a095ab968	Jaffe, Rudolf	Examination of protein-like fluorophores in chromophoric dissolved organic matter (CDOM) in a wetland and coastal environment for the wet and dry seasons of the years 2002 and 2003 (FCE)

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10.6073/pasta/1bb7981116c89e6f414964b0a113b294	Jaffe, Rudolf	Monthly monitoring fluorescence data for Florida Bay, Ten Thousand Islands, and Whitewater Bay, in southwest coast of Everglades National Park (FCE) for February 2001 to December 2002
10.6073/pasta/22916d1d52d8a756020b8c7537b1bd87	Jaffe, Rudolf	Quantitative and qualitative aspects of dissolved organic carbon leached from plant biomass in Taylor Slough, Shark River and Florida Bay (FCE) for samples collected in July 2004
10.6073/pasta/76696c297746734756f827ec748eb20f	Jaffe, Rudolf	Chemical characteristics of dissolved organic matter in an oligotrophic subtropical wetland/estuary ecosystem, Everglades National Park (FCE), South Florida from December 2001 to January 2002
10.6073/pasta/07272b339cff887abca38b8676789a56	Jaffe, Rudolf	Physical and microbial processing of dissolved organic nitrogen (DON) (Salinity Experiment) along an oligotrophic marsh/mangrove/estuary ecotone (Taylor Slough and Florida Bay) for August 2003 in Everglades National Park (FCE), South Florida, USA

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10.6073/pasta/da883a9edecd3c2a2be661531b16a780	Jaffe, Rudolf	Physical and microbial processing of dissolved organic nitrogen (DON) (Photodegradation Experiment) along an oligotrophic marsh/mangrove/estuary ecotone (Taylor Slough and Florida Bay) for August 2003 in Everglades National Park (FCE), South Florida, USA
10.6073/pasta/cc9f23891b8bb977eaf5d7eb6f76005f	Jaffe, Rudolf	Characterization of dissloved organic nitrogen in an oligotrophic subtropical coastal ecosystem (Taylor Slough and Shark River Slough) for December 2001 in Everglades National Park (FCE), South Florida, USA
10.6073/pasta/13d36fb0c4c5a6a52eb36dcbe25c2678	Gaiser, Evelyn	Periphyton Productivity from the Shark River Slough and Taylor Slough, Everglades National Park (FCE LTER), South Florida, USA, October 2001 - ongoing
10.6073/pasta/df0df1868e303a71e58ec7b29fcf8b29	Gaiser, Evelyn	Macrophyte count data collected from Northeast Shark Slough, Everglades National Park (FCE LTER) from September 2006 to September 2008
10.6073/pasta/e7898d1958661abfec2910d778cb2991	Gaiser, Evelyn	Periphyton data collected from Northeast Shark Slough, Everglades National Park (FCE LTER) from September 2006 to September 2008

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10.6073/pasta/d56adc9dca95af7ed2c63c831f55bf3e	Gaiser, Evelyn	Periphyton Accumulation Rates from Shark River Slough, Taylor Slough and Florida Bay, Everglades National Park (FCE LTER), South Florida, USA, January 2001 - ongoing
10.6073/pasta/7462a09216593c960a996c7a9424518d	Gaiser, Evelyn	Periphyton Biomass Accumulation from the Shark River and Taylor Sloughs, Everglades National Park (FCE LTER), South Florida, USA, January 2003 - ongoing
10.6073/pasta/0648326d435de9ae615de0448e291dc1	Collado-Vides, Ligia	Macroalgae Production in Florida Bay (FCE LTER), South Florida, USA, May 2007 - ongoing
10.6073/pasta/25a403f500aa209327c5f13371bef6ef	Castaneda, Edward; Rivera-Monroy, Victor; Twilley, Robert	Mangrove Forest Growth from the Shark River Slough, Everglades National Park (FCE), South Florida, USA, January 1995 - ongoing
10.6073/pasta/b159b26b251d40494258f3d4430f4dfc	Troxler, Tiffany; Childers, Daniel	Soil Characteristics and Nutrient Data from the Shark River Slough, within Everglades National Park (FCE), from March 2003 to March 2004
10.6073/pasta/542c044a50f7081beb454d1314fddff2	Castaneda, Edward; Rivera-Monroy, Victor; Twilley, Robert	Mangrove Soil Chemistry Shark River Slough and Taylor Slough, Everglades National Park (FCE), from December 2000 to May 23, 2002

