Florida Coastal Everglades LTER
FCE IV YEAR THREE ANNUAL REPORT
FOR NSF AWARD DEB- 2025954

View of autosampler platform at SRS-6, Photo: Evelyn Gaiser

Reporting Period: March 1, 2023 – December 15, 2023

Submitted December 2023

Principal Investigators

John Kominoski

James Fouqurean

Evelyn Gaiser

Kevin Grove

Jennifer Rehage

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.

Table of Contents

Accomplishments *2*
Major goals of the project 2
Major Activities 3
Specific Objectives 7
Significant Results 10
Key outcomes or other achievements 38
Opportunities for training and professional development 46
Communicating results to communities of interest 48
Plans to accomplish goals during the next reporting period 49
Impacts *51*
Impact on the development of the principal disciplines 51
Impact on other disciplines 51
Impact on the development of human resources 51
Impact on teaching and educational experiences 53
Impact on information resources that form infrastructure 54
Impact on society beyond science and technology 55
Products *56*
Publications 56
Journal Articles 56
Conference Papers and Presentations 59
Dissertations and Theses 68
Other publications 69
Websites 69
Other products 69
Participants & Other Collaborating Organizations *70*
Participants 70
Collaborating Organizations 76
Appendix: FCE LTER Data Packages in the EDI Repository *78*

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 continued our analyses and identified significant recent changes in South Florida's hydroclimate. We have expanded the research to incorporate high resolution reanalysis datasets to ERA5 and NARR reanalysis to elucidate the driving atmospheric mechanisms in connection with the observed changes. We detected changes in extreme hydroclimatic events in the region in state-of-the-art downscaled modeling products.

Hydrologic Connectivity

We quantified how pulses of fresh and marine water induce changes in water level, inundation duration, groundwater-surface water exchange, and the extent of saltwater intrusion in both the surface and subsurface. We continue to collect rainfall and water levels at each of the SRS and TS/Ph sites (n = 14). We analyzed 14 tide gauge records and 6 geomorphic sectors to evaluate the Holocene, present-day, and projected rates of sea level rise (SLR) along the entire Florida coast. We used multi-sensor remote sensing observation to measure water levels and evaluate the quality of the measurements over the Everglades.

SOCIAL LANDSCAPE

Water Governance/Cultural & Economic Values

- We continued ecosystem service valuation work in the Florida Everglades with the creation, testing, and release of an online survey of South Florida Water Management District residents.
- We completed developing the economic analysis framework and generated estimates of the economic values of various ecosystem service benefits of restoration under different future climate scenarios.
- We began conducting interviews with Everglades scientists in and outside of the FCE network. This is contributing to data collection for H2b, with a focus on understanding how diverse values of nature have been incorporated into decision-making processes and the conduct of transdisciplinary research.
- We conducted further interviews on cultural valuation for H2a.

ECOLOGICAL LANDSCAPE

Vegetation & Geomorphic Gradients

We continued to monitor long-term water level, sawgrass productivity and water quality along the Taylor Slough transect. We began monitoring conductivity at TS/Ph3, historically a freshwater site, in 2021. We are establishing a long-term experiment to evaluate adaptive capacity of salinizing marl-forming marshes. We continued to monitor new SET sites, refine and improve BISECT and CWEM modeling outputs, and refine and improve vegetation mapping and change detection.

Ecosystem Structure & Functions

Abiotic Resources & Stressors

We continued collection and analysis of FCE water nutrient, DOC, and salinity data to examine presses and pulse dynamics.

Detritus & Microbes

We quantified long-term changes in dissolved and particulate organic matter and associated microbial communities along gradients of salinity and P of freshwater, brackish, and estuarine wetlands. We 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 characterized microbial communities in surface waters and associated with various POC components (leaf litter, periphyton, soil, and sediments).

Vegetation

We coupled long-term field observations of blue carbon ecosystems (i.e., marshes, mangroves, seagrasses) and periphyton communities, manipulative experiments, and state-of-the-art remote sensing tools to understand landscape vegetation (above- and belowground) and carbon dynamics (vegetation and soil) in response to environmental drivers in the FCE. We continued collection of periphyton quality, quantity, composition, and metabolism from FCE and satellite sites and interpreted long-term trends. We provided new diatom taxon descriptions to diatoms.org and completed a book chapter about the use of diatoms in guiding restoration. We continued mangrove structural and functional attributes to interpret the long-term effects of hurricanes on mangrove litterfall production and aboveground biomass (AGB) C stocks and the resilience capacity of these forested wetlands to hurricane disturbance. We also estimated ecosystem-level C stocks across FCE mangroves. We measured the geochemical properties of mangrove soils and evaluated soil strength as a function of root biomass in all FCE mangrove sites. We used remote sensing observations to detect the extent of mangrove forest damage induced by Hurricane Irma.

Consumers

- We continued to sample FCE food webs across both FCE transects. We added a fifth year of stable isotope data to our FCE IV stable isotope long-term data stream. Sampling involves the collection of samples across 7 consumer functional groups (25-30 consumers taxa) and 4 primary producer groups across 9 coastal food webs (approximately 600 samples). Samples for year 1 are completed, years 2-4 are being submitted for analysis, and year 5 are being processed.

- We submitted 72 bull shark muscle, blood, and plasma samples from 19 sharks caught in the second half of 2022 for C, N, and S stable isotope analysis with the FIU Stable Isotope Lab. The 25 sharks caught this period were swabbed for fecal matter analyses to get taxa-specific information on bull shark diets.
- In SRS, we continued long-term electrofishing sampling (2004-2023) that tracks ecotonal fish community structure, the abundance of pulsing freshwater prey and of their consumers, Common Snook and Florida Largemouth Bass (following Boucek and Rehage 2013).
- We continued long-term sampling of Bull Shark abundance (and other consumers) via long line sampling in Tarpon Bay (following Heithaus et al. 2009). A total of 25 juvenile bull sharks were caught this year. Muscle, fin, and blood samples were collected from all individuals for isotopic tracer analyses. A subset of individuals (n=15) were also tagged with passive integrated transponder (PIT) tags for mark-recapture studies.
- An additional 10 common snook, 10 largemouth bass, and 3 bull sharks were tagged with acoustic telemetry transmitters as part of long term animal movement tracking. Consumer movement patterns provide valuable information about habitat use and migratory patterns and how these respond to hydroclimatic variation.
- Our investigation of the factors influencing mercury, methylmercury, and selenium accumulation in bull sharks in waters of the Gulf of Mexico and western North Atlantic (n = 230) was completed in April 2023. We focused on accumulation dynamics across nursery areas where juvenile sharks reside for several years. Findings will be submitted to Chemosphere in January 2024 and were part of a successful doctoral dissertation defended in Spring 2023.
- We held our first workshop and began data harmonization for our marine consumer nutrient dynamics synthesis group.

Carbon Fluxes and Ecosystem Trajectories

The flux working group has been working to maintain flux towers, collect data within tower footprints, and run experiments to understand how changes in presses and pulses are impacting landscape carbon dynamics. We have completed plans for adding a new tower to our existing tower network. This second Florida Bay tower is being prepared for deployment west of Rabbit Key Basin in the Winter 23/24 (**Fig. 1**). Rabbit Key tower instrumentation is currently being bench tested while the support tower is fabricated (**Fig. 2**) and will replace a historic meteorological research station that currently represents a hazard to navigation. The flux group has been measuring alkalinity to better characterize horizontal flows of carbon.

The Everglades Landscape Model (ELM) is a spatial model that integrates (calibrated/validated) dynamic modules of 3D raster-vector hydrology with dynamic modules of biogeochemistry (TP, Cl, SO_4), plant biology (growth/mortality of macrophytes and periphyton), soil processes (organic carbon accumulation/loss), and habitat succession. We continue to extend and refine the ELM.

Figure 1. Location of Bob Allen (blue dot) eddy covariance tower and Rabbit Key Basin eddy covariance tower in Florida Bay, north of the Florida Keys.

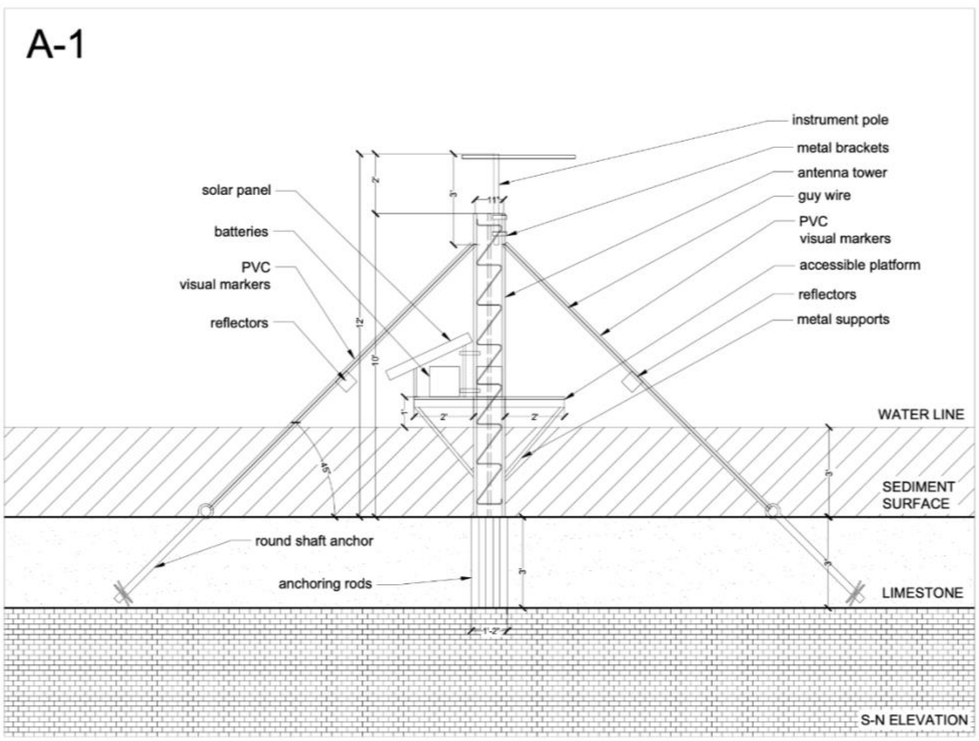

Figure 2. Engineering drawing of new Rabbit Key Basin flux tower

Specific Objectives

Climate Variability & Change
An expanded analysis including N = 22 stations in Florida showed decreasing May and October precipitation, indicating a later wet season onset and a reduction in wet season duration. We quantified regional changes in precipitation extremes as changes to rainfall depth-duration-frequency using both statistically- and dynamically downscaled climate model data (e.g. LOCA, MACA, and CORDEX). Examining both historical and future periods, we identified change factors that could be considered to adjust the extreme rainfall for a variety of durations and return periods that reflect projected future conditions. Additional analyses of downscaled LOCA data for both CMIP5 and CMIP6 has been completed and suggest a shift in the seasonality of rainfall, potential drying patterns, and definite increase temperatures in the south Florida region.

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

SOCIAL LANDSCAPE

Water Governance/Cultural & Economic Values
Wakefield is formulating a research program with colleagues at the University of Chicago that will bridge H2a in FCE IV and proposed work in FCE V. This research will explore the coproduction of urban and nonurban spaces past, present, and future and will focus on data visualization and theoretical interventions.

Grove and Bernardo will continue conducting interviews for H2b, which will examine how scientists and practitioners approach valuation of nature and integrate valuation into governance decisions. This will allow them to complete a paper on the history of valuation in Everglades governance, which will be submitted to Antipode in spring 2024.

Vorseth, Stainback and Bhat will complete the paper on Multi-Criteria Analysis of Restoration Alternatives and Analytical Hierarchy of Stakeholder Preferences, a publication relevant to H2a. Also, they will complete the manuscript on stochastic benefit-cost analysis of the Everglades restoration alternatives. Bhat will continue to work on deep leverage points for sustainable transformation and urban development in the context for the South Florida socio-ecological system. Vorseth will complete the analysis of the data gathered from the residents of the South Florida residents on Lake Okeechobee management. This is part of her dissertation.

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 maintained long-term biogeochemical datasets for SRS transect and analyzed data.

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 (3) characterizing assemblages of water-column and benthic microbial communities.

Vegetation

- Maintain datasets on periphyton quality, quantity, composition, and metabolism from FCE and satellite sites and interpret long-term trends
- Continue contributing diatom taxon descriptions to diatoms.org. and complete a book chapter about the use of diatoms in guiding restoration.
- Evaluate the long-term effects of hurricane disturbances on spatiotemporal patterns of mangrove aboveground biomass and NPP in Shark River estuary. Estimate ecosystem-level C stocks of FCE mangroves. Use remote sensing to quantify mangrove damage in ENP post-disturbance.
- Assess the geochemical properties of mangrove soils and evaluated soil strength as a function of root biomass in all FCE mangrove sites.

Consumers

- Long-term monitoring of food web energy dynamics aims to identify drivers of ecosystem structure and function across the FCE as hydrologic presses and pulses continue to alter ecosystem trajectories. Examine spatiotemporal trends in food web production sources and structure and relate these patterns to hydroclimatic drivers. This involves sampling of functionally representative species across large ecosystem gradients and determining the relative contributions of basal resources with Bayesian stable isotope mixing models.

- Continue to track consumer movement and foraging of common snook, largemouth bass, and bull shark populations using 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. Use long-term data to investigate if trends in behavioral and social dynamics across tiered population scales are influenced by changes in energy pathways and resource availability by means of social network and genetic analysis.
- Integrate 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.
- Examine effects of hydroclimatic factors on long-term fish community structure, and on the magnitude and quality of marsh prey subsidies, along with the role of matches/mismatches in peak predator/prey abundance in energetics and body condition of mesoconsumers.
- Determine 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.
- Quantify the patterns, magnitude, and drivers of consumer nutrient supply ecotonal fish communities. We will examine the importance of individual movement behavior and its variability in mediating empirical consumer nutrient supply.
- Leverage LTER timeseries data to quantify the role of consumers in nutrient fluxes across marine and coastal LTER sites and examine the effect of disturbance on these fluxes. We will examine the resilience of consumer nutrient supply to disturbance over broad spatiotemporal scales by integrating models of consumer nutrient excretion rates with time series of consumer populations across 10 marine and coastal LTER programs.

Carbon Fluxes and Ecosystem Trajectories

Our goals for this year were to maintain long-term flux datasets for SRS and TS transects, to add a new flux tower in a relatively high-P, high NPP region of Florida Bay, and initiate alkalinity measurements.

Significant Results

Climate Variability & Change

- Increasing August precipitation shows an overall increase in wet season and annual total precipitation, particularly in South Florida (**Fig. 3**).
- We measured less dry season precipitation throughout Florida over the past 40 years (**Fig. 3**).
- We detect shorter wet-season duration and lower dry-season rainfall driven by local and regional climate changes (**Fig. 3**).

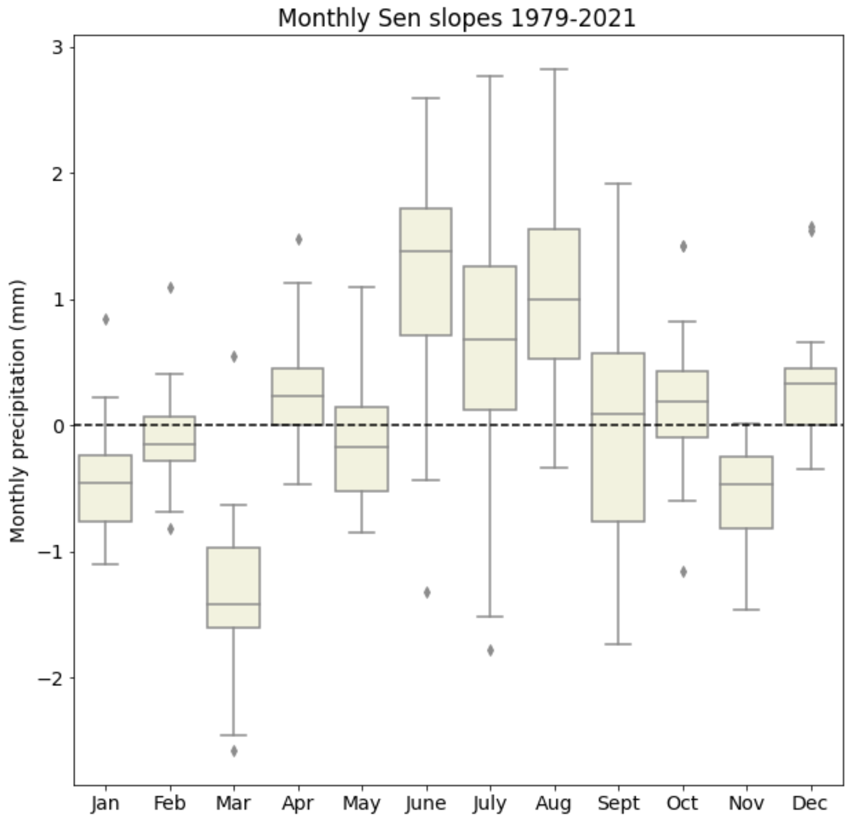

Figure 3. Changes in long-term (1979-2021) monthly precipitation in Miami shows a decrease in dry-season (Nov - April) and an increase in wet-season precipitation (June-Oct), as well as a delay in the onset of the wet-season (May).

Hydrologic Connectivity

- Sea-level rise rates between 4.8 and 10 mm yr^{-1} (1993-2022) are similar to those associated with an early Holocene transgression (**Fig. 4**)(Parkinson and Wdowinski 2023).
- Total phosphorus (TP) in groundwater and porewater are higher in SRS than TS/Ph (**Fig. 5**).
- Remotely sensed altimetry data collected from ICESat-2 and GEDI missions compared toland-based measures show a 6-15 cm level of accuracy (Palomino et al. 2023, **Fig. 6**).

GRAPHICAL ABSTRACT

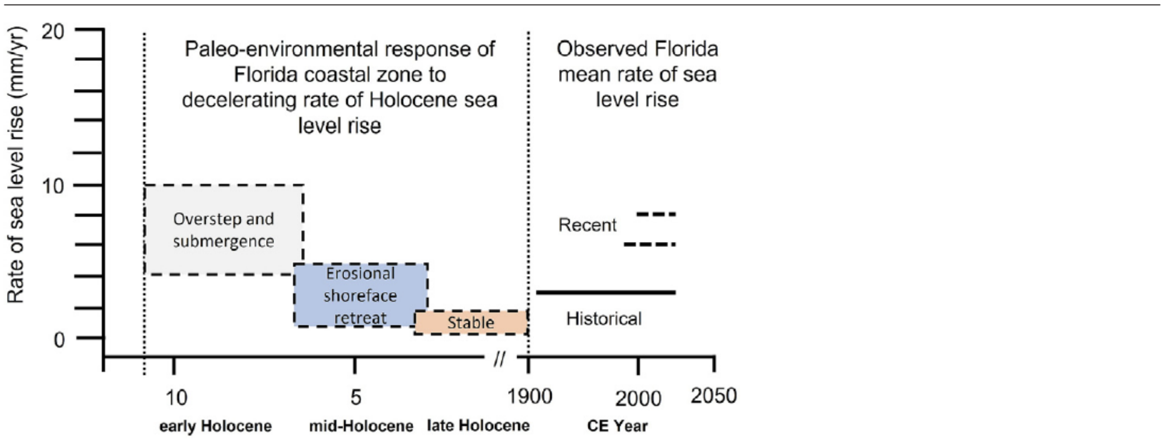

Figure 4. Graphical abstract showing Holocene, historical, and current rates of sea level rise along the entire Florida coastline. (Source: Parkinson and Wdowinski, 2023).

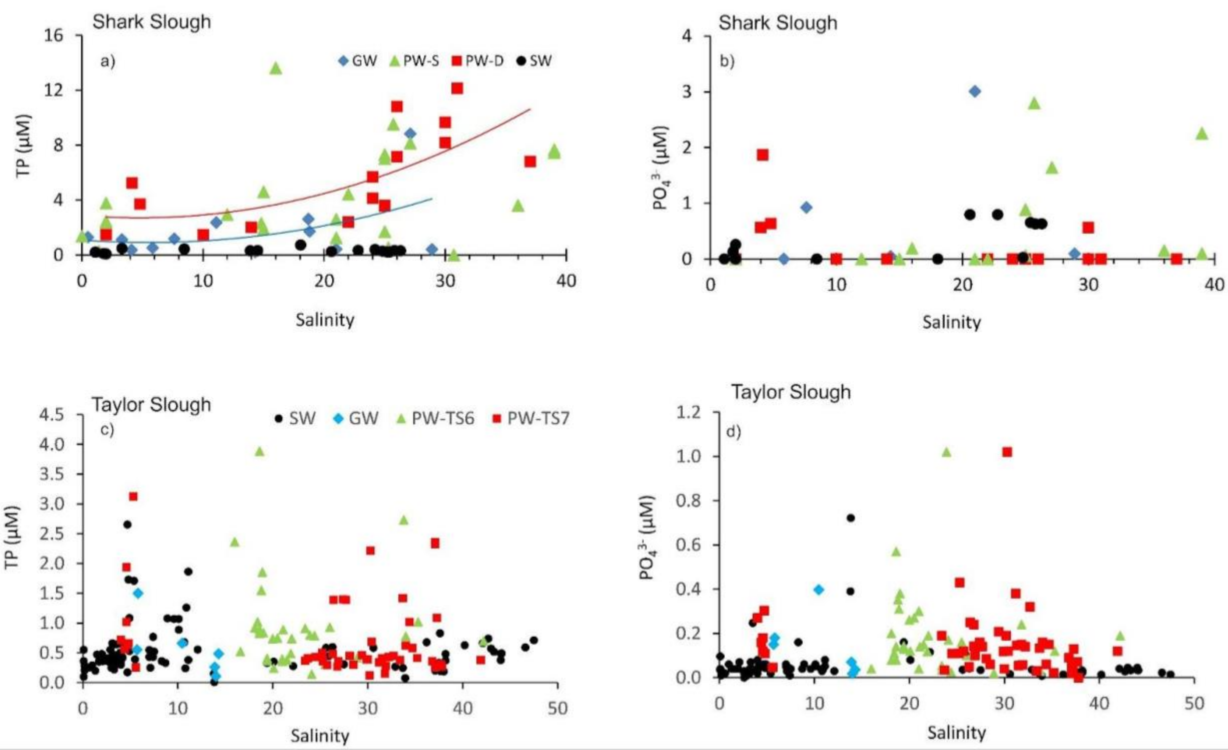

Figure 5. Total phosphorus (TP) and phosphate (PO_4^{3-}) as a function of salinity for a range of subsurface and surface waters at Shark Slough (top figures) and Taylor Slough (bottom figures): (a) TP at Shark Slough; (b) PO_4^{3-}at Shark Slough; (c) TP at Taylor Slough and d) PO_4^{3-}at Taylor Slough. GW indicates samples from limestone bedrock wells (4-8 m deep), PW-S indicates porewaters from (20 cm), PW-D indicates porewaters from 80 cm, PW-TS6 indicates porewaters from 90-100 cm, PW-TS7 indicates porewaters from 20-30 cm. Blue and red lines in figure a) indicate best-fit polynomials between TP and salinity for the groundwaters and PW-D, respectively. Data repurposed from Lagomasino et al., 2014 and Zapata-Rios and Price, 2012.