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10.6073/pasta/f0e13c236606c1ed6efe5618e3eee8c0	Frankovich, Thomas	Florida Bay Physical Data, Everglades National Park (FCE), South Florida from January 2001 to February 2002
10.6073/pasta/5a01d59e5f7d73bd1f7baee2c71af765	Gaiser, Evelyn	Environmental data from FCE LTER Caribbean Karstic Region (CKR) study in Yucatan, Belize and Jamaica during Years 2006, 2007 and 2008
10.6073/pasta/7b0e0c1a9a93965c79fd66bd4bbae46d	McIvor, Carole	Global Climate Change Impacts on the Vegetation and Fauna of Mangrove Forested Ecosystems in Florida (FCE): Nekton Portion from March 2000 to April 2004
10.6073/pasta/52ed83a4d3148a02c8642e6f18d45659	Lorenz, Jerry	Physical Hydrologic Data for the National Audubon Society's 16 Research Sites in coastal mangrove transition zone of southern Florida from November 2000 to Present
10.6073/pasta/c40d320f5d15fdd36a65ef7a2ef93f17	Smith, Ned	Evaporation Estimates for Long Key C-MAN Weather Station, Florida Bay (FCE) from July 1998 to May 2004
10.6073/pasta/43f9e2156680db7372e8ad4db497eb0d	Saunders, Colin	Physical Characteristics and Stratigraphy of Deep Soil Sediments from Shark River Slough, Everglades National Park (FCE) from 2005 and 2006

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10.6073/pasta/c0cb8ff0f150e429674ecf0db15bedc5	Saunders, Colin	Radiometric Characteristics of Soil Sediments from Shark River Slough, Everglades National Park (FCE) from 2005 and 2006
10.6073/pasta/e8f697869b4be3ac9c0cecff377d94d8	Saunders, Colin	Macrofossil Characteristics of Soil from Shark River Slough, Everglades National Park (FCE) from July 2003 to February 2006
10.6073/pasta/2bcdb06ad4018aac1783c25701fa086b	Saunders, Colin	Isotopic Variation of Soil Macrofossils from Shark River Slough, Everglades National Park (FCE) in December 2004
10.6073/pasta/8660289b8c1e9f2ca01ee503f0d9ecda	Chambers, Randy; Russell, Timothy; Gorsky, Adrianna	Physical and Chemical Characteristics of Soil Sediments from the Shark River Slough and Taylor Slough, Everglades National Park (FCE LTER) from August 2004 to Present
10.6073/pasta/b6c470fdd35ad19af1cddef0463bf9e4	Fourqurean, James	Florida Bay Nutrient Data, Everglades National Park (FCE LTER), South Florida, ongoing since August 2008
10.6073/pasta/239479d36efc4dee4723f30c727ead62	Fourqurean, James	Florida Bay Braun Blanquet, Everglades National Park (FCE LTER), South Florida, USA, October 2000 - ongoing
10.6073/pasta/c159d681ea7fb25d3f9c90796f5053ef	Fourqurean, James	Florida Bay Productivity Data, Everglades National Park (FCE LTER), South Florida, USA ongoing since September 2000

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10.6073/pasta/1d1d319ca13c351c483bdcede22e557f	Fourqurean, James	Florida Bay Stable Isotope Data Everglades National Park (FCE LTER), South Florida, USA, ongoing since January 2005
10.6073/pasta/1b688d21d16bedea573c45be568e4ba7	Fourqurean, James	Florida Bay Physical Data, Everglades National Park (FCE LTER), South Florida, USA, Ongoing Since September 2000
10.6073/pasta/010d709d3dd768a14f6fbb20a344aa5a	Fourqurean, James	Florida Bay Seagrass Canopy Temperature Data, Everglades National Park (FCE LTER), South Florida, USA, ongoing since September 2000
10.6073/pasta/846912ffee551f31a886a24efb3064bb	Barr, Jordan; Fuentes, Jose; Engel, Vic; Zieman, Joseph	Flux measurements from the SRS-6 Tower, Shark River Slough, Everglades National Park (FCE LTER), South Florida from October 2006 to 2014
10.6073/pasta/f2dea22c72b4ba72fed419f15cbabb60	Price, Rene	Water flow velocity data, Shark River Slough (SRS) near Black Hammock island, Everglades National Park (FCE LTER), South Florida from October 2003 to August 2005
10.6073/pasta/f0a076ef1cdb35abafab8b0b61fde59f	Price, Rene	Water flow velocity data, Shark River Slough (SRS) near Chekika tree island, Everglades National Park (FCE LTER) from January 2006 to Present

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10.6073/pasta/18c744af8da6cbfb986ff2a2fb20eded	Price, Rene	Water flow velocity data, Shark River Slough (SRS) near Frog City, south of US 41, Everglades National Park (FCE LTER) from October 2006 to July 2009
10.6073/pasta/bdc327b2f493cfd4f51e3820fcbe4a0c	Price, Rene	Water flow velocity data, Shark River Slough (SRS) near Gumbo Limbo Island, Everglades National Park (FCE) from October 2003 to Present
10.6073/pasta/fbb12ce7f9595d2b9c6ec6011b9236e1	Price, Rene	Water flow velocity data, Shark River Slough (SRS) near Satinleaf Island, Everglades National Park (FCE LTER) from July 2003 to December 2005
10.6073/pasta/06938136601cdd81eb37837b7ea4b5fb	Price, Rene	Non-continuous TS/Ph7b Weather Tower Data, Everglades National Park (FCE LTER), South Florida from May 2008 to 2017
10.6073/pasta/d5a224eed0f1bec5b69ce963493d9af1	Price, Rene	Non-continous meteorological data from Butternut Key Weather Tower, Florida Bay, Everglades National Park (FCE LTER), April 2001 through August 2013
10.6073/pasta/2b42a17496155b8a7ce2191ae90e193b	Price, Rene	Groundwater and surface water phosphorus concentrations, Everglades National Park (FCE), South Florida for June, July, August and November 2003
10.6073/pasta/274fb25dec72d09d8226f147cdfbecb1	Rosenblatt, Adam	Water Temperature measured at Shark River, Everglades National Park (FCE) from October 2007 to August 2008

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10.6073/pasta/d5f7c45539c24870c37a4e05689ba9f2	Rosenblatt, Adam	Water Temperature, Salinity and other physical measurements taken at Shark River, Everglades National Park (FCE LTER) from February 2010 to March 2014
10.6073/pasta/a50dd41d188c25bc122deee65c2c73a9	Rosenblatt, Adam	Water Temperature measured at Shark River, Everglades National Park (FCE) from July 2007 to June 2011
10.6073/pasta/7682f3f1180f6048716b39531328a0b4	Barr, Jordan; Fuentes, Jose; Zieman, Joseph	Radiation measurements at Key Largo Ranger Station, South Florida (FCE) for July 2001
10.6073/pasta/d0950d21f1ba78c9e91ae08d867174be	Barr, Jordan; Fuentes, Jose; Zieman, Joseph	Meteorological measurements at Key Largo Ranger Station, South Florida (FCE) for July 2001 to August 2001
10.6073/pasta/7390d5ffed6b06f0b881a8942a53e880	Barr, Jordan; Fuentes, Jose; Zieman, Joseph	Mangrove leaf physiological response to local climate at Key Largo, Watson River Chickee, Taylor Slough, and Little Rabbit Key, South Florida (FCE) from July 2001 to August 2001
10.6073/pasta/6a3a958ec35ea159a935be9ceb214fe8	Barr, Jordan; Fuentes, Jose; Zieman, Joseph	Rubisco limited photosynthesis rates of Red mangrove leaves at Key Largo, Watson River Chickee, Taylor Slough, and Little Rabbit Key, South Florida (FCE) from July 2001 to August 2001

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10.6073/pasta/d6bea805dbfa2dca53bfd60735de1af8	Barr, Jordan; Fuentes, Jose; Zieman, Joseph	Light limited carboxylation rates of Red mangrove leaves at Key Largo, Watson River Chickee, Taylor Slough, and Little Rabbit Key, South Florida (FCE) from July 2001 to August 2001
10.6073/pasta/aec87311dc582fde9adf4a11a198e0aa	Barr, Jordan; Fuentes, Jose; Zieman, Joseph	Flux measurements from the SRS-6 Tower, Shark River Slough, Everglades National Park, South Florida (FCE) from January 2004 to August 2005
10.6073/pasta/e9498a3ecfd1d497c6b4c266901c9d4b	Frankovich, Thomas	Gastropod Biomass and Densities found at Rabbit Key Basin, Florida Bay (FCE) from March 2000 to April 2001
10.6073/pasta/2bf2a1f1d9c7904b12b137ba58956203	Frankovich, Thomas	Seagrass Epiphyte Accumulation for Florida Bay, South Florida (FCE) from December 2000 to September 2001
10.6073/pasta/0d88f0cd8f29d6f227e19050bde91896	Frankovich, Thomas	Mean Seagrass Epiphyte Accumulation for Florida Bay, South Florida (FCE) from December 2000 to September 2001
10.6073/pasta/5aadc198730a74b48ae27b6c1e11f3a8	Frankovich, Thomas	Seagrass Epiphyte Accumulation: Epiphyte Loads on Thalassia testudinum in Rabbit Key Basin, Florida Bay (FCE) from March 2000 to April 2001
10.6073/pasta/bf798892c1105cb3a157f7132165c732	Frankovich, Thomas	Thalassia leaf morphology and productivity measurements from arbitrary plots located in a Thalassia seagrass meadow in Rabbit Key Basin, Florida Bay (FCE) from March 2000 to April 2001