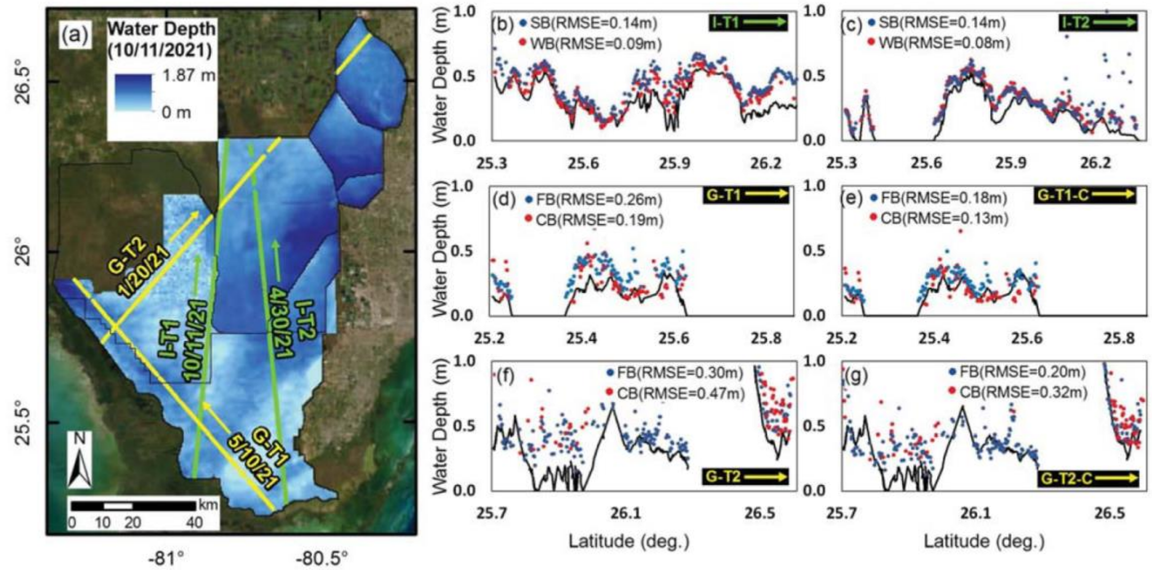

Figure 6. Spatial variation of the water depth along different transects. (a) Presents the transect location and direction. Each subplot presents the water depth for the (b) ICESat-2 Transect 1 (I-T1); (c) ICESat-2 Transect 2 (I-T2); (d) GEDI Transect 1 (G-T1); (e) GEDI Transect 1 corrected (G-T1-C); (f) GEDI Transect 2 (G-T2); and (g) GEDI Transect 2 corrected (G-T2-C). The solid black line represents the reference water depth obtained from EDEN. The blue dots represent the ICESat-2 and GEDI observations in strong (SB) and full (FB) beams. The red dots represent ICESat-2 and GEDI observations in weak (WB) and coverage (CB) beams. Source: Palomino et al. (2023).

SOCIAL LANDSCAPE

Water Governance/Cultural & Economic Values

- South Florida residents prioritized management decisions that improve ecological conditions, habitat, food, and drinking water.
- Simulation of the benefits and costs of the ongoing restoration plans revealed that wildlife, real-estate value improvement, carbon sequestration, and urban water supply gains were highest (**Fig. 7**).
- Work on governance and valuation is identifying how valuation emerged as a conceptual response to complexity and the failures of high modernist science to provide an objective guide to policy.

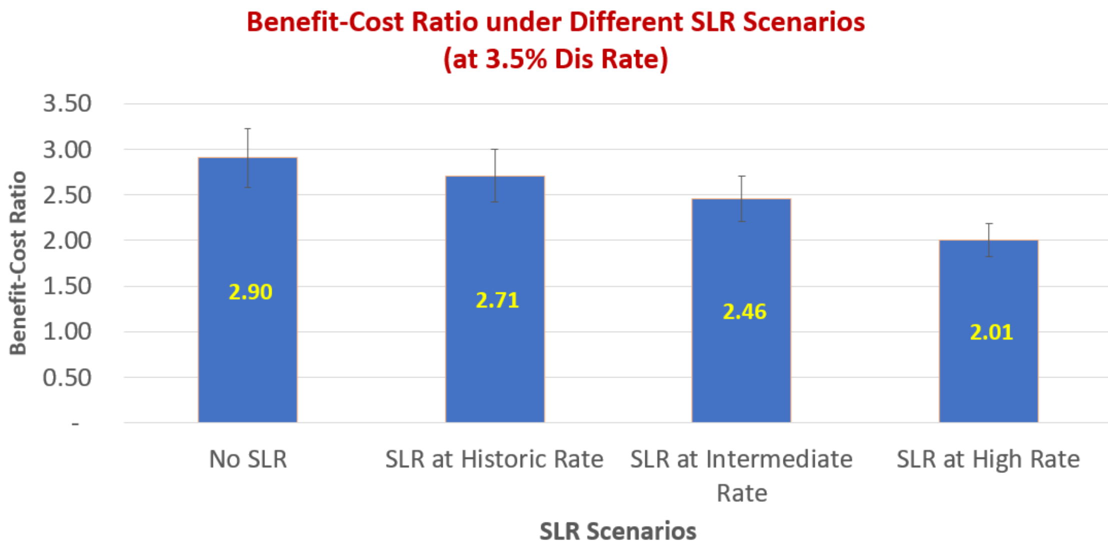

Figure 7. Benefit-Cost ratio of the Central Everglades Planning Project (CEPP) under different sea level rise scenarios.

ECOLOGICAL LANDSCAPE

Vegetation & Geomorphic Gradients

- Sawgrass above and belowground production declined with salt exposure, resulting in losses of soil elevation and carbon stocks (**Fig. 8**).
- Sea-level rise increased total creek length from 3.8 km in 1950 to 21.8 km in 2018, continuously increasing ~ 0.5 to 1 km yr^{-1}. *Rhizophora* is expanding fastest in close proximity to creeks.

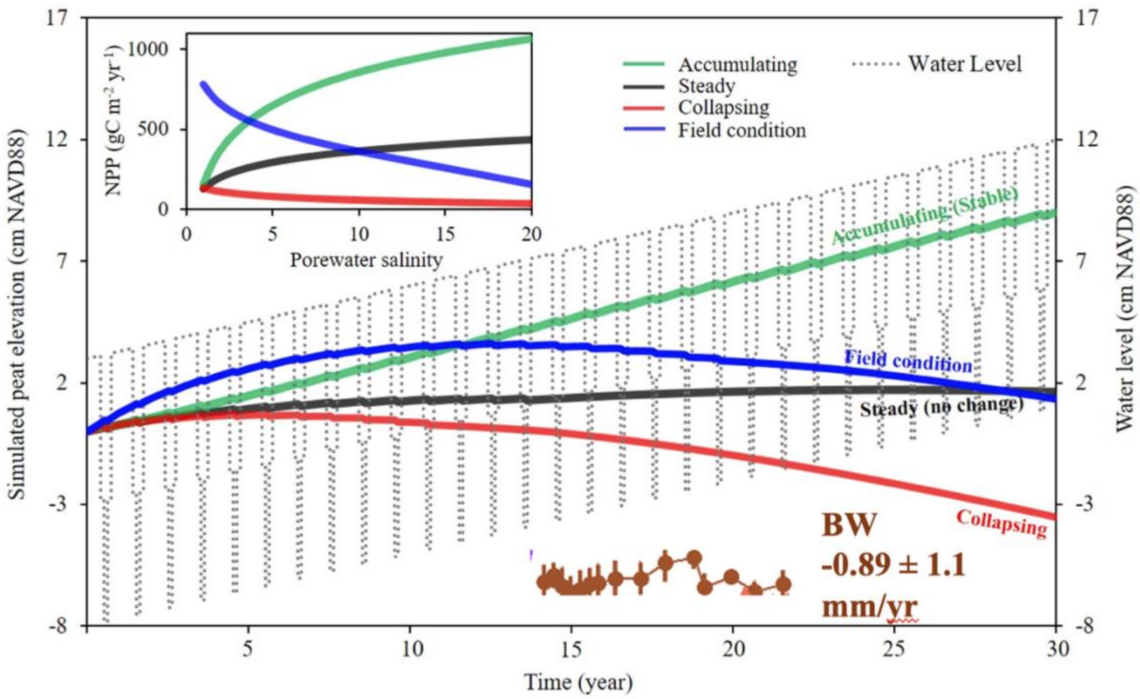

Figure 8. Preliminary calibration results for simulation of mangrove elevation change using the Marsh Equilibrium Model (MEM)/CWEM9.0

Ecosystem Structure & Functions

Abiotic Resources & Stressors

- Surface water TP in grab and auto-samples continue to increase in freshwater marshes and mangroves (**Fig. 9**).

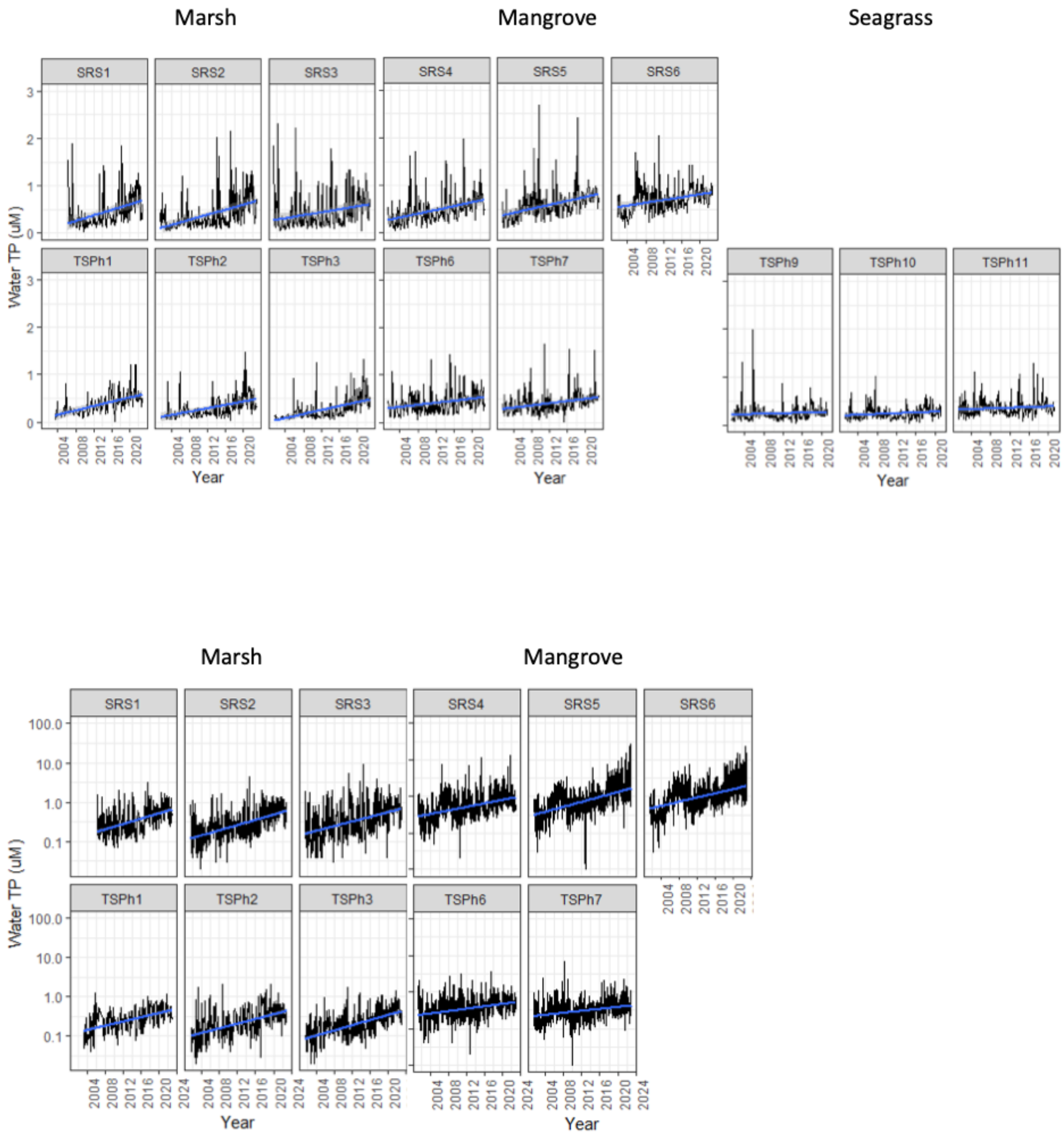

Figure 9. Trends in total phosphorus concentrations from grab (above) and auto- (below) samples from across the FCE LTER research sites.

Detritus & Microbes

- Microbial and marine contributions to DOM composition are increasing with SLR compared to storms as drivers of DOC pulses of more high-complexity DOC (**Figs. 10, 11A-C**).
- DOC increases as depth decreases in SRS peat marshes, whereas DOC in SRS mangroves increases with water depth (**Figs. 12A, 12C**). DOC concentrations increase with increasing water depths in TS/Ph marl marshes and mangroves (**Figs. 12B, 12D**). Sources of DOM shift from dry to wet seasons (**Figs. 12A-12D**).
- Seasonal water pulses shift sources of DOM (**Fig. 13**). Increases in algal-derived and humic DOM are increasing with salinity in SRS and TS/Ph mangroves (**Fig. 14**).
- Litter breakdown rates (*k*) are fastest in marine habitats (**Fig. 15**). Seawater salinities decreased litter N:P and increased litter cellulose:lignin (**Fig. 16**).
- Sulfate uptake was positively correlated with higher freshwater inputs, and a peak of dissimilatory sulfate reduction was measured at higher salinities (**Fig. 17**). Enzymes associated with reduced environmental conditions were higher in soil than periphyton or litter (**Fig. 18**).
- Alphaproteobacteria of the SAR11 clade is found throughout the FCE (**Fig. 19** Laas et al. 2022). SAR11 usually dominate oligotrophic marine waters and are characterized by a high microdiversity (**Fig. 20**).
- High concentrations of SAR11 were found in Florida Bay (TS/Ph 9, 10, 11) and to a lesser degree in mangrove sites (TS/Ph6, TS/Ph7 and SRS5-6)(**Figs. 21-22**).
- Genotyping of clades Ia.3 and IIIa.1 suggests recent selective sweeps in freshwater populations (**Fig. 23**).

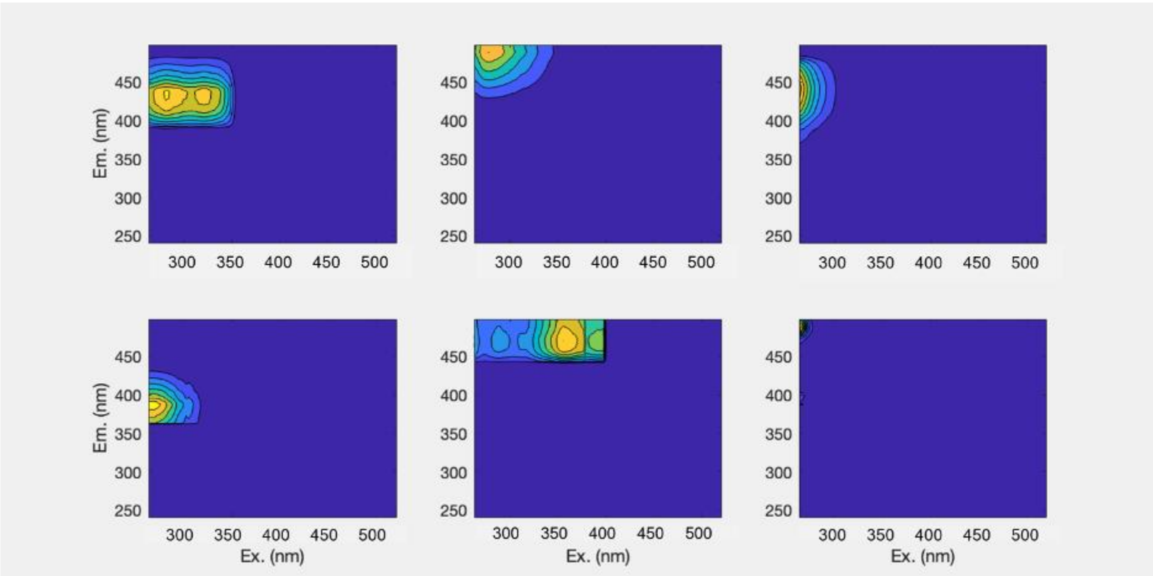

Figure 10. Parallel factor analysis (PARAFAC) model of long-term (2011-2022) fluorescent dissolved organic matter (fDOM) across Everglades ecosystems (e.g., marsh, mangrove, and seagrass) reveal distinct and common contributions to fDOM composition.

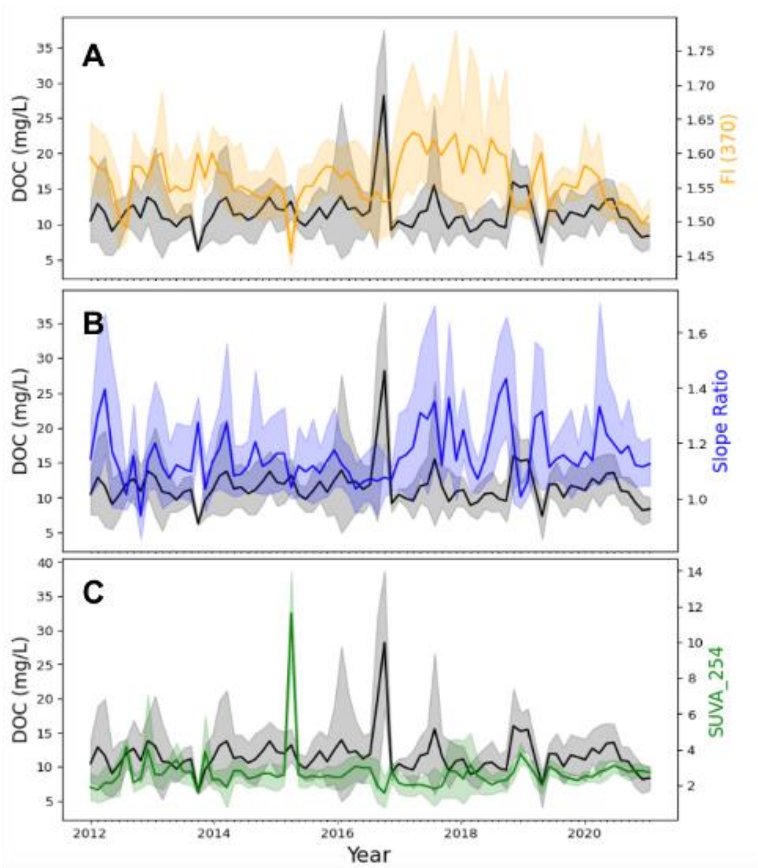

Figure 11. Long-term (2012-2022) pulses in dissolved organic carbon (DOC) concentrations and composition. Patterns show pulsed and overall increases in (**A**) microbial (Fluorescence Index, FI, yellow line) and (**B**) marine contributions (Slope Ratio, blue line) to DOC composition compared to storms as drivers of DOC pulses (black lines in all plots) of more high-complexity DOC (**C**) (Specific Ultraviolet Absorbance at 254 nm wavelength, SUVA_254, red line). From Smith et al., in prep.

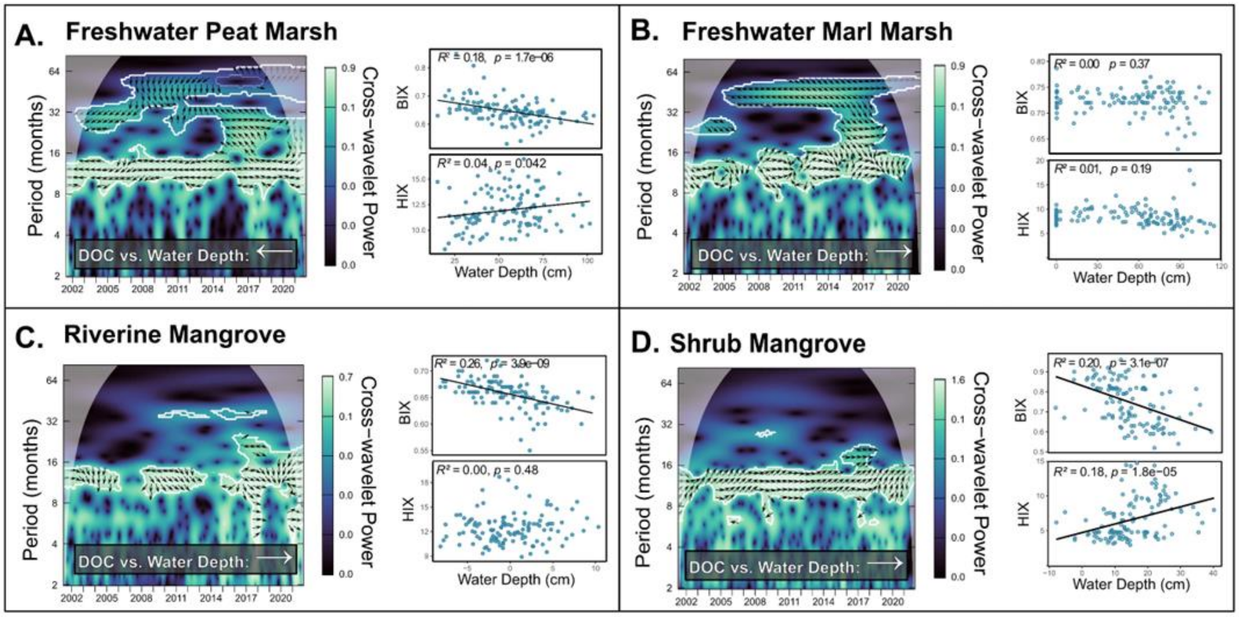

Figure 12A-12D. Long-term (2001-2021) trends in DOC concentrations and DOM quality in Everglades freshwater peat marsh (A), marl (B) marsh, riverine (C), and shrub (D) mangrove habitats. White contour lines in wavelet plots indicate statistically significant cross-wavelet power between DOC concentrations (µmol/L) and water depth (cm). Arrows are plotted where wavelet power is significant, and the direction 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-facing ones indicate the variables are 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 after changes in depth. Below each plot we have included the most consistent trend in the relationship between DOC and water depth over the full time period. The scatterplots use two fluorescence metrics: BIX and HIX. Increasing BIX indicates increasing algal influence on DOC, while increasing HIX indicates increasing humic influence on DOC.

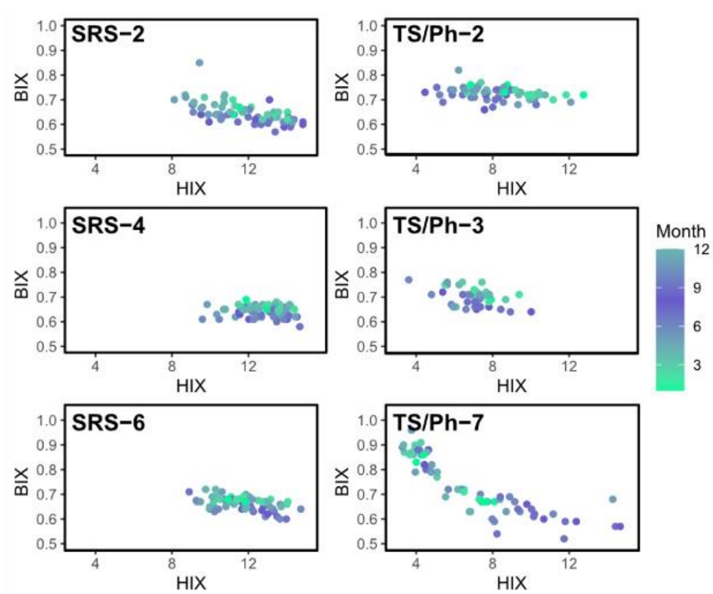

Figure 13. Seasonal changes in HIX and BIX in marsh, ecotone, and mangrove sites along the long-hydroperiod peat marshes of Shark River Slough (SRS-2, -4, -6), and the short-hydroperiod marl marshes of Taylor Slough (TS/Ph-2, -3, -7). Increasing BIX (Biological Index) indicates more prevalent autochthonous influence on DOM. Increasing HIX (Humification Index) indicates more prevalent humic influence on DOM. Blue colors signify the wet season (May – October) while green colors signify the dry season.