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10.6073/pasta/393fd3bbbd5a520e5cf372483113f2ce	Frankovich, Thomas	Florida Bay, South Florida (FCE) Seagrass Epiphyte Light Transmission from December 2000 to February 2002
10.6073/pasta/6b1a16e33753fdd17053c94d3e69c044	Troxler, Tiffany; Childers, Daniel	Periphyton Net Primary Productivity and Respiration Rates from the Taylor Slough, just outside Everglades National Park, South Florida (FCE) from December 1998 to August 2002
10.6073/pasta/84241f5358c01c8dacd832b42d3fc736	Gaiser, Evelyn	Diatom Species Abundance Data from LTER Caribbean Karstic Region (CKR) study (FCE) in Yucatan, Belize and Jamaica during 2006, 2007, 2008
10.6073/pasta/6f71911870cb18e274416d0bf297cdc4	Gaiser, Evelyn	Periphyton data from LTER Caribbean Karstic Region (CKR) study in Yucatan, Belize and Jamaica (FCE LTER) during 2006, 2007, 2008
10.6073/pasta/b4200968cd7c84d47fd59a3d271e11b8	Cardona-Olarte, Pablo; Rivera-Monroy, Victor; Twilley, Robert	Greenhouse experiment (FCE) in April and August 2001: Responses of neotropical mangrove saplings to the combined effect of hydroperiod and salinity/Biomass
10.6073/pasta/c559309bdc4b90e325b1e8772e1de60a	Cardona-Olarte, Pablo; Rivera-Monroy, Victor; Twilley, Robert	Greenhouse mixed culture experiment from August 2002 to April 2003 (FCE): Evaluate the effect of salinity and hydroperiod on interspecific mangrove seedlings growth rate (mixed culture) / Morphometric variables

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10.6073/pasta/435f4c70788b8199849b43c5445d3367	Mead, Ralph	Bulk Parameters for Soils/Sediments from the Shark River Slough and Taylor Slough, Everglades National Park (FCE), from October 2000 to January 2001
10.6073/pasta/f886e5c64a0836e489ac848074ebbe52	Rehage, Jennifer	Seasonal Electrofishing Data from Rookery Branch and Tarpon Bay, Everglades National Park (FCE LTER), Florida, USA, November 2004 - ongoing
10.6073/pasta/91d7c7dd18e2580c7b1523c562db8021	Rehage, Jennifer	Minnowtrap Data from Rookery Branch and the North, Watson, and Roberts Rivers National Park (FCE) from November 2004 to April 2008
10.6073/pasta/4eda63d153f0859a70c4398c3762be9e	Gaiser, Evelyn; Trexler, Joel	Fish and consumer data collected from Northeast Shark Slough, Everglades National Park (FCE) from September 2006 to September 2008
10.6073/pasta/04a8792fed9ceed4237bd3273a97e8f8	Heithaus, Michael; Matich, Philip	Bull shark catches, water temperatures, salinities, and dissolved oxygen levels in the Shark River Slough, Everglades National Park (FCE) , from May 2005 to May 2009
10.6073/pasta/590267a4b46755c34b230d35b60d1004	Castaneda, Edward; Rivera-Monroy, Victor	Water Levels and Porewater Temperature data from the Shark River and Taylor River Slough mangrove sites, Everglades National Park (FCE LTER), South Florida, USA: May 2001 - ongoing

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10.6073/pasta/285bc87dc9418e5f0579f72d1e00b6d9	Castaneda, Edward; Rivera-Monroy, Victor	Abiotic monitoring of physical characteristics in porewaters and surface waters of mangrove forests from the Shark River Slough and Taylor Slough, Everglades National Park (FCE LTER), South Florida, USA, December 2000 - ongoing
10.6073/pasta/beb355c2f21efc3653f888709cf49637	McIvor, Carole	Global Climate Change Impacts on the Vegetation and Fauna of Mangrove Forested Ecosystems in Florida (FCE): Nekton Mass from March 2000 to April 2004
10.6073/pasta/71579955fc6cb2b099879c15b583317a	Castaneda, Edward; Rivera-Monroy, Victor; Twilley, Robert	Monitoring of nutrient and sulfide concentrations in porewaters of mangrove forests from the Shark River Slough and Taylor Slough, Everglades National Park (FCE LTER), South Florida, USA, ongoing since December 2000
10.6073/pasta/73c32ad91eddd1843338e4081754d41e	Lorenz, Jerry	Standard Lengths and Mean Weights for Prey-base Fishes from Taylor River and Joe Bay Sites, Everglades National Park (FCE), South Florida from January 2000 to April 2004
10.6073/pasta/56a7c2c88e4e20dc8c2b0100c3de9a1d	Rains, Mark	Subsurface Water Temperatures taken in Shark River Slough and Taylor Slough, Everglades National Park, South Florida (FCE) from May 2010 to Present

DOI	Authors	Title
10.6073/pasta/3938d3bb664d57584afc749c6a768f31	Jaffe, Rudolf	Monthly monitoring fluorescence data for Shark River Slough and Taylor Slough, Everglades National Park (FCE) for October 2004 to February 2014
10.6073/pasta/f8b5c0585e41ab48f07faf79c380043c	Heithaus, Michael; Matich, Philip	Large shark catches (Drumline), water temperatures, salinities, dissolved oxygen levels, and stable isotope values in the Shark River Slough, Everglades National Park (FCE LTER) from May 2009 to May 2011
10.6073/pasta/e9ac5ed3ba1c846f86d46207f97f3fc3	Heithaus, Michael; Matich, Philip	Shark catches (longline), water temperatures, salinities, and dissolved oxygen levels, and stable isotope values in the Shark River Slough, Everglades National Park (FCE LTER), Florida, USA: May 2005 - ongoing
10.6073/pasta/1d696e0668ed238469adeaed24dd7bc1	Onsted, Jeff	FCE Redlands 1994 Land Use, Miami-Dade County, South Florida
10.6073/pasta/ab8e1dea7bc3301919512575093460fc	Onsted, Jeff	FCE Redlands 1998 Land Use, Miami-Dade County, South Florida
10.6073/pasta/f5831e56dffab52a99bbe8a1a2563b1d	Onsted, Jeff	FCE Redlands 1998 Roads, Miami-Dade County, South Florida
10.6073/pasta/b7e35d8321a2db2138748b869993dacd	Onsted, Jeff	FCE Redlands 2006 Land Use, Miami-Dade County, South Florida
10.6073/pasta/c1e2b4bdf4d5a1ad441e69b7417cdfab	Onsted, Jeff	FCE Redlands 2006 Roads, Miami-Dade County, South Florida

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10.6073/pasta/54138174a44f11a0000279a7e480b632	Onsted, Jeff	FCE Redlands Flood Zones, Miami-Dade County, South Florida
10.6073/pasta/b1c64a9c7c616829ace724de8d41785b	Onsted, Jeff	FCE Redlands 2001 Land Use, Miami-Dade County, South Florida
10.6073/pasta/f0c0fcaaca44b472112745262c372628	Onsted, Jeff	FCE Redlands 2008 Slope Mosaic, Miami-Dade County, South Florida
10.6073/pasta/e6e6563f64ae6d6aa4cb07b294f1ec95	Onsted, Jeff	FCE Redlands 2001 Zoning, Miami-Dade County, South Florida
10.6073/pasta/e7856aad78610c7c365cf620f47a5ef5	Onsted, Jeff	FCE Redlands 1994 Land Use, Miami-Dade County, South Florida
10.6073/pasta/29ed91e46b4a898129f8b03c3500abbd	Heithaus, Michael; Nowicki, Robert	Percent cover, species richness, and canopy height data of seagrass communities in Shark Bay, Western Australia, with accompanying abiotic data, from October 2012 to July 2013
10.6073/pasta/3eed6e46081423861d71e6d6a6ee3194	Heithaus, Michael; Nowicki, Robert	Fish community data obtained from Antillean-Z fish trap deployment in the Eastern Gulf of Shark Bay, Australia from June 2013 to August 2013
10.6073/pasta/b4c39439f21d56d0c87b00c59073cf89	Heithaus, Michael; Thomson, Jordan	Capture data for sharks caught in standardized drumline fishing in Shark Bay, Western Australia, with accompanying abiotic data, from February 2008 to July 2014.

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10.6073/pasta/225c82aa5925cee430a8c7a6a44e8d85	Heithaus, Michael; Thomson, Jordan	Capture data for sharks caught in standardized drumline fishing in Shark Bay, Western Australia, with accompanying abiotic data, from January 2012 to April 2014.
10.6073/pasta/e91ff5368ab0dfc412678170f8a0d1a6	Heithaus, Michael; Nowicki, Robert	Count data of air-breathing fauna from visual transect surveys including water temperature, time, sea and weather conditions in Shark Bay Marine Park, Western Australia from February 2008 to July 2014
10.6073/pasta/7696e20214fbf84f25d664ff7dc8050c	Heithaus, Michael; Thomson, Jordan	Marine turtles captured during haphazard at-sea surveys in Shark Bay, Australia from February 2008 to December 2013
10.6073/pasta/299262fa63c46ead98210cb5ea0bcac2	Heithaus, Michael; Bessey, Cindy	Stationary camera observations, set, and environmental data from Shark Bay Marine Park, Western Australia from July 2011 to June 2012
10.6073/pasta/b7742d3e0a93696342708d98590b9db1	Heithaus, Michael; Bessey, Cindy	Fish trap catch, set, and environmental data from Shark Bay Marine Park, Western Australia from May 2010 to July 2012
10.6073/pasta/95ea6a96d0ffd39339eb363cbc858260	Castaneda, Edward; Rivera-Monroy, Victor; Twilley, Robert	Mangrove Litterfall from the Shark River Slough and Taylor Slough, Everglades National Park (FCE), South Florida, USA, ongoing since January 2001