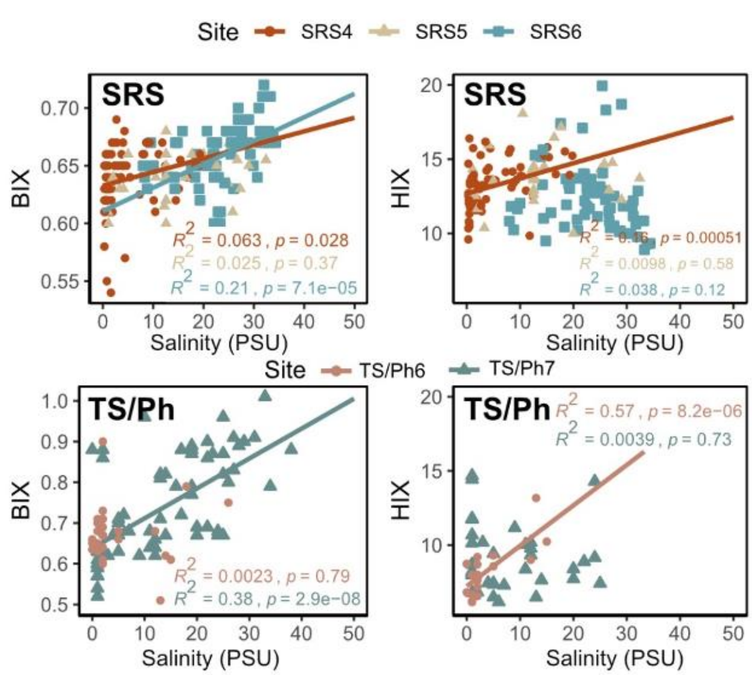

Figure 14. Salinity as a driver of BIX (Biological Index) and HIX (Humification Index) at mangrove sites in the riverine mangroves of the peat-based Shark River Slough (SRS-4, -5, -6) and the shrub mangroves of the marl-based Taylor Slough (TS/Ph-6, -7). Data on fluorescent DOM ranges from 2011–2021 at SRS-4, -6, and TS/PH-7 and ranges from 2019–2021 at SRS-5, and TS/Ph-6. Increasing BIX indicates increasing autochthonous influence on DOM. Increasing HIX indicates increasing humic influence on DOM.

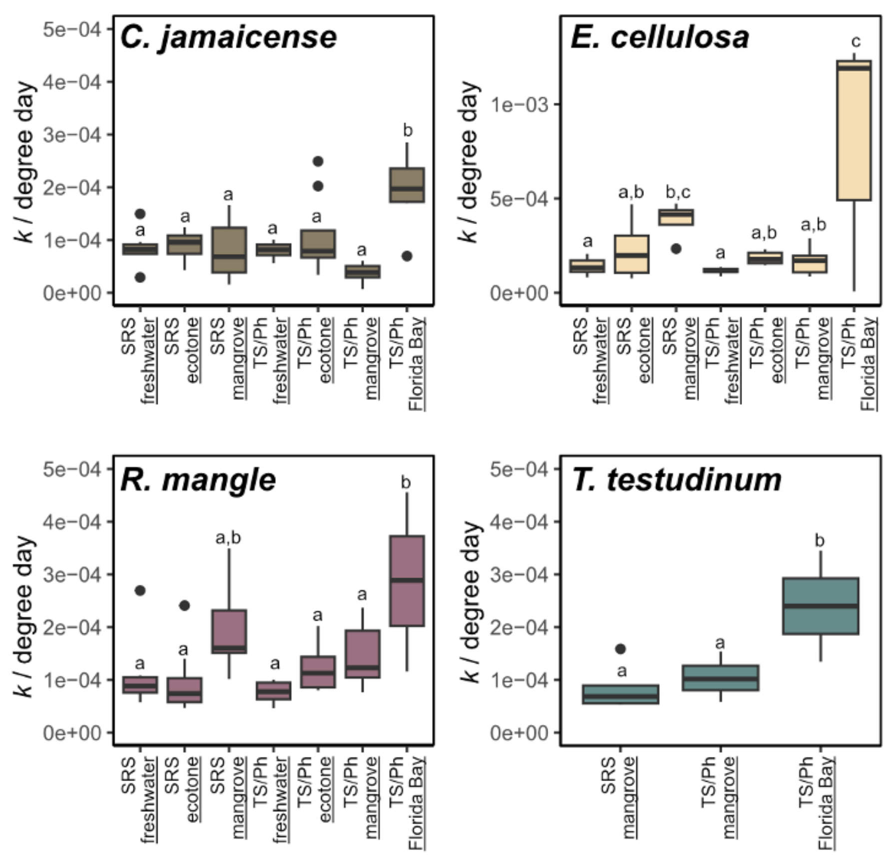

Figure 15. The breakdown rates (k) of dominant leaf litter species reciprocally incubated in marsh, mangrove, and seagrass ecosystems. Wetland habitats include peat (SRS-2) and marl marshes (TS/Ph-2), ecotonal wetlands (SRS-4, TS/Ph-3), riverine (SRS-6) and scrub mangroves (TS/Ph-7), and seagrass meadows (TS/Ph-10).

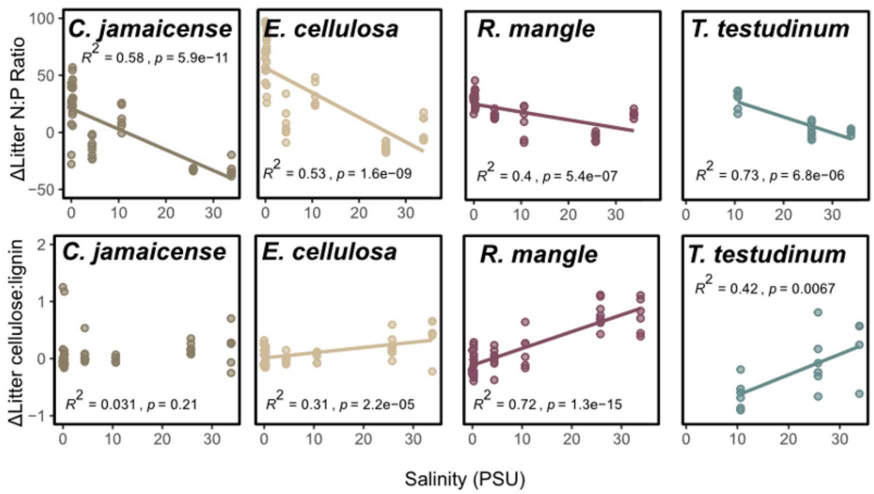

Figure 16. Linear relationships between average site surface water salinity and Δlitter N:P ratio, and Δcellulose:lignin ratio after 4 months of incubation.

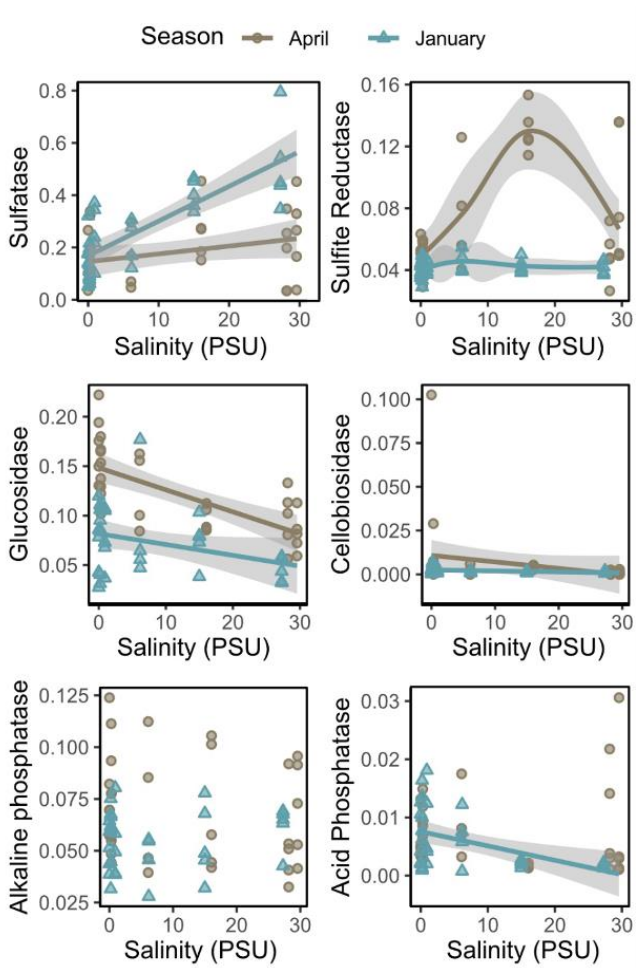

Figure 17. Linear regressions comparing surface water salinity and relative gene abundance of six focal gene families, along Everglades freshwater to marine gradients. The shaded area indicates 95% CI.

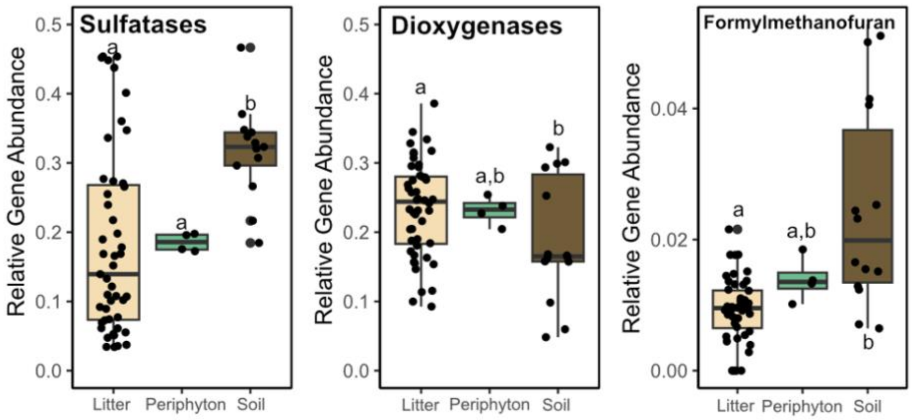

Figure 18. Gene expression for sulfatases, dioxygenases, and formylmethanofuran across leaf litter, periphyton, and soil along Everglades freshwater to marine gradients. Boxplots represent the interquartile range for each variable, and the solid line is the median. Error bars represent the 95% confidence intervals. Letters above boxplots indicate significant (α ≤ 0.05) differences among groups using one-way ANOVA.

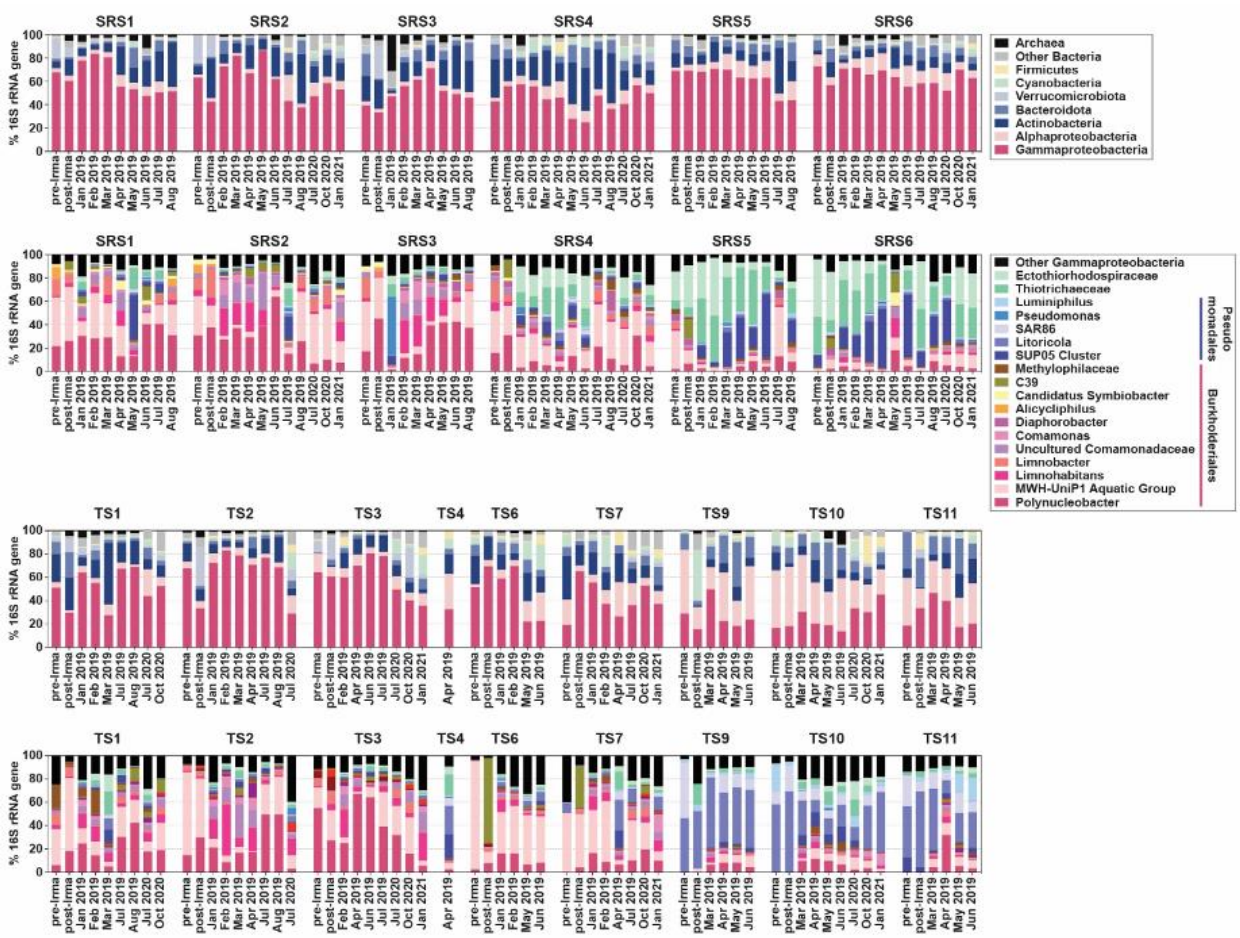

Figure 19. Summary of all 16S rRNA amplicon data from this project. The panels show main bacterial groups (upper panels) and subgroups of Gammaproteobacteria (lower panels) for Shark River Slough and Taylor Slough (TS/Ph).

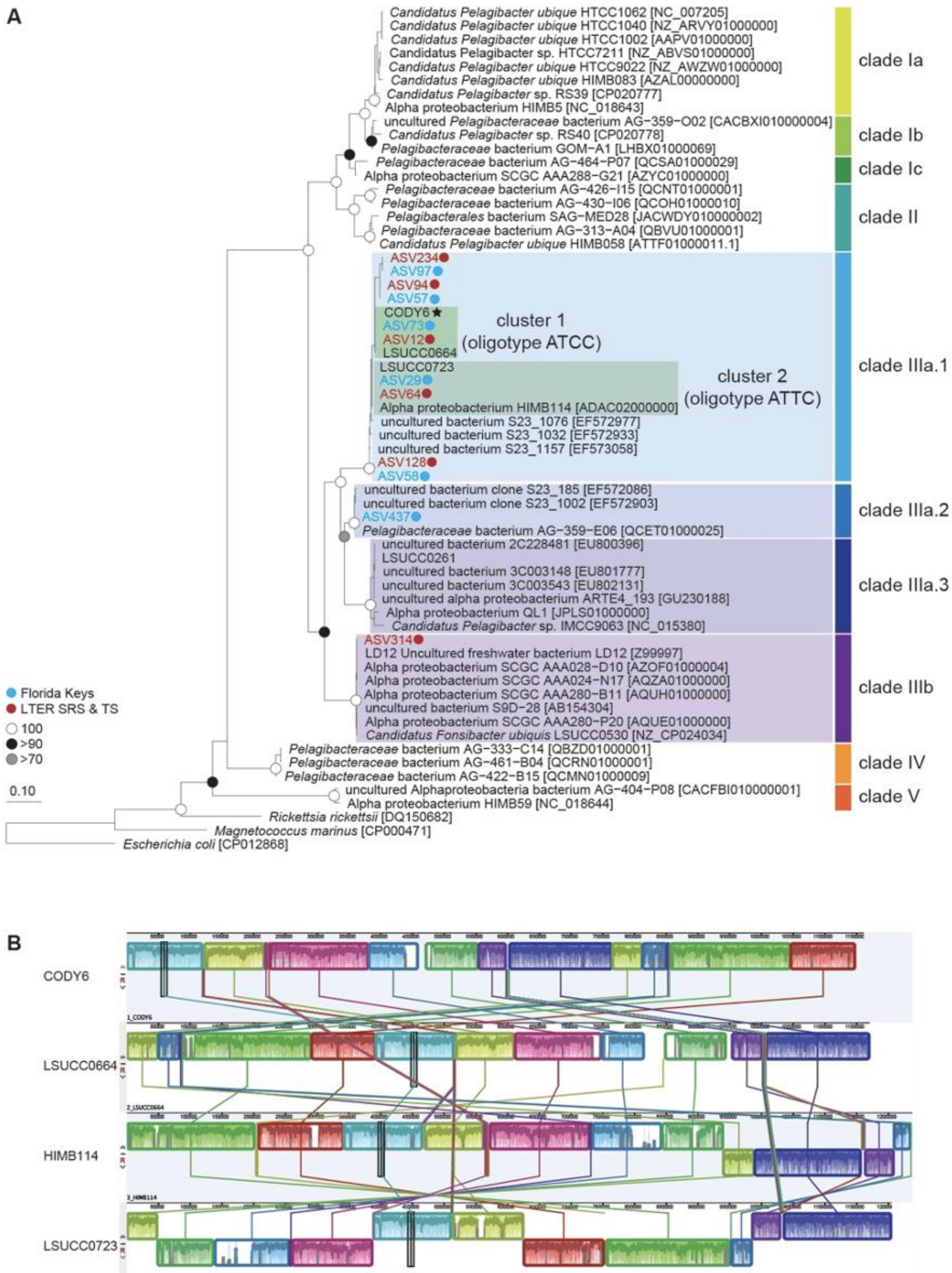

Figure 20. Diversity and distribution of SAR11 clade III in datasets from the FCE LTER (Laas et al 2022) and Florida Keys (Laas et al. 2021).

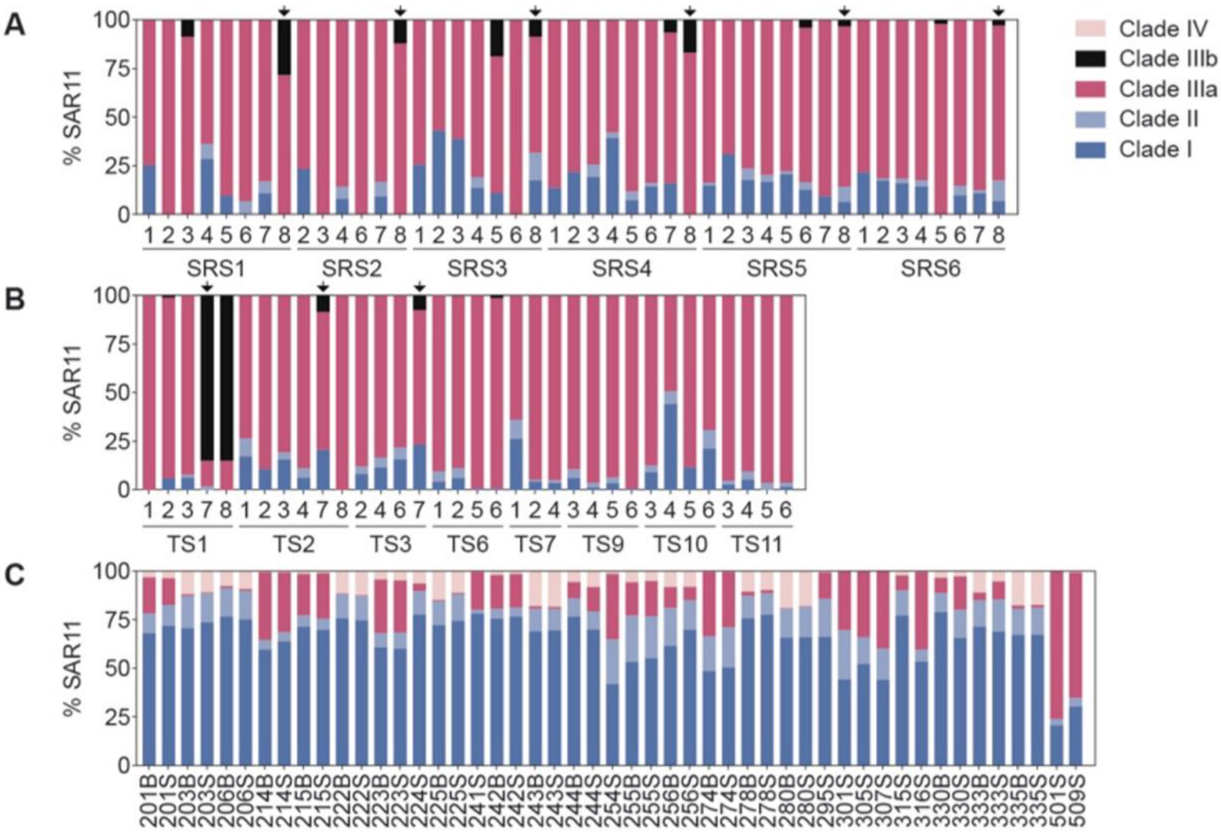

Figure 21. Diversity and distribution of SAR11 clades in the Everglades wetland transects and the Florida Keys. **A.** The relative abundance of SAR11 clades in the Shark River Slough (SRS) and **B.** Taylor Slough/Panhandle (TS/Ph) study sites, and **C.** sampling sites within the Florida Keys National Marine Sanctuary (FKNMS). Arrows indicate clade IIIb transport along with water flow from the upstream sites (SRS1 and TS/Ph1) to the downstream sites (SRS6 and TS/Ph3).