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10.6073/pasta/dd9da92e48b2506cc0c2a352a5cbea8f	Anderson, William	DIC and DOC 13C tracer data from Shark River Slough and Harney River (FCE), Everglades, South Florida in November 2011
10.6073/pasta/8404e7eeccc4622c6175bfa8283639f8	Rehage, Jennifer	Movements of aquatic mesopredators within the Shark River estuary (FCE LTER), Everglades National Park, South Florida, USA from February 2012 to Present
10.6073/pasta/cf25fb8c2996ab74bbc98aa36704a762	Rehage, Jennifer	Trophic transfer of Everglades marsh consumer biomass to Everglades Estuaries (FCE LTER), Everglades National Park, South Florida, USA, December 2010 to July 2013
10.6073/pasta/19cf88ce1278d8aec2bf776de13f4ff4	Harrison, Elizabeth; Trexler, Joel	Cichlasoma urophthalmus microsatellite fragment size collected from the Florida Everglades (FCE) and Central America from June 2010 to March 2013
10.6073/pasta/4a07f10ec6a08e78279a506423f22305	Harrison, Elizabeth; Trexler, Joel	Cichlasoma urophthalmus cytochrome b sequences collected from the Florida Everglades (FCE) and Central America from January 2012 to May 2014
10.6073/pasta/fa74b6fd049af01379f50d9693552d55	Chambers, Randy; Russell, Timothy; Hatch, Rosemary; Katsaros, Dean; Gorsky, Adrianna	Percentage of Carbon and Nitrogen of Soil Sediments from the Shark River Slough, Taylor Slough and Florida Bay within Everglades National Park (FCE LTER) from August 2008 to Present

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10.6073/pasta/4ad1a469ff103d2e8f0c3971f703ec16	Fourqurean, James; Howard, Jason	Cross Bank Benthic Aboveground Biomass, Everglades National Park (FCE LTER), South Florida from 1983 to 2014
10.6073/pasta/3a9bb697bbb8295bffdf6031ff1ae644	Fourqurean, James; Howard, Jason	Cross Bank Sediment Characteristics, Everglades National Park (FCE LTER), South Florida from 2014
10.6073/pasta/756edd5f40dbf69ca478d8c48f6ee6ba	Price, Rene	Monthly water balance data for southern Taylor Slough Watershed (FCE LTER) from January 2001 to December 2011
10.6073/pasta/e84cc609ffbc63bb45bd484810e6746b	Jaffe, Rudolf; Pisani, Oliva	Biomarker assessment of spatial and temporal changes in the composition of flocculent material (floc) in the subtropical wetland of the Florida Coastal Everglades (FCE) from May 2007 to December 2009
10.6073/pasta/e355a9f1d3c1e5ad4e5764a9c24b02c3	Kominoski, John; Gaiser, Evelyn	Mangrove soil phosphorus addition experiment from June 2013 to August 2013 at the mangrove peat soil mesocosms (FCE), Key Largo, Florida - Nutrients in Porewater, Soil and Roots
10.6073/pasta/96f4fc41e721f657219429c64b01f0e4	Kominoski, John; Gaiser, Evelyn	Mangrove soil phosphorus addition experiment from July 2013 to August 2013 at the mangrove peat soil mesocosms (FCE), Key Largo, Florida - Nutrients in Surface Water and Aboveground Biomass

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10.6073/pasta/02cf0405c4f560746a5e5275ef6e225b	Regier, Peter; Jaffé, Rudolf	Fluxes of dissolved organic carbon from the Shark River Slough, Everglades National Park (FCE), South Florida from May 2001 to September 2014
10.6073/pasta/eadd93a36c2d935c069f3b0a4c98775b	Gaiser, Evelyn	Periphyton and Associated Environmental Data Relative from Samples Collected from the Greater Everglades, Florida, USA from September 2005 to November 2014
10.6073/pasta/a9dca89331d33221c59a6aa0ae96278a	Gaiser, Evelyn	Relative Abundance Diatom Data from Periphyton Samples Collected from the Greater Everglades, Florida USA from September 2005 to November 2014
10.6073/pasta/6e16b97781030e670fd94221ac812f5d	Gaiser, Evelyn	Relative Abundance of Soft Algae From theComprehensive Everglades Restoration Plan (CERP) Study (FCE) from February 2005 to November 2014
10.6073/pasta/1755e84862607d90e33bcefe6ce997e2	Coronado, Carlos A; Sklar, Fred	Sediment Elevation Change (Feldspar Marker Horizon Method) from Northeastern Florida Bay (FCE) from 1996 to Present
10.6073/pasta/0edc80f91191e66eea6b4b0ebd407a0d	Coronado, Carlos A; Sklar, Fred	Sediment Elevation Change (SET Method) from Northeastern Florida Bay (FCE) from 1996 to Present
10.6073/pasta/70cdfca241ed9dffefdb7b3608d20ef1	Trexler, Joel; Sanchez, Jessica	Periphyton Nutritonal Data across the freshwater Everglades (FCE): June 2016-Feb 2017