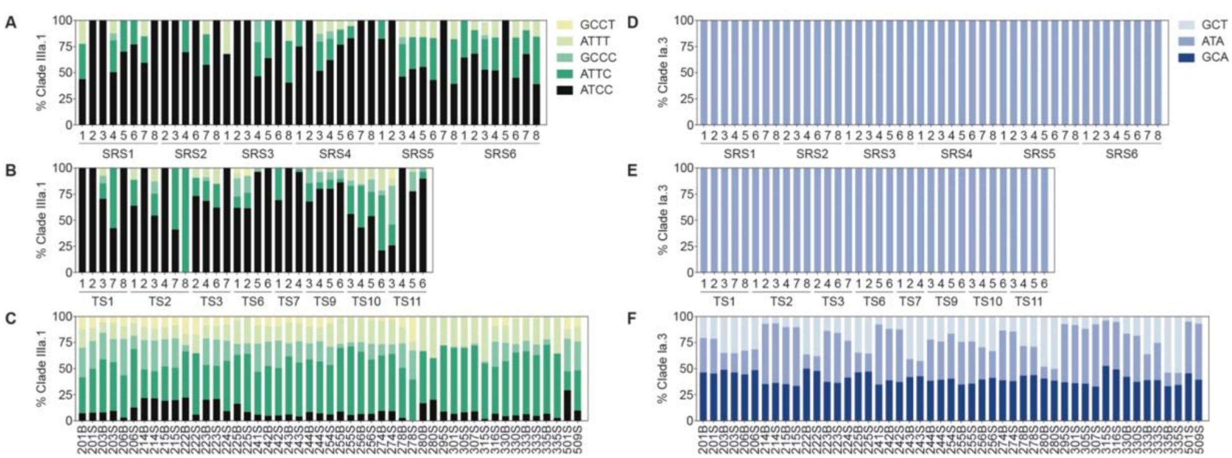

Figure 22. Oligotype distributions within the SAR11 subclades IIIa.1 and Ia.3 in the Everglades wetland transects and the Florida Keys. A. The relative abundance of subclade IIIa.1 oligotypes in the Shark River Slough (SRS) and B. Taylor Slough/Panhandle (TS/Ph) study sites, and C. sampling sites within the Florida Keys National Marine Sanctuary (FKNMS). D. The relative abundance of oligotypes within the subclade Ia.3 in the Shark River Slough (SRS) and E. Taylor Slough/Panhandle (TS/Ph) study sites, and the F. FKNMS sampling sites.

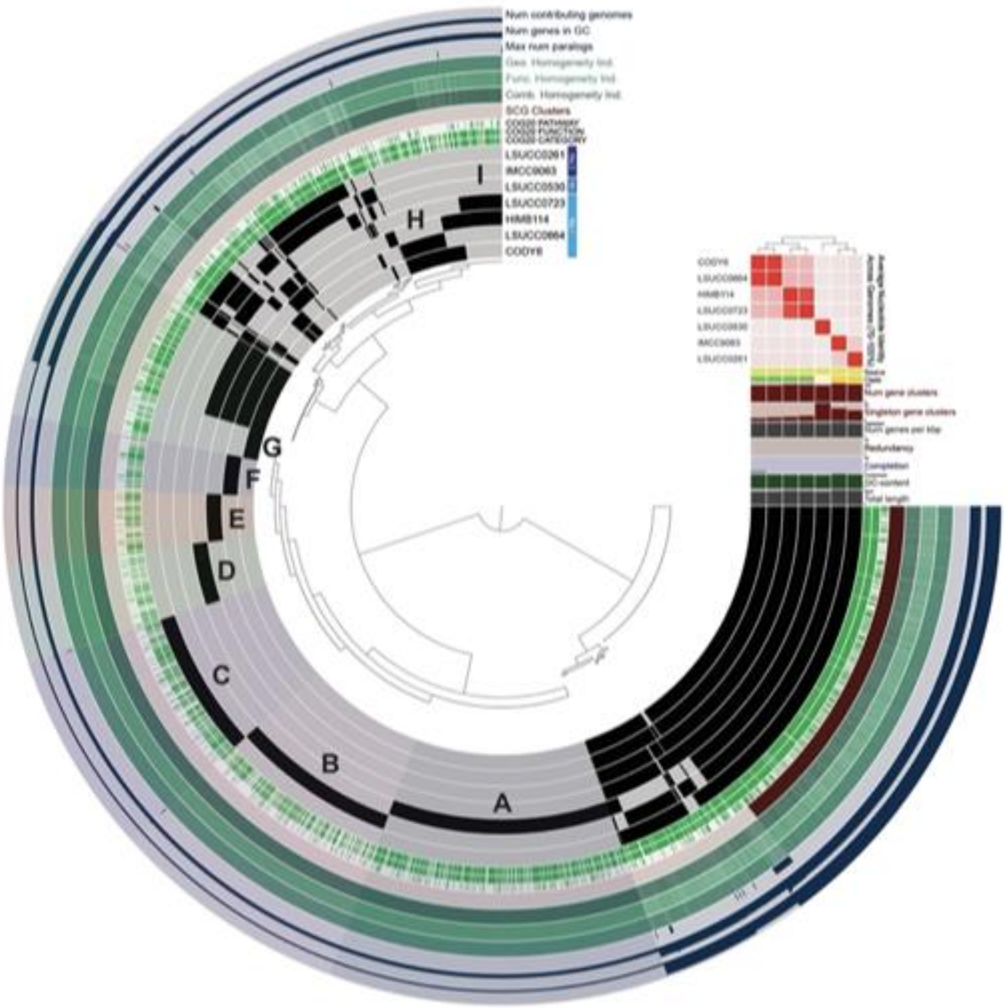

Figure 23. SAR11 clade III pangenome. The dendrogram in the center organizes 3,075 gene clusters identified across clade III genomes represented by seven innermost layers. Black bar graphs within the seven layers indicate the presence of a gene cluster in a given genome. Unique gene clusters in each genome are labeled **A-G** and two closely related genomes representing cluster 1 and 2 are labeled **H** and **I**, respectively. From inside to outside, the next three layers indicate known versus unknown COG category, COG function, and COG pathway. The next layer indicates single copy core gene (SCG) clusters, followed by three computed homogeneity indices each representing the combined homogeneity index, functional homogeneity index, and the geometric homogeneity index describing how similar genes within a gene cluster. The next two layers indicate the maximum number of paralogs and the number of genes in the gene cluster, and the outermost layer indicates the number of contributing genomes.

Vegetation

- A diatom-derived target for periphyton TP of 150 mg L^{-1} indicates oligotrophic conditions (**Fig. 24**). Periphyton biomass is declining with increasing hydroperiods in the marl prairies, while calcareous diatoms continue to rapidly decline in the mangrove ecotone experiencing sea water intrusion (**Fig. 25**).
- Mangrove litterfall rates declined (50-70%) in SRS following Irma, with annual rates 2-4 times lower during 2018 compared to the long-term pre-disturbance rate, but have recovered (**Fig. 26**).
- AGB C stocks at SRS-6 mangroves have decreased by ~half since 2000 (79 MgC ha^{-1}) due to Wilma and Irma impacts, with a 39% reduction (35 MgC ha^{-1}) in C stocks post-Irma. AGB C stocks at SRS-4 & 5 have remained similar throughout the years (**Fig. 27**).
- Total ecosystem-level C stocks (aboveground + roots + soil) ranged from 332 MgC ha^{-1} (TS/Ph-6) to 568 MgC ha^{-1} (SRS-5) across FCE sites. Aboveground components (i.e., leaf and wood) contributed between 60-87% of the total vegetation C pool in the SRS, whereas roots accounted for 66-79% of the vegetation C stocks in the TS/Ph. Most (80-90%) of the ecosystem C pool is stored in soil (**Fig. 28**).
- Mangrove soil shear strength increased with depth within the shallow (0-45 cm depth) root zone at all sites until it peaked. In the deeper (>45 cm) root zone, soil shear strength decreased (**Fig. 29**).
- Soil shear strength in the shallow root zone increased with increasing root biomass (**Fig. 30**) and decreased with increasing flooding duration (**Fig. 31**).
- Aboveground necromass (AGN) was highest at the mouth and downstream section of Shark River. Mean AGN was 46 Mg ha^{-1} in Shark River, and an average loss of 29% in AGB suggests significant damage by Irma (**Fig. 32**) (Chavez et al. 2023).
- Sawgrass productivity responds to changes in hydroperiod and salinity in coastal ecotones and to relative nutrient (phosphorus) availability in sloughs (**Fig. 33A**). Mangrove productivity increases following hurricane pulses of P (**Fig. 33B**). Seagrass productivity responds to the availability of nutrients (N, P) and disturbance legacies of storms (Krause et al. 2022; **Fig. 33C**). Microbial mat productivity responds to increasing presses and pulses of water, nutrients, and salinity (**Fig. 33D**).

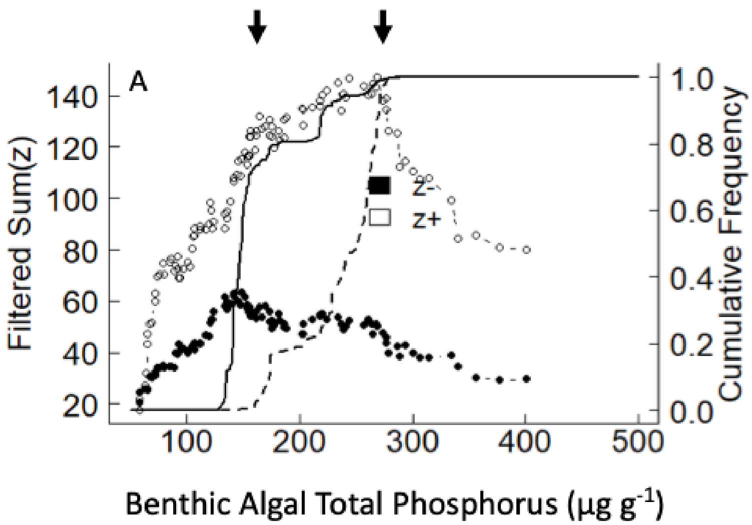

Figure 24. Threshold Indicator Taxa Analysis (TITAN) of benthic diatom response to benthic algal total phosphorus content with arrows indicating change points where a peak in filtered sum(z-) and sum(z+) indicates an assemblage threshold where a coincident decline or increase in taxa occurs. Solid circles are negative taxa (z-); open circles are positive taxa (z+). Oligotrophic taxa were defined as negatively responding taxa that indicate a protective level of periphyton total phosphorus at the point of the first arrow (150 mg L^{-1}), which corresponds to experimentally-derived thresholds (Gaiser 2024).

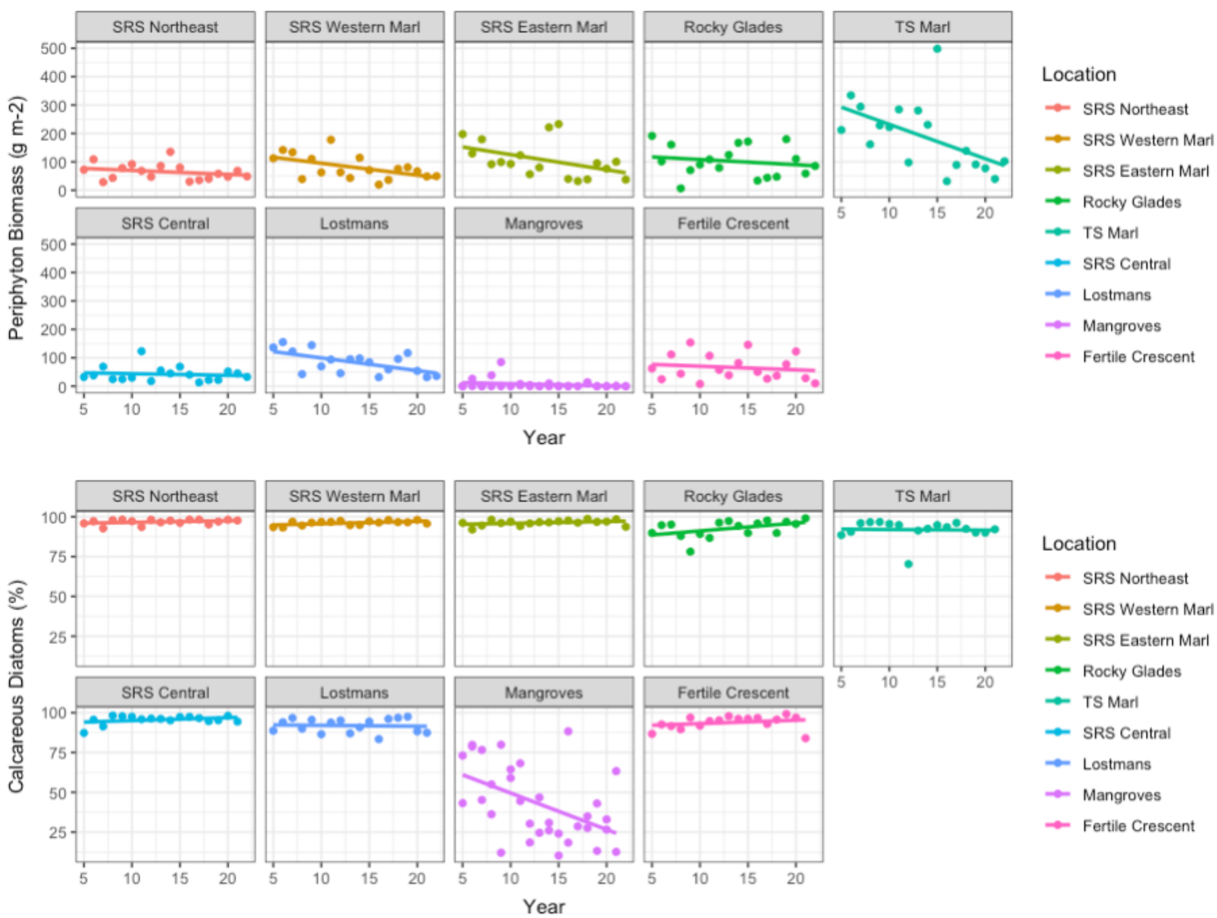

Figure 25. Trends over time in periphyton biomass (above) and calcareous diatoms (oligotrophic indicators, below) across satellite sites within landscape units of Everglades National Park.

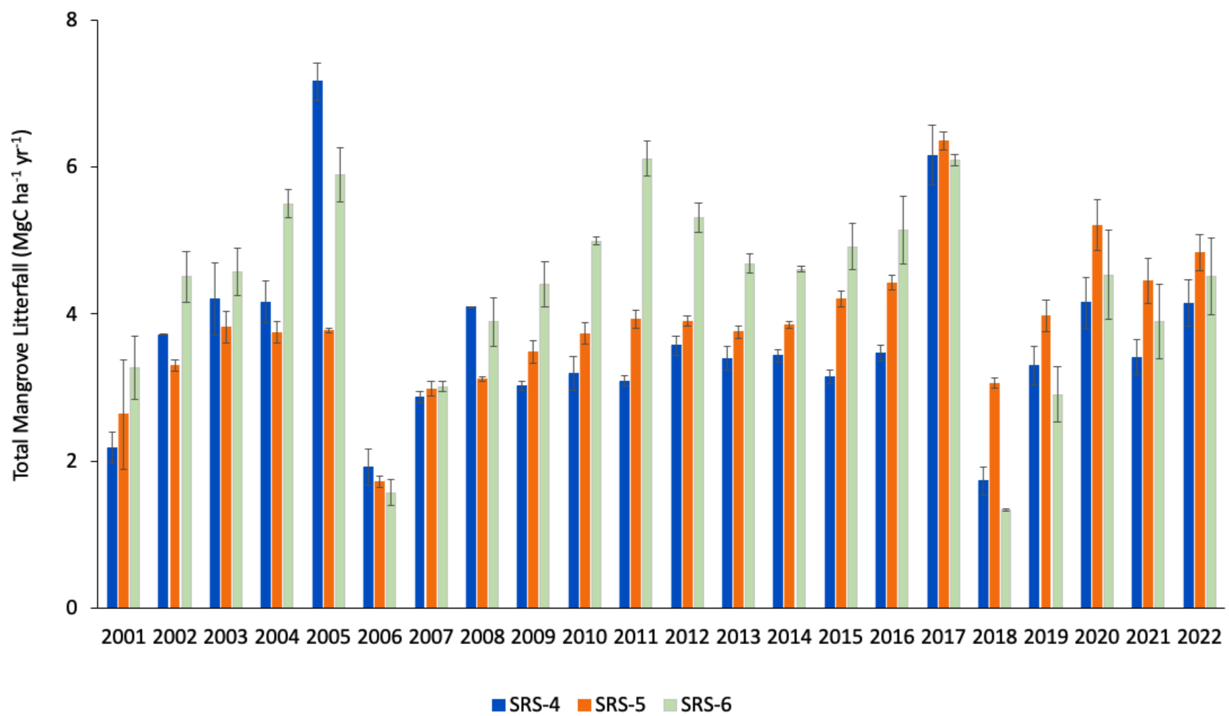

Figure 26. Long-term (2001-2022) variation in total annual litterfall production in riverine mangrove forests along Shark River estuary before and after the passage of Hurricanes Wilma (October 2005) and Irma (September 2017) across the FCE.

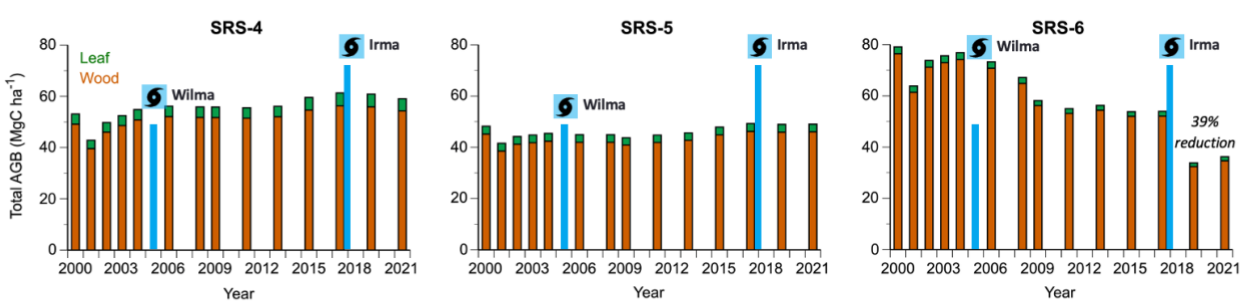

Figure 27. Long-term (2000-2021) changes in total (leaf + wood) aboveground biomass C stocks in riverine mangrove forests along Shark River estuary before and after the passage of Hurricanes Wilma (October 2005) and Irma (September 2017) across the FCE. During 2017, sampling at all sites was conducted in May.

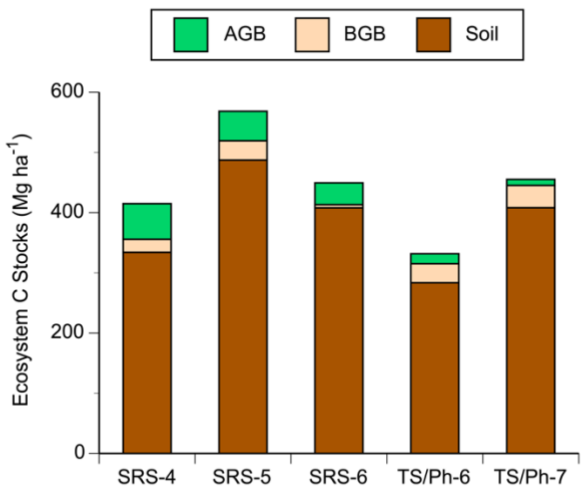

Figure 28. Total ecosystem-level C stocks (aboveground [leaf + wood], roots, soil) in FCE mangrove forests.

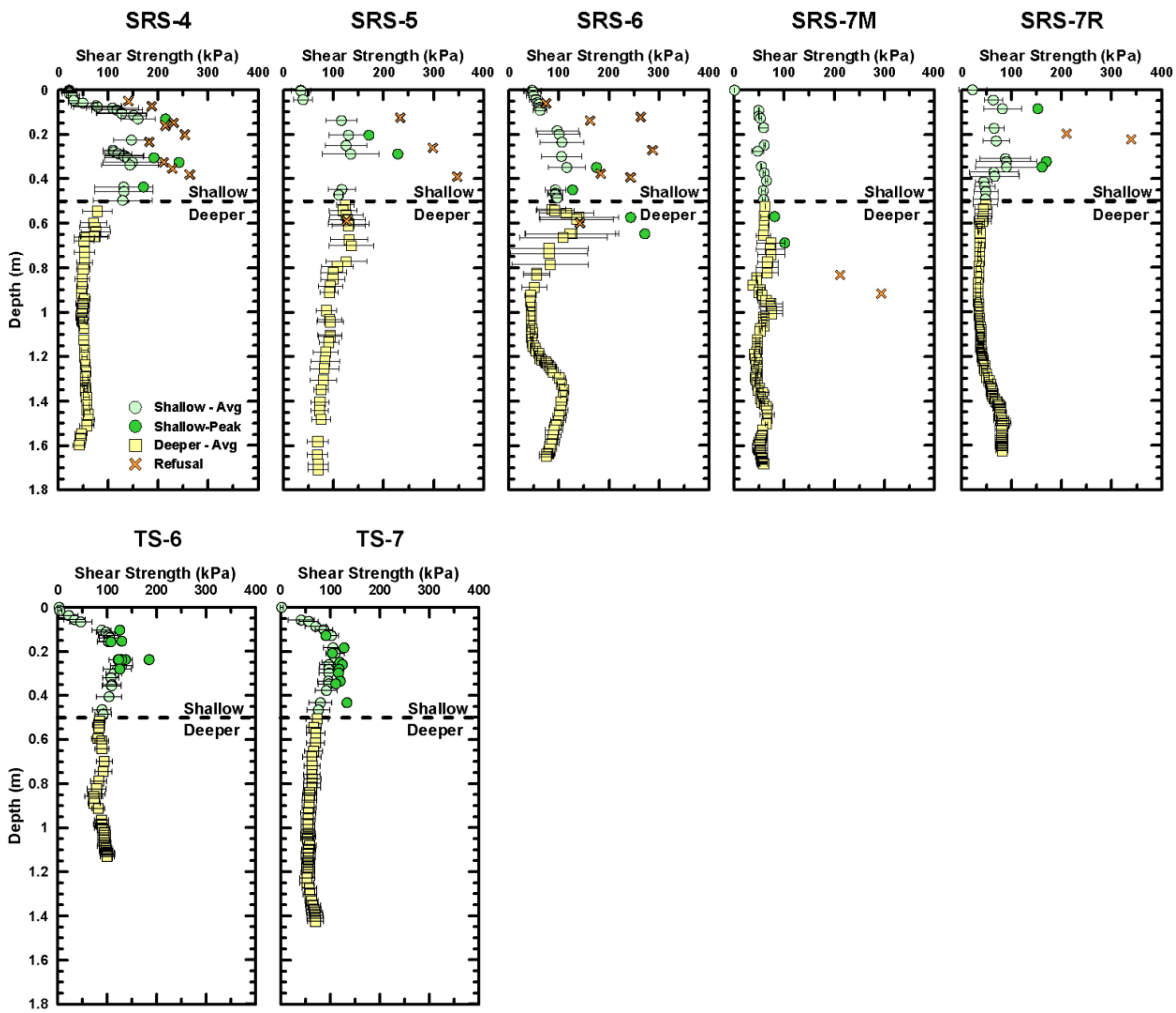

Figure 29. Variation in shear strength with soil depth across FCE mangroves. SRS-7M refers to developed forests at the mouth of Shark River, whereas SRS-7R indicates a regenerated forest patch post-Wilma at the mouth of the estuary.