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10.6073/pasta/4e6dc2b1aab5c02c224a27c2eaff2e82	Mazzei, Viviana; Gaiser, Evelyn	Periphyton, hydrological and environmental data in a coastal freshwater wetland (FCE), Florida Everglades National Park, USA (2014-2015)
10.6073/pasta/05944589bc8b526ead9b1df50797e00a	Yoder, Landon; Roy Chowdhury, Rinku	Institutional Dimensions of Restoring Everglades Water Quality - Social Capital Analysis (FCE), Florida Everglades Agricultural Area from September 2014 to July 2015
10.6073/pasta/94d1f65d4c822af1150bc9e7694e59d1	Yoder, Landon; Roy Chowdhury, Rinku	Institutional Dimensions of Restoring Everglades Water Quality -Interview Notes (FCE), September 2014-July 2015
10.6073/pasta/f66a58d857b76740e03c3c48da16cc73	Sarker, Shishir	Water, Soil, Floc, Plant Total Phosphorus, Total Carbon, and Bulk Density data (FCE) from Everglades Protection Area (EPA) from 2004 to 2016
10.6073/pasta/adc510f0d772128a19c545cc6c8a7df1	Wilson, Benjamin; Troxler, Tiffany	Nutrient data from the Peat Collapse-Saltwater Intrusion Field Experiment from brackish and freshwater sites within Everglades National Park, Florida (FCE LTER), collected from October 2014 to September 2016
10.6073/pasta/0412d0e992558af65cf22110ef8f0e1b	Wilson, Benjamin; Troxler, Tiffany	Leaf nutrient and root biomass data from the Peat Collapse-Saltwater Intrusion Field Experiment within Everglades National Park (FCE), collected from October 2014 to September 2016

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10.6073/pasta/6a18d0ec3a960a82b6989c18f01205b2	Wilson, Benjamin; Troxler, Tiffany	Biomass data from the Peat Collapse-Saltwater Intrusion Field Experiment within Everglades National Park (FCE), collected from October 2014 to September 2016
10.6073/pasta/54104d869d122b20b4bcfa3cf8acad1c	Wilson, Benjamin; Troxler, Tiffany	Modeled flux data from the Peat Collapse-Saltwater Intrusion Field Experiment within Everglades National Park (FCE), collected from October 2014 to September 2016
10.6073/pasta/a84048bfa2552499fad8d80f313db008	Wilson, Benjamin; Troxler, Tiffany	Flux data from the Peat Collapse-Saltwater Intrusion Field Experiment within Everglades National Park, collected from October 2014 to September 2016
10.6073/pasta/1e39d1b154054d7f7507dd1eff65b3c6	Hoffman, Sophia; Rizzie, Chris; Nocentini, Andrea; Sarker, Shishir; Kominoski, John; Gaiser, Evelyn; Scinto, Leonard	Biogeochemical data collected from Northeast Shark River Slough, Everglades National Park, Florida, USA, 2006 - ongoing
10.6073/pasta/a269722318964f74cb5cabf87f0d3fb3	Lee, Dong Yoon; Wilson, Ben J.; Servais, Shelby; Mazzei, Viviana; Kominoski, John	The Salinity and phosphorus mesocosm experiment in freshwater sawgrass wetlands: Determining the trajectory and capacity of freshwater wetland ecosystems to recover carbon losses from saltwater intrusion (FCE LTER), Florida, USA from 2015 to 2018

DOI	Authors	Title
10.6073/pasta/2eb6663175051c21427304e75d0840fb	Castaneda, Edward; Rivera-Monroy, Victor	Sediment and nutrient deposition and plant-soil phosphorus interactions associated with Hurricane Irma (2017) in mangroves of the Florida Coastal Everglades (FCE LTER), Florida
10.6073/pasta/45cfe2505580cedf88a82f8911bdd741	Howard, Jason L; Fourqurean, James W	Organic and inorganic data for soil cores from Brazil and Florida Bay seagrasses to support Howard et al 2018, CO2 released by carbonate sediment production in some coastal areas may offset the benefits of seagrass “Blue Carbon” storage, Limnology and Oceanography, DOI: 10.1002/lno.10621
10.6073/pasta/73e4219fef685927c24140250deb6f1b	Hoffman, Sophia; Rizzie, Chris B.; Nocentini, Andrea; Tobias, Franco; Kominoski, John S.; Gaiser, Evelyn	Vegetation data collected from Northeast Shark River Slough, Everglades National Park, Florida, from September 2006 to present
10.6073/pasta/27f6332609eb1ef6d398c7855855f2e3	Hogan, James A; Castaneda, Edward; Lamb-Wotton, Lukas	FCE LTER Taylor Slough/Panhandle-7 Site Scrub Red Mangrove (Rhizophora mangle) Leaf Gas Exchange Data, Florida, USA from January-December 2019
10.6073/pasta/27afcea3bab0adc058457705506248f8	Kominoski, John	Saltwater Coastal Carbon Flux Synthesis
10.6073/pasta/4097433552819a3c6958b5dbd0b8ef86	Kominoski, John Stephen	Freshwater Subtropical Ridge and Slough Wetland Metabolism, South Florida, USA: 2014-2016