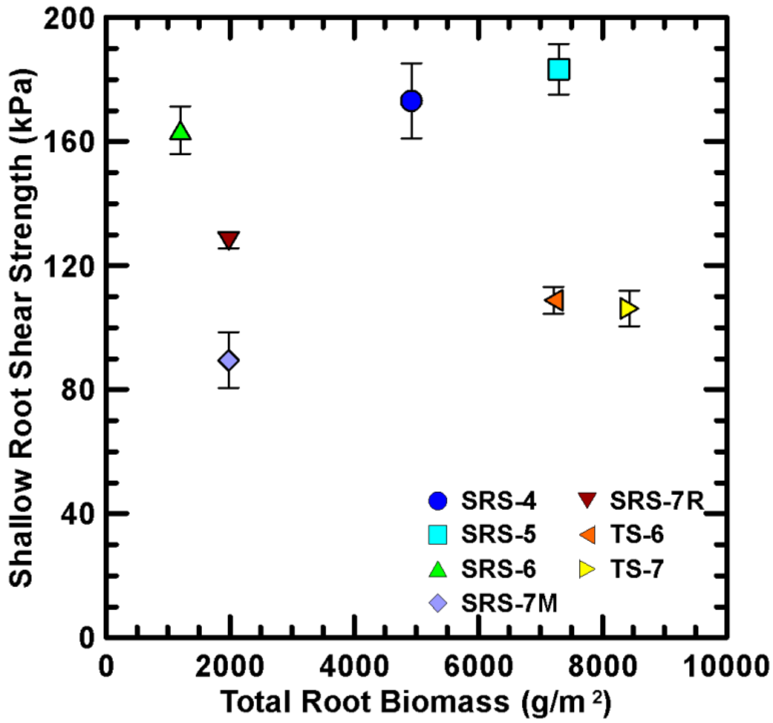

Figure 30. Variation in shear strength with total root biomass in the shallow (0-45 cm depth) root zone across FCE mangroves.

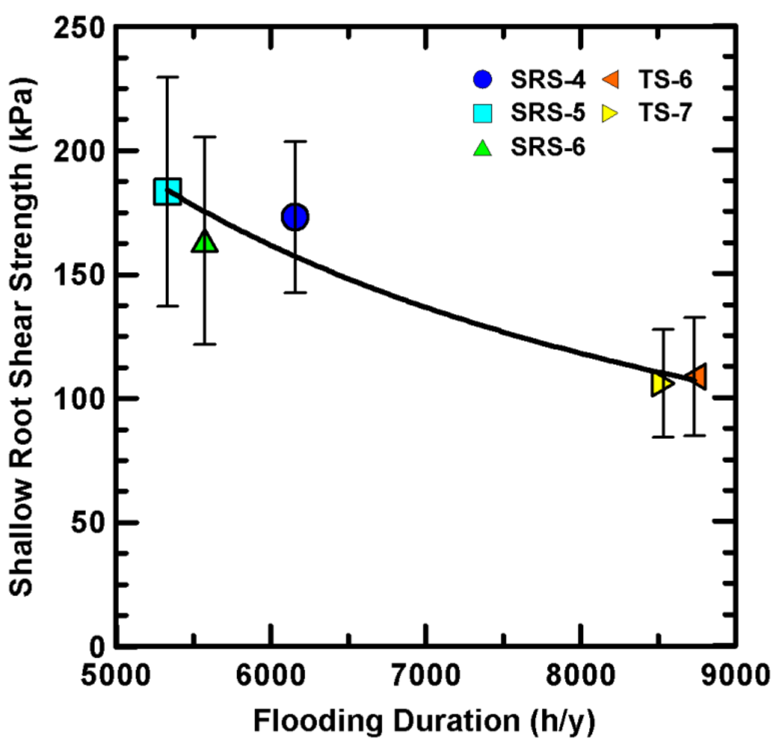

Figure 31. Variation in shear strength of the shallow (0-45 cm depth) root zone with flooding duration across FCE mangroves.

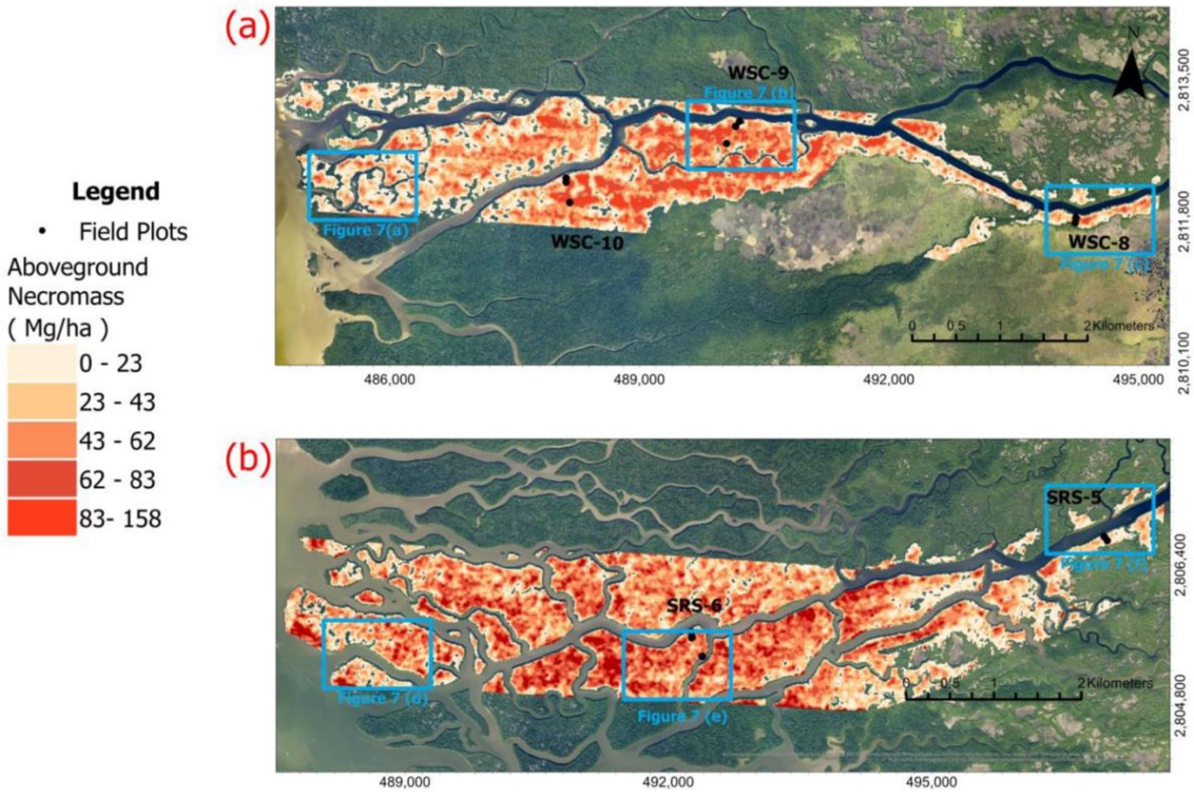

Figure 32. Spatial distribution of mangrove aboveground necromass in the Harney River (a) and the Shark River (b) estuaries in southwestern Everglades after the passage of Hurricane Irma.

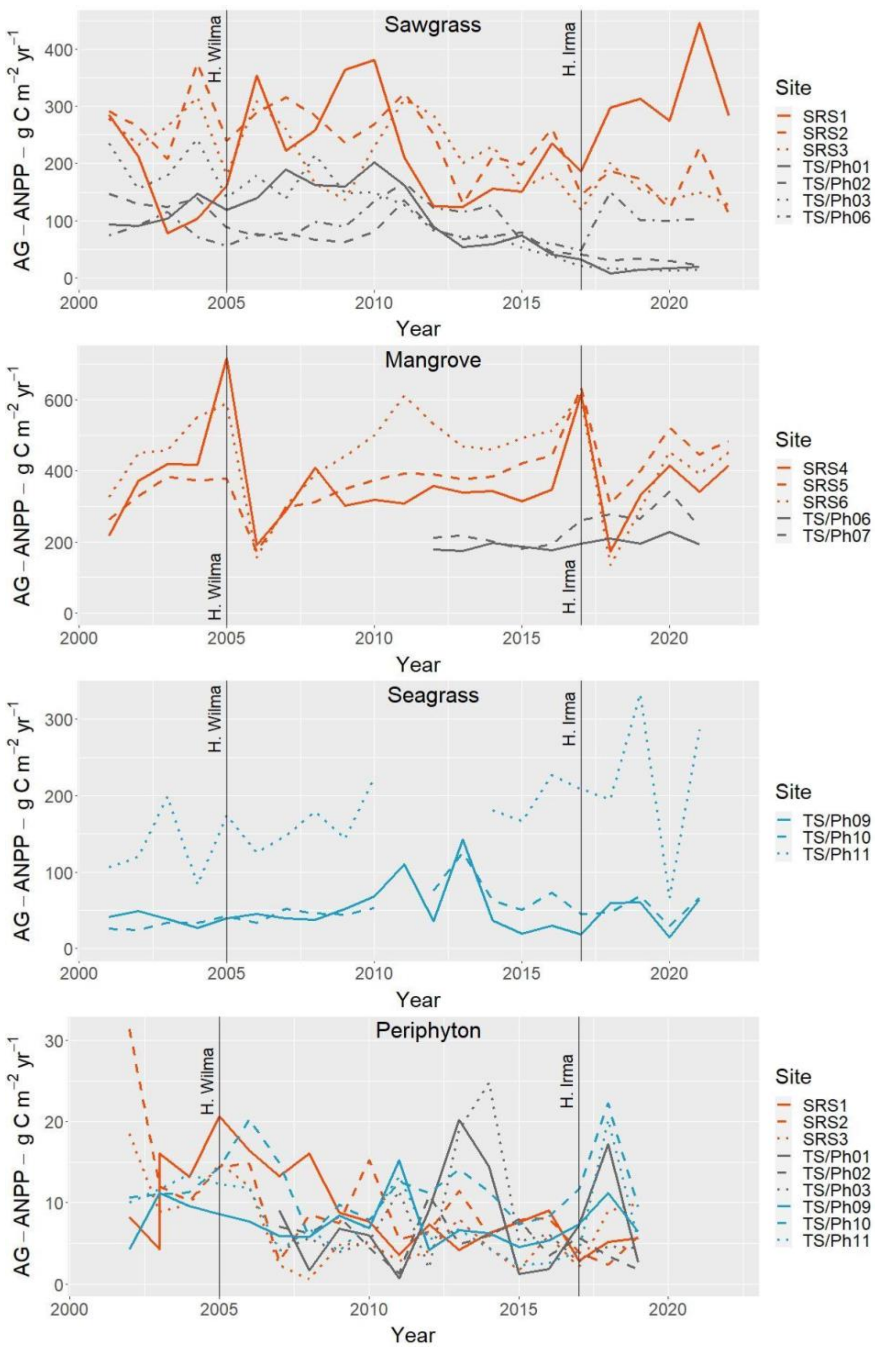

Figure 33. Above-ground productivity in (**A**) sawgrass, (**B**) mangrove, (**C**) seagrass, and (**D**) periphyton across Shark River Slough (SRS; orange lines) and Taylor Slough/Panhandle (TS/Ph; green lines) sites. Sawgrass: Overall higher in SRS than TS/Ph sites. SRS: reduced production towards the coast TS/Ph: Overall reduction except for TS/Ph-6. Mangrove: Strong hurricane disturbance signal (pulse) in SRS with recovery after storm. TS/Ph-7 increases since 2017. Seagrass: Much higher productivity in TS/Ph-11 with increase in variance over time. Periphyton: Significant contribution to organic carbon cycling, extremely pulse-driven, no strong temporal patterns.

Consumers

- FCE food webs relied more on green energy channels during both seasons and most sites showed evidence of a greening effect and became more reliant on green pathways during the wet season (**Fig. 34**). Two sites, however, TS11 and SRS6 showed the opposite trend and became brown dominated food webs during the wet season.
- Food web browning was found with seagrass die offs in central Florida Bay (Calhoun-Grosch et al. 2023, **Fig. 35**).
- Marsh prey pulses of freshwater sunfishes (*Lepomis* spp.) increase in biomass with longer periods of marsh flooding (Rezek et al. 2023, **Fig. 36**).
- American alligators act as ecosystem engineers, providing hotspots of P availability that transfer up the food web, enhancing food web heterogeneity across the landscape (Strickland et al. 2023).
- Prey contribute more to nutrient budgets via excretion, whereas larger-bodied consumers, including nonnatives play a greater role in bioturbation (Barton et al. 2023, **Fig. 37**). Small species excreted higher proportions of particulate P and N, while the larger species had higher proportions of dissolved nutrients.
- Invasion of swamp eels in TS/Ph produced near-complete loss of four native species (Pintar et al. 2023). Invasion of African jewelfish in Shark River Slough had shorter and smaller magnitude effects.
- The trophic niche of peacock eels, though significantly smaller in volume, almost completely overlaps with that of native sunfishes (*Lepomis* spp.) (**Fig. 38**).
- Juvenile bull sharks have high total mercury and methylmercury concentrations (**Fig. 39**). Concentrations of selenium, total mercury and methylmercury increased as sharks grew, but selenium increased more quickly.

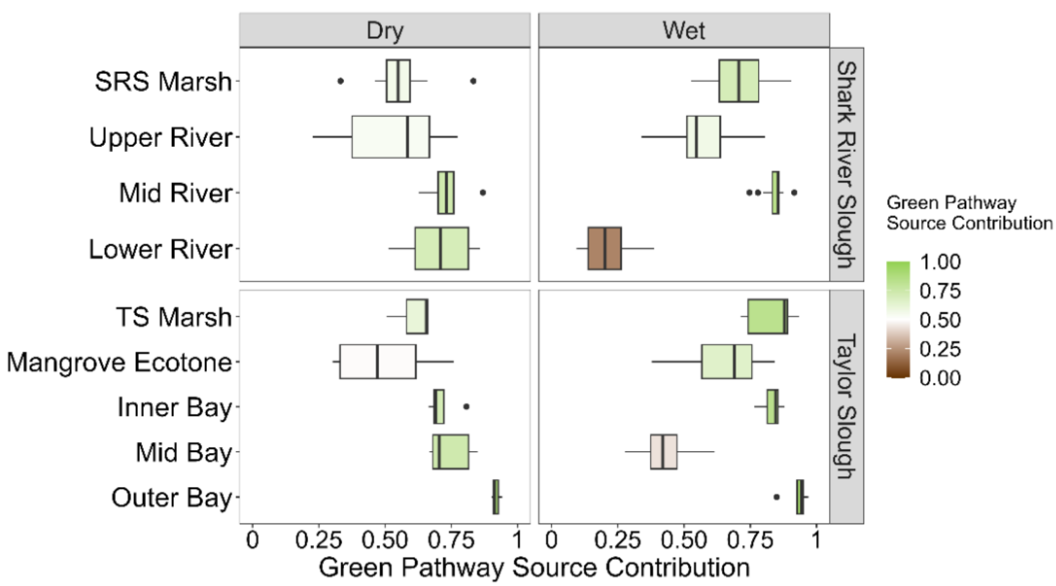

Figure 34. Box plots of the proportional contribution of green energy pathways to aquatic food webs at nine sites during the wet and dry seasons of 2019 for two coastal drainages, Shark River Slough and Taylor Slough.

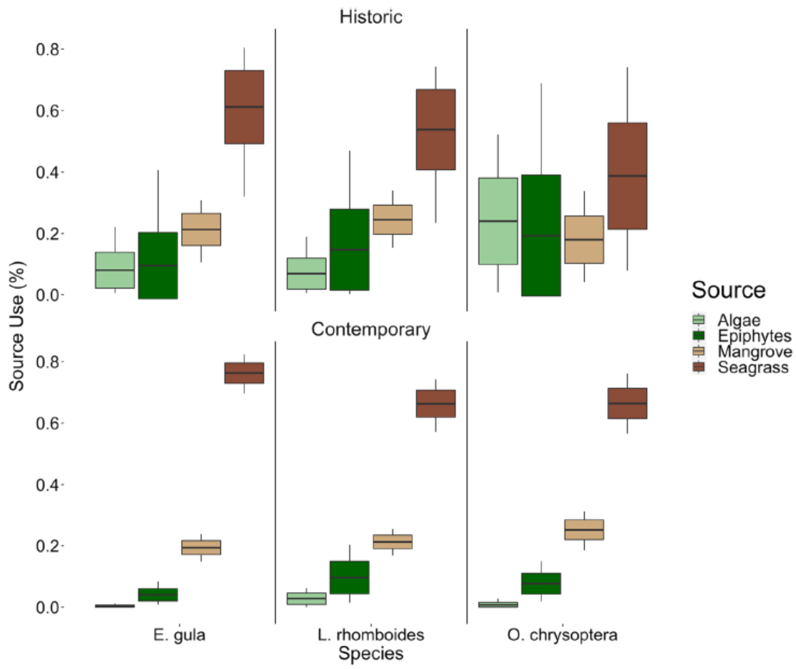

Figure 35. Proportion of primary production use by historic (top) and contemporary (bottom) consumer species in areas affected by seagrass die off in central Florida Bay.

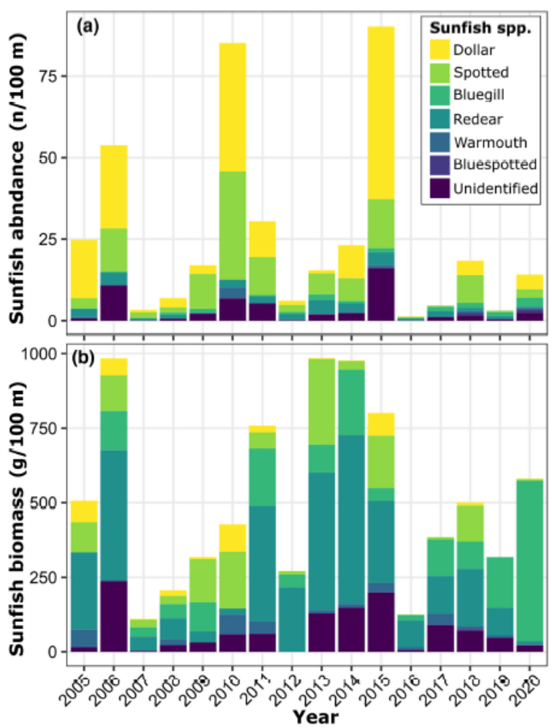

Figure 36. Stacked bar chart indicating the contribution of each sunfish species to total dry season annual peak abundance (a) and biomass (b) per 100 m of river shoreline.

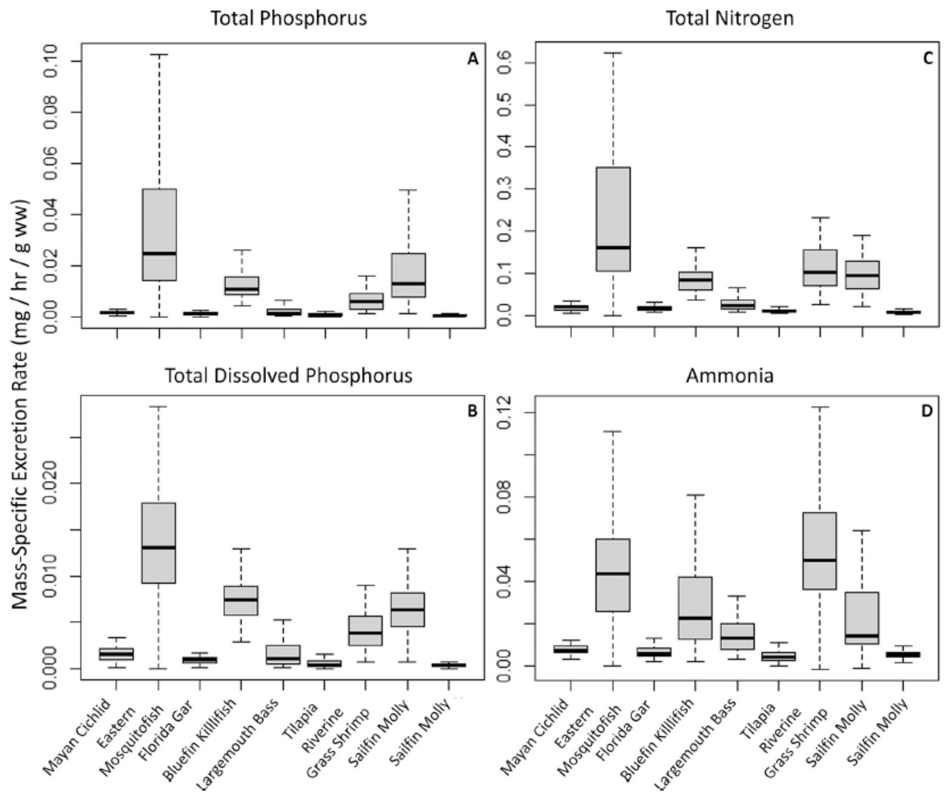

Figure 37. Boxplots of mass-specific excretion rates for each of the nine species for total phosphorus (A), total dissolved phosphorus (B), total nitrogen (C), and ammonia (D). The central black line represents the median, the gray box represents the interquartile range (IQR) with the top and bottom of the box being the 3rd and 1st quartile, and the T-bars represent the IQR*1.5 above and below the 3rd and 1st quartiles, respectively.

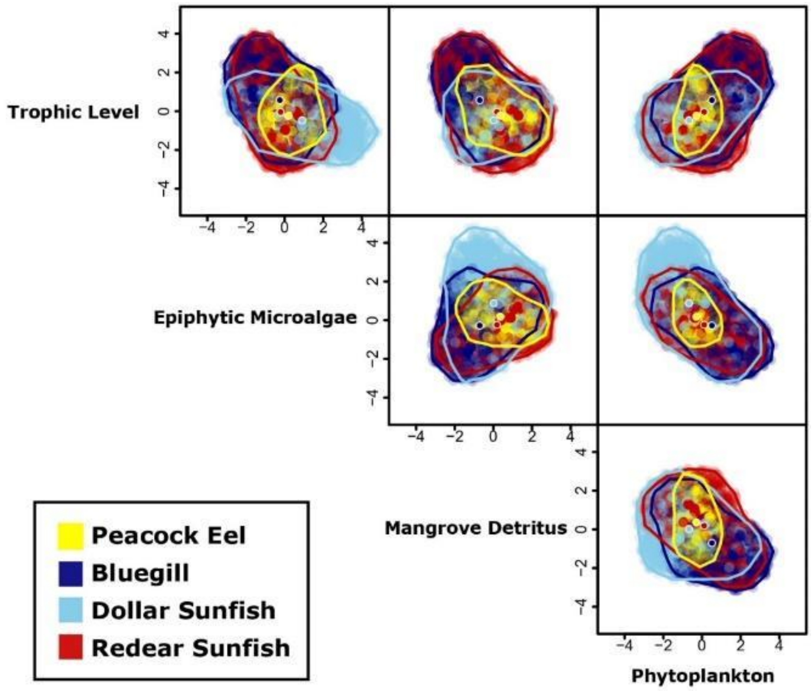

Figure 38. Trophic niche hypervolumes of the invasive Peacock eel (*Macrognathus siamensis*) vs. native Dollar sunfish (*Lepomis marginatus*), Bluegill (*Lepomis macrochirus*), and Redear sunfish (*Lepomis microlophus*) in the SRS ecotone. Axes represent z-scores of estimated dietary contributions (mixing model posterior means) or trophic positions.

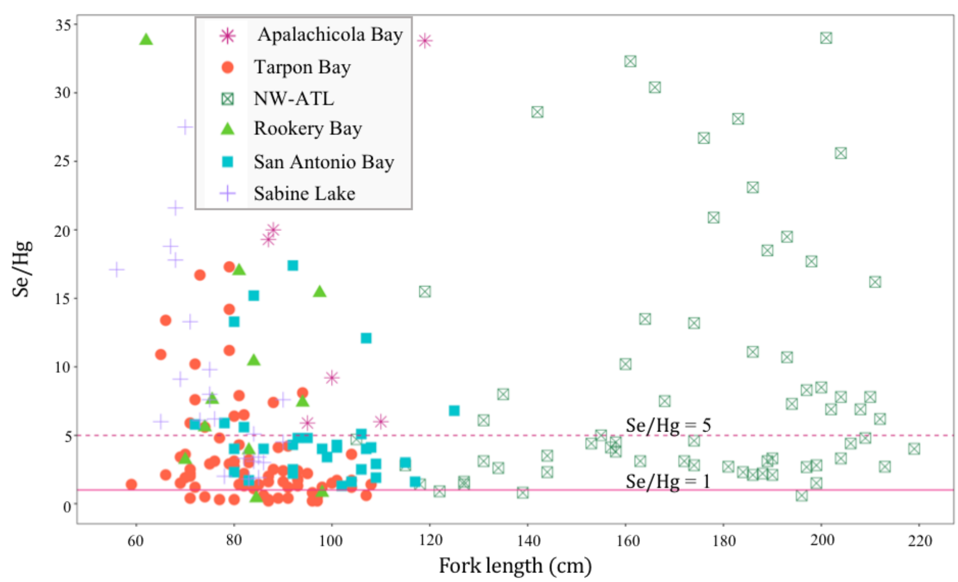

Figure 39. *Selenium to mercury molar ratios.* The solid line indicates a 1:1 selenium (Se) to total mercury (Hg) ratio and dashed lined indicates a 5:1 Se/Hg ratio. Individuals below the 1:1 line are considered to be at higher risk of methylmercury toxicity.

Carbon Fluxes and Ecosystem Trajectories

- NASA BlueFlux campaign (Poulter et al. 2023) conducted multi-scale measurements of CO_2 and CH_4 fluxes. In April 2022, CO_2 uptake and CH_4 emissions across the FCE averaged −4.9 ± 4.7 μmol CO_2 m^{-2} s^{-1} and 19.8 ± 41.1 nmol CH_4 m^{-2} s^{-1}, respectively. When scaled to the region, mangrove CH_4 emissions offset the mangrove CO_2 uptake by about 5% (assuming a 100-year CH_4 global warming potential of 28), leading to total net uptake of 31.8 Tg CO_2-eq y^{-1}. FCE data were critical to a global synthesis relating aquatic CO_2 concentration and ecosystem fluxes in wetlands (**Fig. 40**, Richardson et al. in press).
- The Everglades Landscape Model (ELM) identified spatial variation in peat accretion rates (**Fig. 41**) and Net Organic Matter Carbon Ecosystem Exchange (**Fig. 42**) responding to important ecosystem drivers.

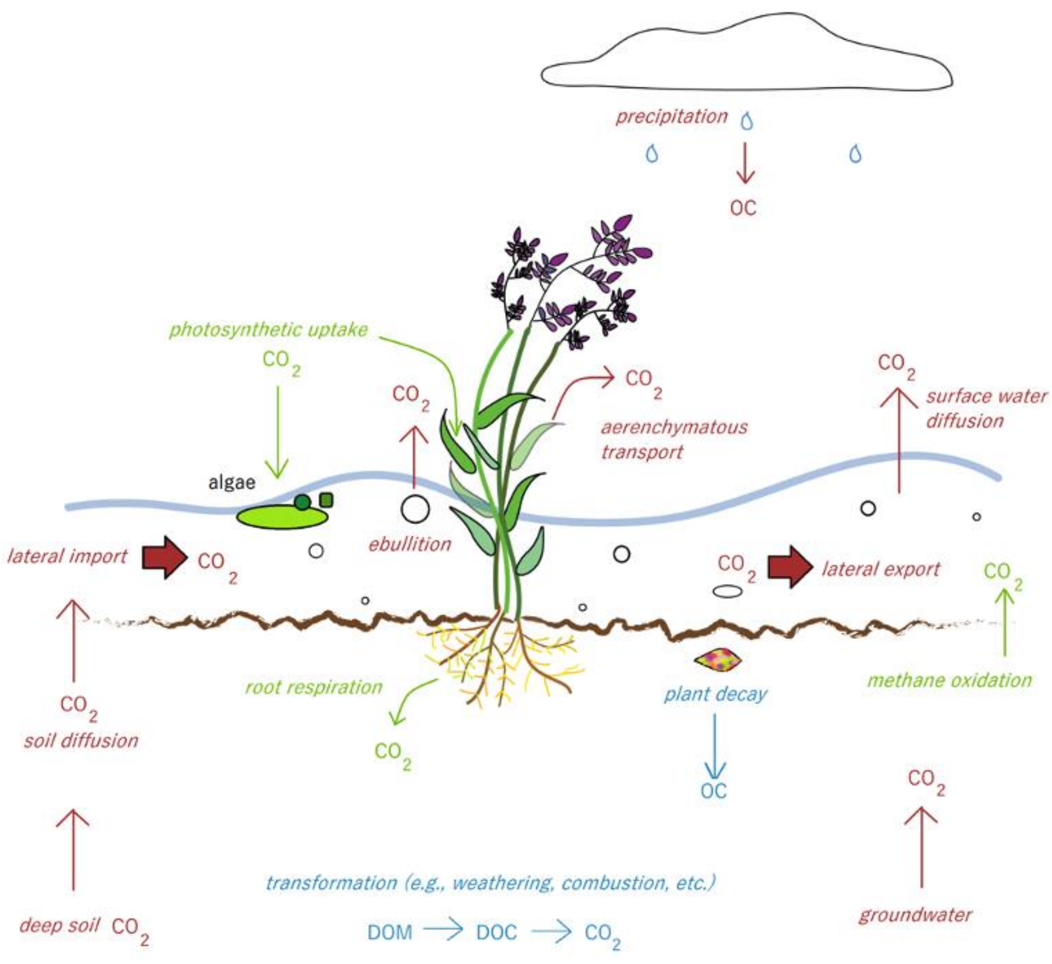

Figure 40. Illustration of various contributions to lateral and vertical CO2 wetland flux between soil, water, and air. Chemical processes are in blue; physical processes in red; biological processes in green. DOM stands for dissolved organic matter. (Source: Richardson et al. in press)

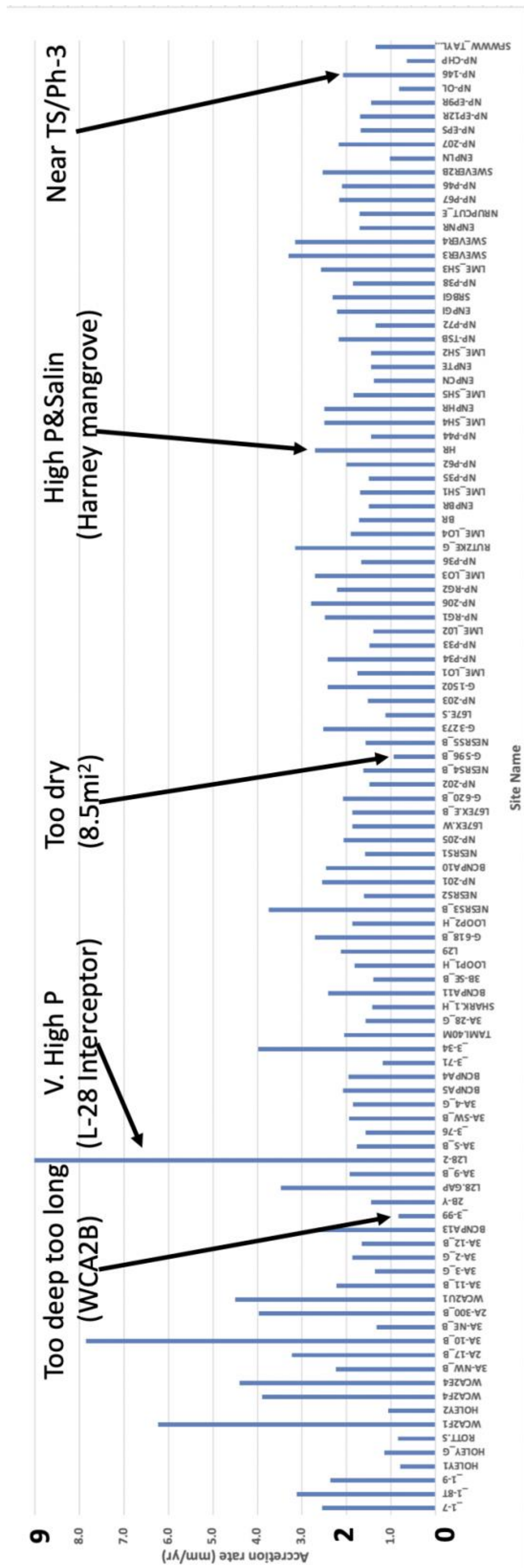

Figure 41. Simulated peat accretion rate in the marsh, 1984-2010. Site order is from NW to SE in regional ELM domain. See Fitz (2023) for maps of stage monitoring sites.

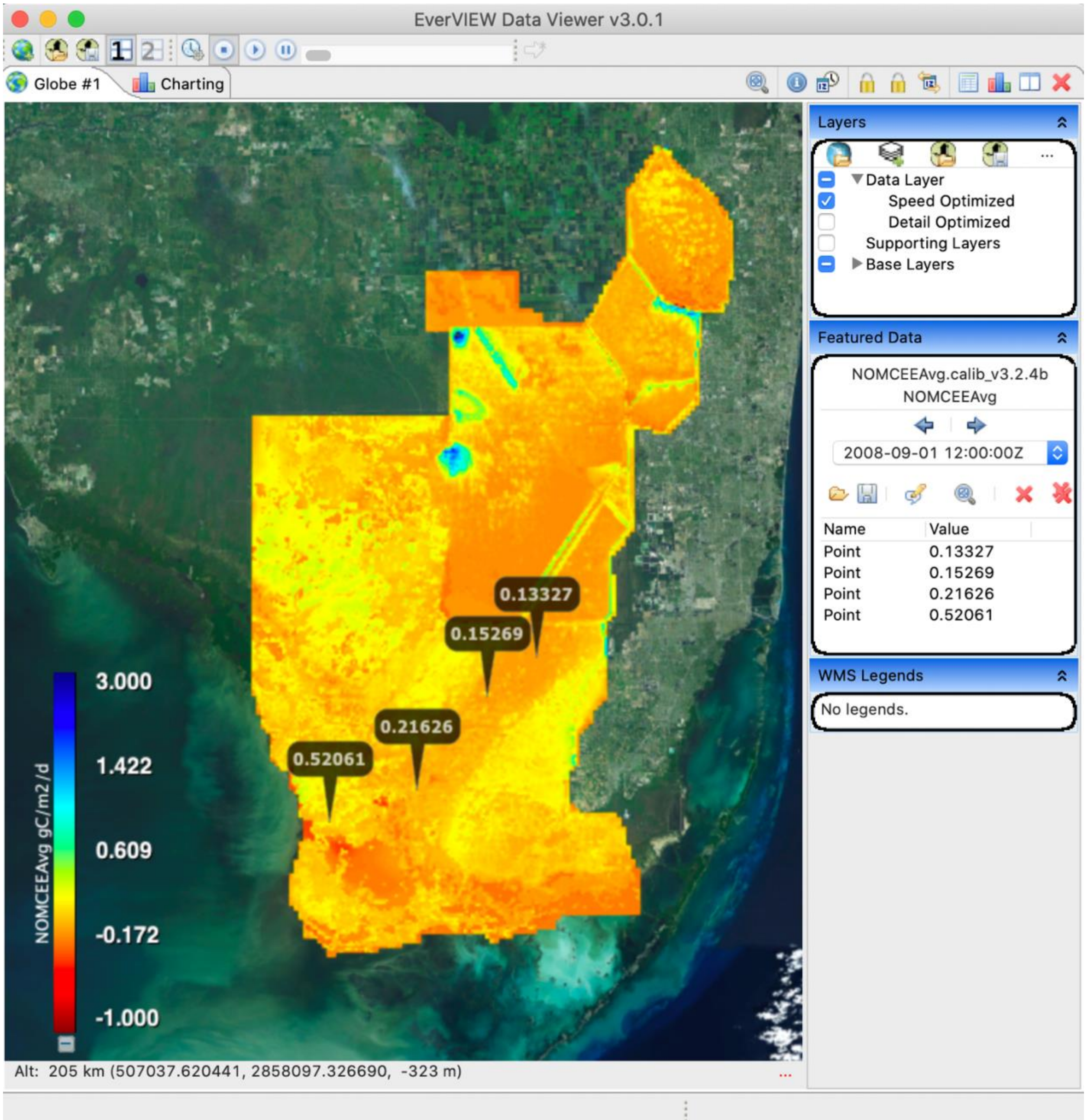

Figure 42. Net Organic Matter Carbon Ecosystem Exchange (NOMCEE), showing a snapshot of the 30-d mean values for Aug 2008 during historical 1984-2010 ELM simulation. Using the EverView software, 4 ad-hoc sites were selected by mouse-clicks, and show the frame's snapshot values for each site. Those individual site locations can be displayed as point time series graphs (not shown here).

Key outcomes or other achievements

Climate Variability & Change

- Our high-resolution climate models allow us to understand long-term and future changes in rainfall that drive freshwater pulses and interact with increases in marine presses and pulses with sea-level rise.

Hydrologic Connectivity

- Sea level rise is accelerating at rates that are detrimental to the FCE ecosystem.
- Total phosphorus in the groundwater and porewaters along Shark Slough increase non-linearly with salinity.
- ICESat-2 and GEDI altimetry data were found to measure water levels in the Everglades with 6-15 cm level of accuracy depending on the vegetation.

SOCIAL LANDSCAPE

Water Governance/Cultural & Economic Values:

- Preliminary explorations of how South Florida residents viewed Lake Okeechobee management
- Developed estimates of benefits over costs of the ongoing Everglades restoration projects under future uncertainty
- Contextualized history and politics of valuation in environmental governance

ECOLOGICAL LANDSCAPE

Vegetation & Geomorphic Gradients

- Our experimental evidence illustrated the mechanisms by which coastal ecosystems remain vegetated and in a carbon accumulating state or lose stored carbon and transition to an open water state given specific thresholds in phosphorus, salinity and duration of inundation. This in turn determines the hydrogeomorphic condition of the ecosystem state which either promotes or reduces peat elevation and provision of ecosystem services in marshes (e.g., Ishtiaq et al. 2022) and mangroves.
- We are using measured SET data to fit the Coastal Wetland Elevation Model (CWEM) to prepare for scenario analyses. Initial model fitting is showing robust results. For instance a ‘non-vegetated’ site in TS/Ph-6 (**Fig. 43**) shows a third of the elevation change rate of a vegetated site in TS/Ph-6 (**Fig. 44**).

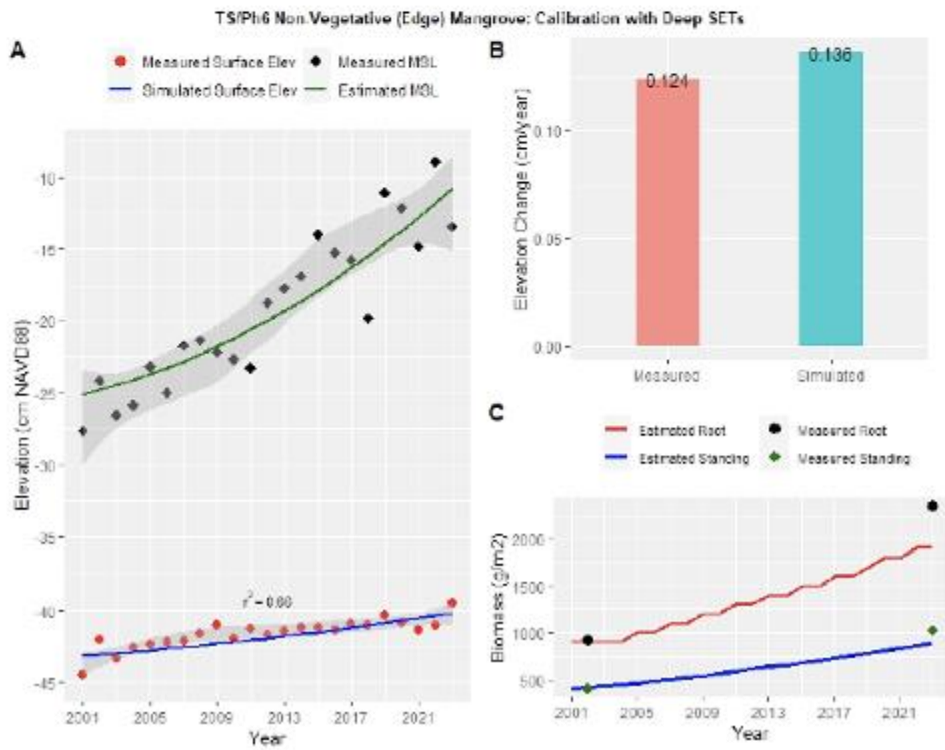

Figure 43. Calibration of the Coastal Wetland Elevation Model (CVEM) with measured SET data at a non-vegetated site at TS/Ph-6.

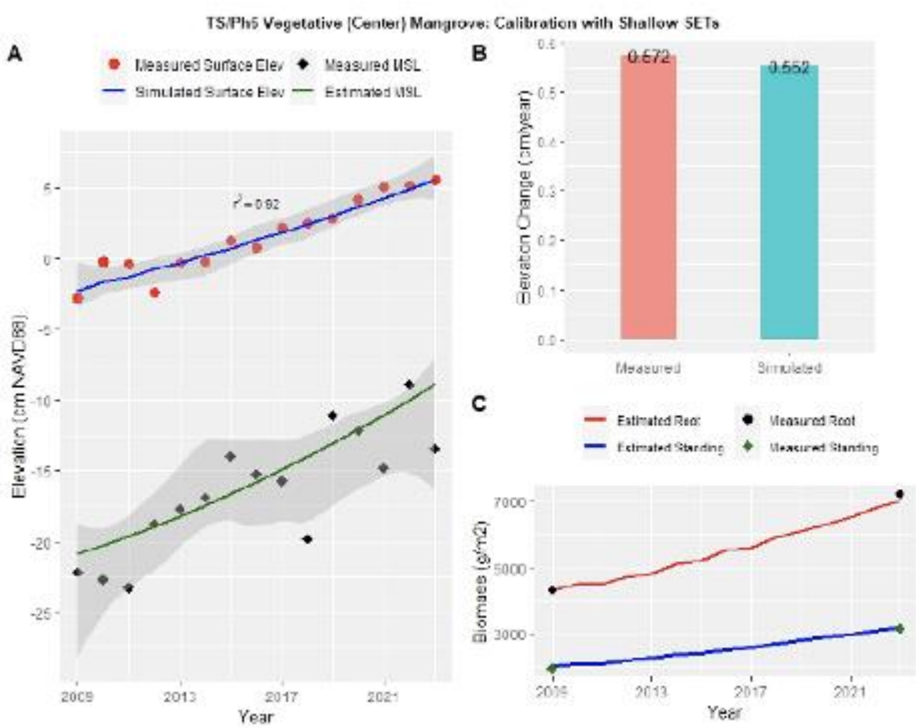

Figure 44. Calibration of the Coastal Wetland Elevation Model (CVEM) with measured SET data at a vegetated site at TS/Ph-6.

Ecosystem Structure & Functions

Detritus & Microbes

- Freshwater restoration pulses and tropical storm disturbances are altering the spatiotemporal patterns of dissolved organic carbon (DOC) concentrations, dissolved organic matter (DOM) composition, and processing in coastal wetlands.
- Marl marsh and mangrove wetlands 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.
- Surface water nutrient concentrations predict POC breakdown rates (k) across species, and litter carbon recalcitrance explained k of the slowest decomposing species (*Cladium jamaicense*). Salinity increased k across all species.
- SAR11 ecotypes are more adaptable than previously acknowledged and that proximity and connectivity between habitats with distinct salinity seem to be important factors that can drive these adaptations.

Vegetation

- Periphyton TP < 150 mg L^{-1} indicates oligotrophic conditions.
- Hydrologic restoration is reducing periphyton biomass in marl marshes but oligotrophic diatom taxa are declining where sea water is invading the marsh-mangrove ecotone.
- Long-term mangrove litterfall rates revealed a significant reduction in rates during 2018, but rates have recovered to pre-disturbance rates by 2022.
- AGB C stocks at SRS-6 mangroves have decreased by ~half since 2000 due to Wilma and Irma impacts, with a 39% reduction (35 MgC ha^{-1}) in C stocks post-Irma.
- The distinct C partitioning between above- and belowground root compartments when comparing Shark and Taylor River mangroves, suggest the ecophysiological adaptation of scrub mangroves to allocate more C to roots relative to aboveground compartments as a result of strong P limitation and longer hydroperiods in Taylor River. However, regardless of mangrove ecotype (riverine vs. scrub), most (80-90%) of the ecosystem C pool is stored in the soil at all sites.
- Mean soil shear strength decreased with depth at all sites, with higher values in the shallow root zone compared to the deeper root zone. The higher soil shear strength in the shallow root zone at the riverine mangroves of Shark River is indicative of higher belowground root structure and complexity (i.e., woody roots and debris) in these developed tall forests compared to scrub forests at Taylor River. Indeed, refusal points were only observed at the SRS sites because of the presence of belowground woody roots and debris.
- Long-term changes in hydrologic presses and pulses are shifting productivity of vegetation in response to P subsidies and salinity and water depth stressors, which are collectively increasing over time with restoration and sea-level rise.

Consumers

- Primarily green energy pathways support coastal FCE food webs.
- Disturbance events, however, such as seagrass die offs, can result in food web browning.
- Marsh prey pulses into coastal habitats are larger in magnitude in years of prolonged marsh flooding.
- Consumer habitat use results in hotspots of P availability that promote the growth and diversity of producers and small consumers.
- Both small and large bodied consumers can contribute to nutrient cycling in marshes.
- Nonnative fish species are increasing in abundance, with significant trophic overlap with native taxa, and negative effects on native species beginning to be documented.
- Consumers in the Everglades may be exposed to pollutants.