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10.6073/pasta/b202c11db7c64943f6b4ed9f8c17fb25	Nocentini, Andrea; Kominoski, John S	Biogeochemical data collected in the eastern marl prairies of the Everglades (Florida, USA) before and after fire, between the years 2018 and 2021
10.6073/pasta/d1abed5732fe4f4b086e092fb85bf431	Kominoski, John Stephen	Monthly monitoring fluorescence data for Shark River Slough and Taylor Slough, Everglades National Park, Florida, USA (FCE LTER) for 2012 to Present
10.6073/pasta/df9603a04633ca1fabe56d0ba2655b8f	Trexler, Joel	Community structure of aquatic vertebrates and macroinvertebrates in relation to hydrologic variables in the Shark River Slough, Everglades National Park, Florida USA: Ongoing since 2012
10.6073/pasta/d61c8bb72f0b4c7c827ba15aa60bda10	Parkinson, Randall W	Sediment accumulation rate data aggregated from publications describing research conducted in South Florida on coastal wetlands prior to 2022
10.6073/pasta/4593b0279c730e136acaaf88c13e312a	Troxler, Tiffany; Ishtiaq, Khandker; Kominoski, John; Wilson, Benjamin; Lukas Lamb-Wotton	The dataset and model code pertinent to the Everglades Peat Elevation Model (EvPEM): The salinity and inundation mesocosm experiment in freshwater and brackish water sawgrass wetlands in Florida Coastal Everglades (2015-2017).
10.6073/pasta/38ed2d0808a8b4c3cb46d8049c4f7d26	Fitz, H. Carl	Everglades Landscape Model (ELM) Code and Documentation

DOI	Authors	Title
10.6073/pasta/913c2e48833bd96849a4a7eb5f0571a8	Anderson, Kenneth J; Kominoski, John S	Decomposition rates of four litter types along coastal gradients in Everglades National Park (FCE LTER), Florida, USA: 2020-2021
10.6073/pasta/1e72d716e065aecd20f9633c0ba00024	Osburn, Chris	Dissolved Organic Carbon Stable Isotopes and Lignin Phenols from Everglades National Park (FCE LTER), South Florida, USA, 2018-ongoing
10.6073/pasta/404ffbbf5433d764a3e8b0ba84845604	Rezek, Ryan	Stable isotope values of consumers, producers, and organic matter in the Shark River Slough and Taylor Slough, Everglades National Park (FCE LTER), Florida, USA, 2019 – ongoing
10.6073/pasta/95b1aeab15d98f73775feccf7e40bdd8	Lamb-Wotton, Lukas; Flowers, Kathryn; Anderson, Kenneth; Flood, Peter; Esch, Melanie; Kochan, David; Kominoski, John S.	Identifying the drivers and responses of abrupt changes across spatial and temporal scales in ecology: a review

DOI	Authors	Title
10.6073/pasta/417f2954c3cd043e73004e89aff83b5e	Malone, Sparkle; Troxler, Tiffany; Casteneda, Edward; Oberbauer, Steven; Starr, Gregory; Fourqurean, James	Eddy Covariance Tower Data from Everglades Towers, Florida: 2004:2021
10.6073/pasta/72da5e950699b98e6f9c9a3aa9e6de25	Lamb-Wotton, Lukas; Troxler, Tiffany; Davis, Stephen	A database of soil type and soil depth across Everglades National Park, Florida, USA
10.6073/pasta/b2c8e104ecac44a44bcc02ffef3dc6f3	Julian, Paul	Annual Water Quality in Everglades National Park, Florida Bay, West Florida Shelf, and Florida Keys National Marine Sanctuary, Florida, USA: 1994-2019
10.6073/pasta/dc93e8b2dd8c96b79baa0795ae4882ac	Lamb, Lukas M.; Troxler, Tiffany G.	Survey of biological, geomorphic, and hydrologic properties across ecosystem states in a non-tidal, salinizing peat marsh in Everglades National Park, Florida, USA: 2019-2020
10.6073/pasta/70379cfaa3572272bfd5e6e7d0d7840c	Pintar, Matthew R; Dorn, Nathan J; Kline, Jeffrey L; Trexler, Joel C	Throw trap and electrofishing data collected during 1996–2022 from the Everglades, Florida, United States for the publication "Hydrology-mediated ecological function of a large wetland threatened by an invasive predator"