Carbon Fluxes and Ecosystem Trajectories

- Similar to drivers of primary productivity at the ecosystem scale, pCO_2 is strongly positively correlated with air temperature (T_{air}). Monthly average pCO_2 tended to peak towards the middle of the year and was more strongly related to R_{eco} than GPP. R_{eco} may be related to biologically driven pCO_2 in wetlands, but the relationship is site-specific and could be an artifact of differently timed seasonal cycles or other factors. Higher levels of discharge do not consistently alter the relationship between R_{eco} and temperature-normalized pCO_2 (**Fig. 45**, Richardson et al. in press).
- CO_2 uptake and CH_4 emissions across the Everglades National Park averaged −4.9 ± 4.7 μmol CO_2 m^{-2} s^{-1} and 19.8 ± 41.1 nmol CH_4 m^{-2} s^{-1}, respectively. When scaled to the region, mangrove CH_4 emissions offset the mangrove CO_2 uptake by about 5% (assuming a 100 year CH_4 global warming potential of 28), leading to total net uptake of 31.8 Tg CO_2-eq y^{-1} (Poulter et al. 2023).
- Water levels increased at both inland and coastal stations from 1993 to 2021 (**Fig. 46**).
- Across ecosystems, the marl prairie has the largest range in maximum uptake rates at 2.61 μmol CO_2 m^{-2} s^{-1}. The brackish ecotone has the lowest maximum CO_2 uptake rate of any ecosystem at -3.57 (± 0.24 S.E.) μmol mol CO_2 m^{-2} s^{-1}, at the lowest canopy coverage condition observed at that site (25-50%). Across canopy coverage conditions, the coastal mangrove scrub had greater CO_2 uptake rates than the marl prairie. At higher canopy coverage conditions (> 25-50% coverage) the marl prairie had higher uptake rates than the ecotone. C uptake in the ecotone was consistent across coverage conditions (**Fig. 47**).
- The total annual WUE demonstrates a wide range of differences, from less than 0.21 g C kg H2O -1 in a semiarid shrubland in the Chihuahuan Desert in Arizona to greater than 33 g C kg H_2O in the boreal forests in Alaska. WUE and SPEI are widely variable, with the highest and lowest SPEI generally corresponding in semi-arid regions (**Fig. 48**).

- As our Florida Bay flux work suggests that lateral fluxes of alkalinity could be a substantial contributor to NEE, we have begun assessing alkalinity along the SRS and TRS transects. Across the landscape and through time, Total Alkalinity varied from ca. 2000 to over 4000 µmol kg^{-1} (**Fig. 49**). Understanding the causes of this variation and the consequences for lateral and vertical C fluxes are a main goal of next year for the flux group.

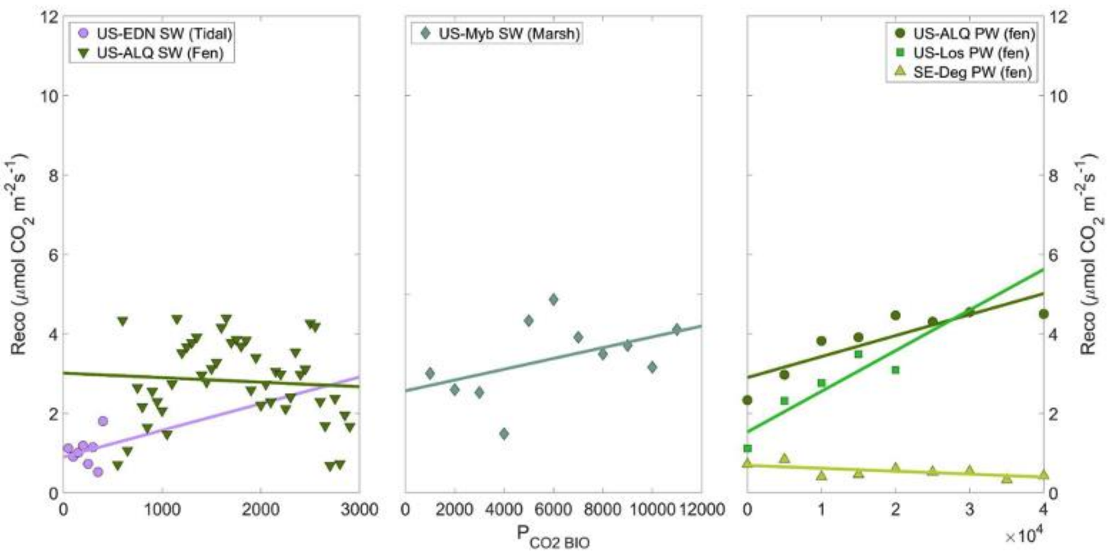

Figure 45. pCO_2 BIO (ppmv) versus Reco in (A) surface water, abbreviated SW, in a tidal wetland and fen bin-averaged every 50 ppmv, (B) nontidal marsh bin-averaged every 1,000 ppmv, and (C) porewater, abbreviated PW, bin-averaged every 5,000 ppmv.Solid lines represent linear fit.

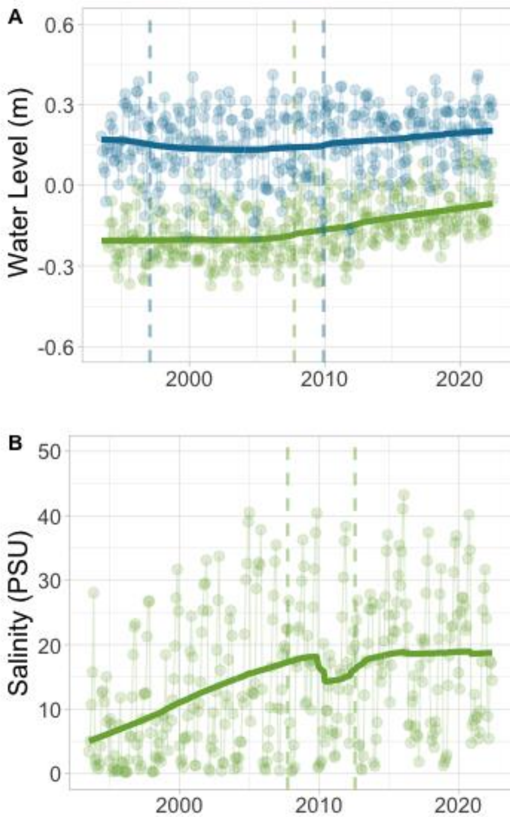

Figure 46. The observed (points) and trend (solid line) in (A) water level for inland (blue; R2 = 0.85) and coastal (green; R2 =0.67) stations and (B) the salinity for the coastal (R2 =0.83) station. The dashed lines represent probable trend change points.

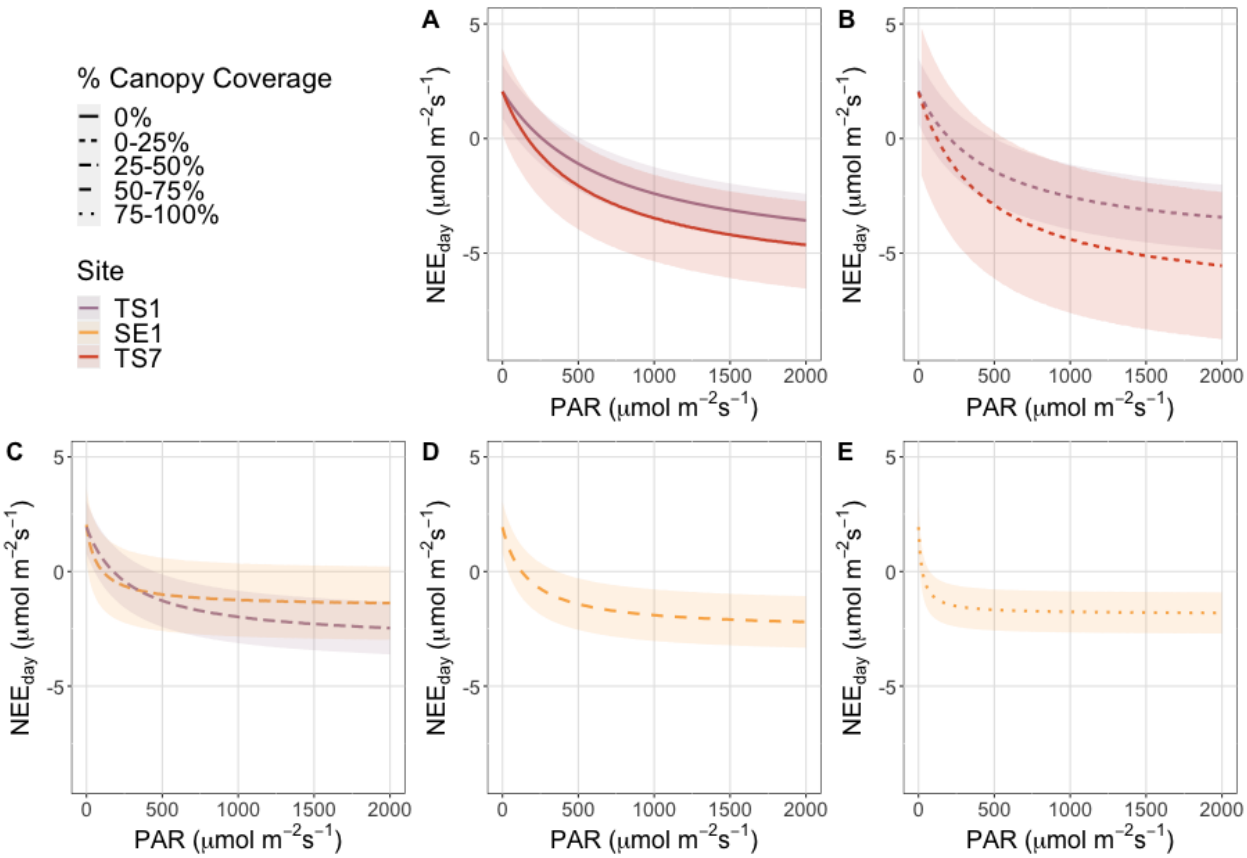

Figure 47. Light response curves under different canopy coverage at 0% (A), 0-25% (B), 25-50% (C), 50-75% (D), and 75-100% (E) coverage for Everglades sites in 2021. Dry conditions (o%) indicate when the water level was at or below the soil surface, all other percentages indicate the proportion of the canopy that was covered by water in each ecosystem.

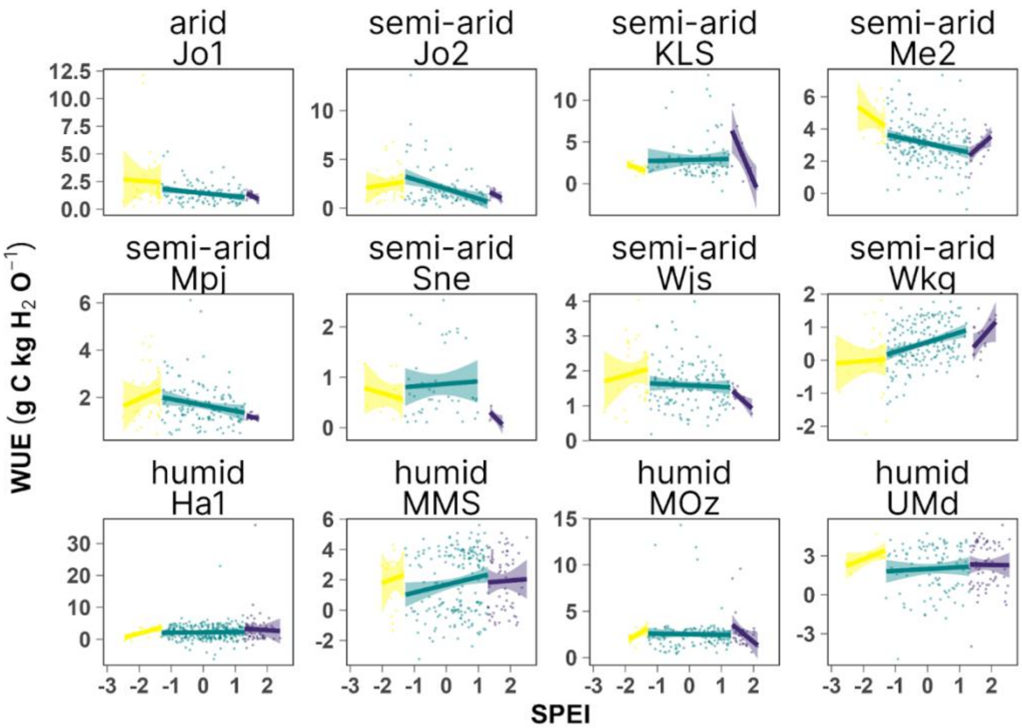

Figure 48. The linear regression of WUE to SPEI for drought, normal, and wet conditions. Shaded areas are the 95% confidence interval.

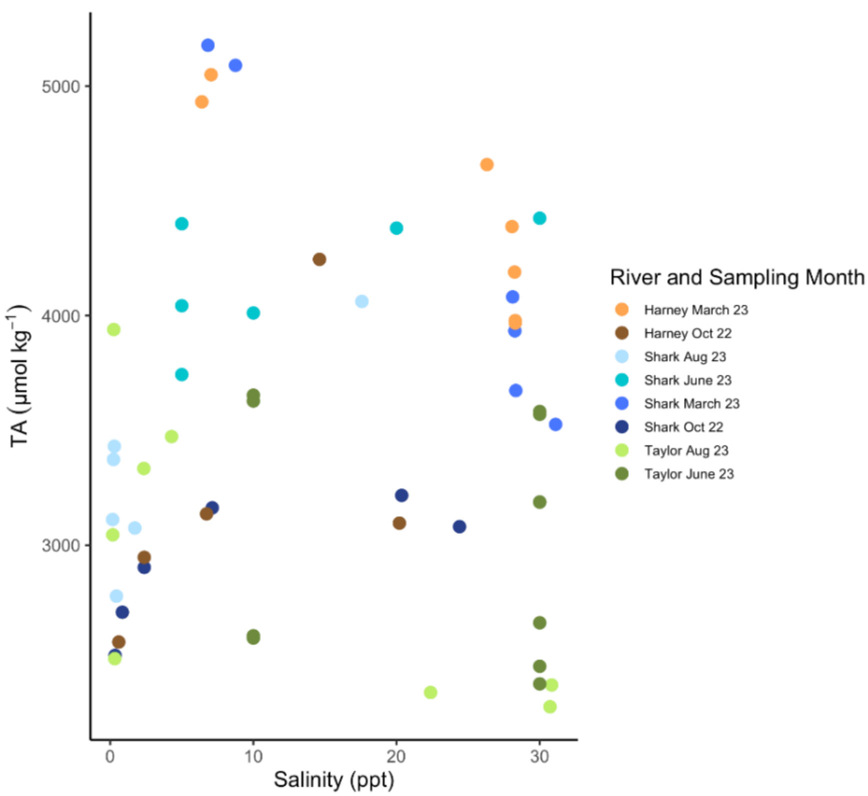

Figure 49. Significant variation in Total Alkalinity (TA) suggests significant creation and consumption of TA in different parts of the FCE landscape.

Opportunities for training and professional development

K-12 Schoolyard Activities
In FCE IV, our Education and Outreach program (EO) is addressing the 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, (2) facilitating the presentation of their findings, and (3) pursuing supplemental sources of funding to support high school and teacher participants.

Mentoring to K-12 students and teachers
Collaborating with the *FIUteach* program and *Everglades Foundation* we are designing and delivering professional development opportunities for teachers through our *Research Experience for Teachers* and the *Everglades Environmental STEM High School Institute (E-STEM).* This year, our researchers helped to launch the *Coastal Ecosystems BIO Research Experience for Teachers Site (RET)-From the Everglades to the Coral Reefs* (NSF #2240593). Working with the Institute of Environment, FIUteach, and the Everglades Foundation we are supporting 44 local teachers over the next three years in coastal Everglades related research projects.

This year's cohort began in May with an RET Alumni panel as an introduction to the program, followed by three days of professional development over the next several weekends. First, the participants met for a day of team building activities, followed by a hike through the Deering Environmental Preserve and a visit to the site of the Cutler Slough Rehydration Project, and airboat tour of Everglades Water Conservation Area 3A with members of the Miccosukee Tribe. Together, these experiences provided a frame of reference to serve as "bookends" that could be used to compare coastal ecosystems in the highly managed, urban setting at the Deering Estate with a more natural setting that is part of the Miccosukee reservation.

The teacher's research experience began in June with a week-long orientation introduction to FCE and our site resources. The teachers visited FCE, FIU's Insitute of Environment, and CREST CAChE (NSF # 2111661) research labs, and met our Information Manager for an introduction to data management. The Everglades Foundation hosted them for *Everglades 101* where they got a crash course on the history and coastal Everglades ecology. Throughout the summer, our researchers led weekly field trips and shared their expertise on a Biscayne Bay boat trawl, working with our marine drones, a mangrove kayak and seagrass snorkeling tour in the Florida Keys, and a visit to the Mote Marine Lab's International Center for Coral Reef Research & Restoration. Additional field trips to the southern Everglades in Everglades National Park with a slough slog, canoeing the northern Everglades in the Loxahatchee National Wildlife Refuge, and a shark tagging trip with our Consumers Working Group were scheduled, but postponed due to excessive heat warnings and have been rescheduled for the cooler winter months.

Since August, the RETs have continued to meet with their Research Mentors, Near Peer (Graduate) Mentors, their cohort, and for professional development. These opportunities are used to discuss scientific papers, plan field collections, reflect, share experiences, and engage their own students in their research.

Facilitating presentations of K-12 findings
Our scientists are mentoring our RETs and working with them and their students on presenting their research at both local and national meetings. In June, they presented their research plans at the *LTER RET Cross Site Exchange*, research updates in July at the *2023 NSF RET Virtual Poster Session,* and then preliminary results in October at the *LTER RET Cross Site Exchange*. Earlier in 2023, RET Amanda Hernandez' students earned a *Superior* ranking that the South Florida Regional Science and Engineering Fair and RET Christina Whelan's students presented their work at the annual FCE All Scientists Meeting. In December, RET Richard Dominguez will present his poster *Creating a New Generation of Real-World Problem Solvers, One RET at a Time* at the American Geophysical Union meeting in San Francisco. Together, our RETs are a productive group and developing a community of practice to support teacher- and student-led presentations of our work.

Pursuing Supplemental Sources of Funding
In addition, we are leveraging the current Schoolyard budget to pursue additional funding sources that will expand existing and implement new programming. In addition to the *Coastal Ecosystem-BIORET Site (CE-BIORETS)*, we are collaborating with researchers at the HJ Andrews Experimental Forest LTER (AND) and the *Authentic research experiences for teachers at Long-Term Ecological Research sites: climate change and biodiversity across ecosystems* BIORET Site (ARETS; NSF# 2147136) on a new proposal *Mechanisms to Optimize Contextualized Science Instruction* (MOCSI) that was submitted in November. If funded, MOCSI will provide support for 32 local teachers with professional development and field experiences at FCE. This work will also: 1) improve our understanding how teachers use contextual information from field experiences and curated multimedia sources in their science instruction and 2) leverage that understanding to optimize both field experiences and online resources that approximate the contextual information available in field settings and mobilize the knowledge between teachers and researchers.

Training of Undergraduates and Early Career Scientists
Our scientists are training and mentoring at all levels of early career scientists, across diverse communities, and are engaging them in all levels of our research. Our group is currently mentoring 1 Postbaccalaureate, 9 Masters, 70 Ph.D. and 15 Post-Doctoral Scientists. Working in collaboration with the CREST Center for Aquatic Chemistry and Environment (CAChE; NSF# 2111661), Coastal Ecosystems REU Site (CE-REU; NSF# 1852123), and the Everglades Foundation, we are leveraging support to provide stipends to a total of 5 graduate and 16 undergraduate students with FCE directly funding 5 graduates and 2 REUs. Additionally, our REUs are included as members of *CE-REU* Site and participate 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 conference. This summer, former RET Lacey Simpson will be joining the team to assist with coordinating the programming between REUs and RETs.

Graduate Students

Our Graduate Student Group has a large and active membership, are engaged in all aspects of our program, and are included as members of our working groups. Each year, they present their work at our annual meetings, assist with the mentoring of new students, teachers, undergraduates, and high school students, and they are mentored in communicating their research results to both the public and scientific audiences. The group currently consists of 81 students distributed across 11 institutions and is governed by a 6-member Executive Board with representatives from both internal and external to FIU. They meet regularly for both professional development and for cohort building experiences. This year, they began meeting for monthly FCE Art Jams and exhibited their work at the *FCE Art Showcase*.

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, 24 of our researchers have been discussed in 46 media events, on 47 calendar days since our last report. This news media has been distributed across 29 local, national, and international media outlets including: *Axios, Jacksonville Today; Miami Herald; Newsweek; Sun Sentinel, and WPLG-Miami.* 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.

Plans to accomplish goals during the next reporting period

Climate Variability & Change

- We will examine how the seasonality of FCE precipitation may change in the future warming scenarios by analyzing outputs from the recently complete CMIP6 effort.
- We will examine the role of enhanced spatial resolution by analyzing the recently released LOCA-2 (Pierce et al. 2023) downscaling project outputs (6km resolution) for the CMIP6 historical and future projections over the FCE domain.
- We will perform very high resolution regional modeling simulations to examine the potential role of urban heat island effects on observed temperature and precipitation trends over the Everglades.

Hydrologic Connectivity

We plan to continue to monitor water levels and rainfall across the FCE. We will 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

We plan to carry out research activities (conducting interviews and participant observation) to 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

- Model spatial expansion pattern relative to hydroperiod and flow considering horizontal connectivity of fresh- and saltwater flow.
- Model biomass as a function of spatial distribution of hydroperiod and connectivity of fresh- and saltwater flow.
- Continue long-term measurements.
- Continue refinement and improvement of modeling outputs to prepare for scenario analyses.

ECOSYSTEM STRUCTURE & FUNCTIONS

Detritus & Microbe

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

Vegetation

- Continue time series analysis of long-term water quality trends and submit manuscript for publication.
- Complete analysis of Hurricane Irma impacts on mangrove structure, biomass, C stocks, and NPP to assess trajectories of recovery post-disturbance.
- Complete analysis of mangrove soil shear strength and root biomass dynamics and submit manuscript for publication.
- Complete long-term analyses of marsh and microbial mat productivities and submit manuscripts for publication.

Consumers

- Continue to track food webs through sampling of functionally representative species at all FCE food web sites.
- Continue the long-term monitoring of bull shark populations via quarterly sampling, mark-recaptures, and tagging with acoustic transmitters.
- Obtain fecal sample biomarkers across wet/dry seasonal variation to get finer scale (species level) information on prey and potential freshwater-mediated prey shifts in consumers.
- Use animal-borne data loggers, environmental monitoring, and active tracking to investigate whether dynamic energy landscapes influence fine-scale movements and activity of bull sharks.

Carbon Fluxes and Ecosystem Trajectories

- Blue Flux (Poulter, Raymond, Malone, Adams-Metayer, Amaral, Barenblitt, Campbell, Charles, Roman-Cuesta, D'Ascanio, Delaria, Doughty, Fatoyinbo, Gewirtzman, Hanisco, Hull, Kawa, Hannun, Lagomasino, Lait, Newman, Rosentreter, Thomas, Vaughn, Wolfe, Xiong, Ying, Zhang): Final field campaign to measure aircraft fluxes for carbon upscaling.
- Malone Disturbance Ecology Lab (Malone, Reed, McLeod, Wagner, Richey, Kotagama, Islam): Measure coastal productivity to understand adaptive management strategies and possible outcomes.
- Freshwater Towers (Starr , Oberbauer, Turner): Measure hydrological drivers of carbon dynamics in freshwater ecosystems.
- Coastal Towers (Malone, Casteneda, Troxler, Oberbauer): Continue to collect data
- Alkalinity (Raymond, Gewirtzman): Samples are being collected and processed.
- Florida Bay towers (Fourqurean, Binder, Castillo and Krause): continue collecting flux data at Bob Allan site and construct and begin flux measurements at the new Rabbit Key Basin tower site, and integrate florida bay tower sites into alkalinity measurement program.

Impacts

Impact on the development of the principal disciplines

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.

FCE research is documenting rare spatially explicit food web dynamics at broad spatial scales and over time. This is greatly improving our understanding of food web function across ecosystem types and of its variability over time.

FCE research is tracking consumer movement over long time scales (> 10 years), which is rare. This is greatly improving our understanding of the drivers of consumer movement, including hard to capture disturbance events.

FCE research is tracking fish communities over long term (20 years) allowing for a detailed understanding of community stability and its drives.

Impact on other disciplines

FCE research is improving our understanding of Everglades ecology and informing management and provides critical supporting information to RECOVER monitoring efforts.

Vorseth and Bhat conducted a Special Session on Social Science Research for the Everglades Restoration, which was held as part of the Greater Everglades Ecosystem Restoration Conference, April 2023. Vorseth and Bhat continued to work on a manuscript on Multi-Criteria Analysis and Analytical Hierarchical Process to include stakeholder preferences in restoration decisions.

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. As the nation's fourth largest university (*n* > 56,000) and largest Hispanic Serving Institution (>60%). The leadership team of FCE is equally diverse with a membership that is 75% underrepresented minority and/or female. 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 are working 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. Our staff has also participated in the NSF workshop *Learning about the ETAP System for REU/RET Programs* and uses it to recruit undergraduates from historically marginalized communities.

Similarly, our RET program targets and recruit teachers from high need schools within Miami Dade County Public Schools (MDCPS). By focusing our recruiting efforts on schools with large, underrepresented populations (URM) and a high percentage of students on Free or Reduced Lunch (FRL), we create opportunities for those that have the most to gain. The current student population impacted by our RETs is 95.5% URM with 62.3% on FRL (Table 1). 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 1. FCE LTER 2022 RETs

BIORET	School	URM %	FRL %
Dr. Gary Yoham Mr. Irvin Arce Ms. Katheen Bravo	MIAMI SHS	98.4	71.8
Mr. Richard Dominguez	WINSTON PARK K-8 CENTER	97.2	52.0
Ms. Diana Ocana	MIAMI SPRINGS MS	98.7	71.5
Mr. Kendric Nixon	FRANK CRAWFORD MARTIN K-8	97.9	57.3
Mr. Nicolas Quintairos	MIAMI PALMETTO SHS	77.4	34.0
Mr. Walfrido Valdes	MIAMI SOUTHRIDGE SHS	97.5	68.4
	AVERAGE	**95.5**	**62.3**
	DISTRICT	**94.0**	**57.1**

In April of 2023 FCE was awarded supplemental funds to host a recent graduate as a Research and Mentoring for Postbaccalaureates (RaMP) participant in the Coastal Connections Program. This one-year pilot program is aimed at training post-baccalaureate students across four US East Coast Long-Term Ecological Research (LTER) sites: Plum Island Ecosystems (PIE), Virginia Coast Reserve (VCR), Georgia Coastal Ecosystems (GCE), and Florida Coastal Everglades (FCE) and part of a broader effort to implement a Collective Impact approach for fostering a diverse and culturally competent workforce in ecology and environmental science.

FCE selected Eric Gomez from a pool of over 40 applicants. The experience with the Bridging Each Applicant's Chances for Higher Education Success (BEACHES) workshop designed to assist underrepresented and first-generation STEM students in applying for graduate degrees in marine, environmental, or geosciences. Mentored by FCE Collaborators Drs. Rolando Santos, Ryan James, and James Nelson, he meets with them weekly and is gaining practical experience with training in the lab, the field, data analysis in R, and scientific writing. He has participated in sampling Trips to GCE, VCR, and PIE LTERs, and also attended the Coastal and Estuarine Research Federation (CERF) 2023 Annual Conference in Portland, OR. He is currently conducting field sampling at each of the coastal LTER sites and will soon begin sample processing and analysis.

Research in the Rehage-Santos Labs is increasing the presentation of underrepresented faculty and student providing research, mentoring and training opportunities.

Water and soil samples collected by the FCE provide opportunities for undergraduates and graduate students in the hydrology group to learn skills in analyzing and interpreting water chemistry data. Many graduate and undergraduate students in the hydrology group are from groups (Hispanic) under-represented in STEM fields. Dr. Price has mentored a number of women toward degrees in the geosciences, a field known for low female representation.

Impact on teaching and educational experiences

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

Members of the Rehage Lab hosted visiting students in grades K-5 on multiple occasions as part of the 2023 Camp Discover program. The program is a partnership through the Frost Science Museum and the Upward Bound RISE program that aims to provide opportunities for low income and educationally disadvantaged students. The goal of the program is to prepare students for higher education and spread scientific literacy.

Members of the Rehage Lab also spoke at the Captains for Clean Water Guide Rendezvous and the FKFGA annual meeting in Fall 2023 to raise awareness on threats to the health of Florida Bay ecosystems and fisheries. These event helps inform local stakeholders with up-to-date information so that they can make informed decisions on the management of fisheries resources.

Impact on information resources that form infrastructure

FCE IM Team
Information Manager Gabriel Kamener and Program Manager Mike Rugge comprise the FCE IM Team. Mike has been with the FCE LTER since its inception. Gabriel has worked for the FCE LTER since 2022.

FCE Databases
The FCE Information Management System (FCE IMS) contains 200 datasets which are available on the FCE LTER's website (https://fcelter.fiu.edu/data/index.html) and in the EDI Data Repository. Three datasets were added and 43 long-term datasets were updated between 03/01/2023 and 11/21/2023. 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 has begun transitioning from FCE's XLSX2EML perl program to the Environmental Data Initiative's ezEML web-based metadata editor to manage updates of long-term datasets and now uses ezEML to create metadata for new datasets. The tool supports datasets with one or more data entities, includes numerous quality checks for both metadata and data, and includes a collaboration feature.

Data Use
Use of FCE LTER data is steady. A manual search of Google Scholar for DOI's from the EDI Data Repository detected 3 papers published since 3/1/2023 that contain 4 citations of FCE LTER datasets, and a citation list from EDI yielded an additional 2 published papers citing 2 FCE LTER datasets in the same time frame. Downloads of FCE datasets suggest that the data are being used more frequently than they are cited. The EDI Repository recorded 35,163 non-robot downloads of FCE datasets between 3/1/2023 and 11/21/2023. Seven datasets had approximately 4,500 downloads apiece, most of which are checksum requests from DataONE. A better estimate of downloads from PASTA is thus approximately 3,142 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. In 2023, G. Kamener gave a presentation on “Preparing data and metadata for publication with ezEML” to the FCE community during one of FCE’s monthly brown bag seminars, hosted an IM workshop for participants in FCE’s Research Experience for Teachers (RET) program, and provided informal training to FCE staff to increase use of reproducible scripted workflows in R to prepare data for publication.

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.
The FCE IM team worked with FCE graduate student James Sturges this year to establish an FCE GitHub organization to serve as a centralized location to track and share project code and documentation.

Other contributions
The FCE IM participated in monthly LTER Network IM Virtual Water Cooler meetings, the Network’s annual Information Managers Committee meeting, and the Earth Science Information Partners July 2023 meeting. The FCE IM also serves on the LTER Information Management Committee’s EML best practices subcommittee, revising best-practices documentation and gathering feedback from the LTER IM community.

Impact on society beyond science and technology

Coproduction with stakeholders in fisheries (South Florida fishing guides) to work together to improve ecosystem and fisheries management.

Products

Publications

Journal Articles

Published

Anderson, K.J., J. Kominoski, A. Nocentini, and S. Hoffman. 2023. Dissolved organic matter in peat and marl marshes vary with nutrient enrichment and restored hydrology. Restoration Ecology DOI: 10.1111/rec.13905.

Anjuman, A., Y. Xiang, G. Liu, and Y. Cai. 2023. Compositional and spectroscopic analysis of dissolved organic matter samples from Everglades periphyton and water. Environmental Science and Pollution Research DOI: 10.1007/s11356-023-29461-1.

Bruhn, A.D., U. Wunsch, C. Osburn, J.C. Rudolph, and C.A. Stedmon. 2023. Lignin phenol quantification from machine learning-assisted decomposition of liquid chromatography-absorbance spectroscopy data. Limnology and Oceanography: Methods 21: 508-528. DOI: 10.1002/lom3.10561

Calhoun-Grosch, S., E.M. Foster, W.R. James, R.O. Santos, J.S. Rehage, and J. Nelson. 2023. Trophic niche metrics reveal long-term shift in Florida Bay food webs. Ecosystems 26: 1183-1194. DOI: 10.1007/s10021-023-00825-5

Chavez, S., S. Wdowinski, D. Lagomasino, E. Castañeda-Moya, T.E. Fatoyinbo, R.P. Moyer, and J.M. Smoak. 2023. Estimating structural damage to mangrove forests using airborne Lidar imagery: Case study of damage induced by the 2017 Hurricane Irma to mangroves in the Florida Everglades, USA. Sensors 23: 6669. DOI: 10.3390/s23156669

Congdon, V.M., M.O. Hall, B. Furman, J.E. Campbell, M.J. Durako, K.L. Goodin, and K.H. Dunton. 2023. Common ecological indicators identify changes in seagrass condition following disturbances in the Gulf of Mexico. Ecological Indicators 156: 111090. DOI: 10.1016/j.ecolind.2023.111090

Flood, P.J., W.F. Loftus, and J.C. Trexler. 2023. Fishes in a seasonally pulsed wetland show spatiotemporal shifts in diet and trophic niche but not shifts in trophic position. Food Webs 34: e00265. DOI: 10.1016/j.fooweb.2022.e00265

Fourqurean, J.W. et al. 2023. Seagrass abundance predicts surficial soil organic carbon stocks across the range of *Thalassia testudinum* in the Western North Atlantic. Estuaries and Coasts 46: 1280-1301. DOI: 10.1007/s12237-023-01210-0

Gann, D., and J.H. Richards. 2023. Scaling of classification systems—effects of class precision on detection accuracy from medium resolution multispectral data. Landscape Ecology 38: 659-687. DOI: 10.1007/s10980-022-01546-1

Gervasi, C.L., M. Karnauskas, A. Rios, R.O. Santos, W.R. James, R. Rezek, and J.S. Rehage. 2023. Rapid approach for assessing an unregulated fishery using a series of data-limited tools. Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science, 15: e10270. DOI: 10.1002/mcf2.10270

James, W.R., V. Bautista, R. Rezek, J.S. Rehage, and R.O. Santos. 2023. 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 106: 349-360. DOI: 10.1007/s10641-022-01319-4

Jordan, D.S., J. Kominoski, S. Servais, and D.K. Mills. 2023. Salinity impacts the functional mcrA and dsrA gene abundances in Everglades marshes. Microorganisms 11: 1180. DOI: 10.3390/microorganisms11051180

Krause, J.R., C. Lopes, S.S. Wilson, J.N. Boyer, H.O. Briceno, and J.W. Fourqurean. 2023. Status and trajectories of soft-bottom benthic communities of the South Florida seascape revealed by 25 years of seagrass and water quality monitoring. Estuaries and Coasts 46: 477-493. DOI: 10.1007/s12237-022-01158-7

Leyva, D., M.U. Tariq, R. Jaffe, F. Saeed, and F.A. Fernandez-Lima. 2023. Description of dissolved organic matter transformational networks at the molecular level. Environmental Science & Technology 57: 2672-2681. DOI: 10.1021/acs.est.2c04715

Parkinson, R., and S. Wdowinski. 2023. A unified conceptual model of coastal response to accelerating sea level rise, Florida, U.S.A. Science of The Total Environment 892: 164448. DOI: 10.1016/j.scitotenv.2023.164448

Pintar, M.R., N.J. Dorn, J. Kline, and J.C. Trexler. 2023. Contrasting invasion histories and effects of three non-native fishes observed with long-term monitoring data. Biological Invasions 25: 3887-3903. DOI: 10.1007/s10530-023-03146-9

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

Poulter, B., F.M. Adams-Metayer, C. Amaral, A. Barenblitt, A. Campbell, S.P. Charles, R.M. Roman-Cuesta, R. D'Ascanio, E. Delaria, C. Doughty, T.E. Fatoyinbo, J. Gewirtzman, T.F. Hanisco, M. Hull, S.R. Kawa, R.A. Hannun, D. Lagomasino, L.R. Lait, S.L. Malone, P.A. Newman, P. Raymond, J.A. Rosentreter, N. Thomas, D. Vaughn, G.M. Wolfe, L. Xiong, Q. Ying, and Z. Zhang. 2023. Multi-scale observations of mangrove blue carbon ecosystem fluxes: The NASA Carbon

Monitoring System BlueFlux field campaign. Environmental Research Letters 18: 075009. DOI: 10.1088/1748-9326/acdae6

Reio, D., R.M. Price, A. Melesse, and M.S. Ross. 2023. Quantification of evapotranspiration and water chemistry in a remediated wetland in Everglades National Park, USA. Water 15: 611. DOI: 10.3390/w15040611

Rezek, R., J. Massie, J. Nelson, R.O. Santos, N. Viadero, W.R. James, R. Boucek, and J.S. Rehage. 2023. The effects of temperature and flooding duration on the structure and magnitude of a floodplain prey subsidy. Freshwater Biology 68: 1518-1529. DOI: 10.1111/fwb.14145

Rezek, R., W.R. James, V. Bautista, I. Zink, J.S. Rehage, and R.O. Santos. 2023. Temporal trends of Biscayne Bay pink shrimp fisheries catch, economic indicators, and potential interactions with South Florida recreational flats fisheries. Environmental Biology of Fishes 106: 361-379. DOI: 10.1007/s10641-022-01314-9

Rodemann, J., W.R. James, J.S. Rehage, H. Baktoft, S.V. Costa, R.D. Ellis, L. Gonzalez, and R.O. Santos. 2023. Residency and fine-scale habitat use of juvenile goliath grouper (*Epinephelus itajara*) in a mangrove nursery. Bulletin of Marine Science 99: 111-118. DOI: 10.5343/bms.2022.0061

Strickland, B.A., P.J. Flood, J. Kline, F.J. Mazzotti, M.R. Heithaus, and J.C. Trexler. 2023. An apex predator engineers wetland food-web heterogeneity through nutrient enrichment and habitat modification. Journal of Animal Ecology 92: 1388-1403. DOI: 10.1111/1365-2656.13939

Wisnoski, N.I., R. Andrade, M.C.N. Castorani, C.P. Catano, A. Compagnoni, T. Lamy, N.K. Lany, L. Marazzi, S. Record, A.C. Smith, C.M. Swan, J.D. Tonkin, N.M. Voelker, P.L. Zarnetske, and E.R. Sokol. 2023. Diversity–stability relationships across organism groups and ecosystem types become decoupled across spatial scales. Ecology DOI: 10.1002/ecy.4136.

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

In Press

Richardson, J.L., A.R. Desai, J. Thom, K. Lindgren, H. Laudon, M. Peichl, M. Nilsson, A. Campeau, J. Järveoja, P. Hawman, D.R. Mishra, D. Smith, B. D'Acunha, S.H. Knox, D. Ng, M.S. Johnson, J. Blackstock, S.L. Malone, S.F. Oberbauer, M. Detto, K.P. Wickland, I. Forbrich, N. Weston, J.K.Y. Hung, C. Edgar, E.S. Euskirchen, S. Bret-Harte, J. Dobkowski, G. Kling, E.S. Kane, P. Badiou, M. Bogard, G. Bohrer, T.

O'Halloran, J. Ritson, A. Arias-Ortiz, D. Baldocchi, P. Oikawa, J. Shahan, and M. Matsumura. In Press. On the relationship between aquatic CO_2 concentration and ecosystem fluxes in some of the world's key wetland types. Wetlands.

Conference Papers and Presentations

Alwakeel, J. 2023. Determining groundwater input, sources and amounts into Everglades estuarine lakes. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 20, 2023.

Anderson, K.J., and J. Kominoski. 2023. Shifting sources and fates of carbon with increasing hydrologic presses and pulses in coastal wetlands. Freshwater Sciences 2023, Brisbane, Australia, June 3, 2023 - June 7, 2023.

Anderson, K.J., J. Kominoski, A. Nocentini, and S. Hoffman. 2023. Peat and marl dissolved organic matter vary among wetlands with nutrient enrichment and restored hydrology. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 19, 2023.

Barrus, N. 2023. Interactive effects of juvenile snail predators and individual growth limit Pomacea paludosa populations. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 18, 2023.

Bernardo, M. 2023. Actually-existing resilience: Mobilizing co- production for problem identification in South Florida environmental governance. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 18, 2023.

Bernardo, M. 2023. Actually-existing resilience: Community-driven innovations and future pathways for environmental governance in Greater Miami. Annual Meeting of the American Association of Geographers, Denver, Colorado, March 27, 2023.

Bhat, M. 2023. Valuing ecosystem services of Everglades restoration: Regional and national policy implications. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 18, 2023.

Bhat, M., M. Chabba, and C. Vorseth. 2023. Common socio-ecological thread as a basis for reaching deep leverage points: The case of Florida Coastal Everglades and Greater Miami, USA. International Society for Ecological Economics, Santa Marta, Colombia, October 26, 2023 - October 28, 2023.

Biswas, H. 2023. Spatial distribution pattern of Rhizophora mangle in Southeast Saline Everglades. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 19, 2023.

Castañeda-Moya, E., D. Lagomasino, J. Kominoski, T. Troxler, and J.P. Sah. 2023. Effects of Hurricane Irma on mangrove forest structure in the Florida Everglades,

USA. Second Mangrove Congress of America, Merida, Mexico, October 10, 2023 - October 24, 2023.

Castañeda-Moya, E., D. Lagomasino, J. Kominoski, T. Troxler, and J.P. Sah. 2023. Hurricane Irma effects on mangrove forest structure in the Florida Everglades, USA. Mangrove Macrobenthos and Management Conference (MMM6), Cartagena, Colombia, July 24, 2023 - July 28, 2023.

Castañeda-Moya, E., V.H. Rivera-Monroy, E. Solohin, and X. Zhao. 2023. Post-hurricane recovery of mangrove forest development in the Florida Coastal Everglades. Coastal and Estuarine Research Federation (CERF) Conference, Portland, Oregon, November 15, 2023.

Castañeda-Moya, E., V.H. Rivera-Monroy, X. Zhao, and E. Solohin. 2023. Hurricane impacts on structural development and carbon dynamics in riverine mangroves of the Florida Everglades. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 19, 2023.

Castillo, N., J.S. Rehage, W.R. James, T. Brodin, R.O. Santos, J. Fick, R. Rezek, D. Cerveny, R. Boucek, A.J. Adams, T. Goldberg, L. Campbell, A. Perez, J. Schmitter-Soto, and J. Lewis. 2023. Understanding pharmaceutical exposure and the potential for effects in marine biota: a survey of bonefish (*Albula vulpes*) across the Caribbean Basin. SETAC North America 44th Annual Meeting, Louisville, Kentucky, November 16, 2023.

Castrillon, K., and M.S. Ross. 2023. Rehydrating an urban forested watershed: tree response to flow during the first decade. Ecological Society of America Annual Meeting 2023, Portland, Oregon, August 8, 2023.

Chen, S., K. Capps, K. Hopkins, R. Hale, J. Kominoski, A. Roy, J. Morse, A. Quick, L. Ortiz Munoz, and C. Rizzie. 2023. Urbanization alters the quantity and quality of dissolved organic matter in subtropical river networks in metropolitan Atlanta, Georgia, USA. Freshwater Sciences 2023, Brisbane, Australia, June 3, 2023 - June 7, 2023.

Cook, B. 2023. Laboratory assessment of sea-level rise effects on mercury methylation in coastal Everglades wetlands. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 19, 2023.

Crowl, T.A. 2023. Back to the future: What do we need to avoid the tipping point. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 20, 2023.

Dorn, N.J. 2023. A novel invasive predator threatening aquatic prey production in the Everglades. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 19, 2023.

E.E. Gaiser. 2023. Unusual features of the Everglades: Signals of restoration success from its smallest creatures. Florida Gulf Coast University Seminar, Ft. Myers, Florida.

Eggenberger, C. 2023. Movement patterns and habitat selection of Common Snook and Atlantic Tarpon in the coastal Everglades. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 18, 2023.

Eggenberger, C., R.O. Santos, T.A. Frankovich, W.R. James, C.J. Madden, and J.S. Rehage. 2023. Environmental variation as driver of Common Snook and Atlantic Tarpon movement strategy selection in the Coastal Everglades. Florida Chapter American Fisheries Society Meeting, St. Augustine, Florida, May 9, 2023.

Eggenberger, C., R.O. Santos, T.A. Frankovich, W.R. James, C.J. Madden, and J.S. Rehage. 2023. Environmental variation as driver of Common Snook and Atlantic Tarpon movement strategy selection in the Coastal Everglades. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 17, 2023 - April 20, 2023.

Fernandez, M. 2023. Flowing water effects on aquatic animal communities: Insights from the Decompartmentalization Physical Model. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 19, 2023.

Flood, P.J., B.A. Strickland, J. Kline, W.F. Loftus, and J.C. Trexler. 2023. Trophic disruption by an invasive species alters spatiotemporal food-web dynamics and energy fluxes. Ecological Society of America Annual Meeting 2023, Portland, Oregon, August 9, 2023.

Gaiser, E.E., J. Kominoski, and T. Troxler. 2023. Long term increases in phosphorus pulses in an oligotrophic wetland undergoing restoration. Freshwater Sciences 2023, Brisbane, Australia, June 5, 2023.

Gaiser, E.E., J. Kominoski, and T. Troxler. 2023. Long term dynamics of phosphorus pulses and their legacies in the Florida Coastal Everglades. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 18, 2023.

Garcia Barcia, L., K.R. Gastrich, G.M. Clementi, B.A. Strickland, P. Matich, K. Zikmanis, S.N. Schoen, P. O'Donnell, J.J. Morris, V. Hagan, K.A. Wilkinson, T.R. Wiley, H. Moncrief-Cox, C.T. Peterson, B. Hamilton, R.D. Grubbs, Y.N. Samara Chacon, Y. Lorenzo, T. Brewer-Tinsl, S. Hemsi, M. Borbolla, E. Babcock, Y. Cai, M.R. Heithaus, and D.D. Chapman. 2023. Spatial and ontogenetic variation in mercury, methylmercury, and selenium accumulation dynamics in bull sharks (*Carcharhinus leucas*) in the Gulf of Mexico. SETAC North America 44th Annual Meeting, Louisville, Kentucky, November 16, 2023.

Gillespie, B., S.L. Malone, S. Oberbauer, T. Troxler, and E. Castañeda-Moya. 2023. Hydro-edaphic conditions can limit carbon sequestration in mangrove dominated blue carbon ecosystems. 2023 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, February 27, 2023.

Goeke, J. 2023. Faunal effects on phosphorus dynamics in the Everglades STAs: Part 2 (surveys and scaling). Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 19, 2023.

Goeke, J., M. Barton, J.C. Trexler, M.I. Cook, S. Newman, and N.J. Dorn. 2023. Fish and phosphorus in a eutrophic wetland: Contrasting bioturbation effects from the species to the ecosystem level. Ecological Society of America Annual Meeting 2023, Portland, Oregon, August 8, 2023.

Grove, K. 2023. Designing value: values of nature and an informational political ecology of restoration ecology. Keynote presentation at Radical Science in the Anthropocene workshop, University of Bergen, Paris, France, April 15, 2023.

Hormiga, S. 2023. Coastal carbon flux: Periphyton contributions and diatom indicators. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 19, 2023.

Hormiga, S., E.E. Gaiser, M.S. Ross, J.W. Fourqurean, and R. Vidales. 2023. Coastal carbon flux: Periphyton contributions and diatom indicators. Coastal and Estuarine Research Federation (CERF) Conference, Portland, Oregon, November 13, 2023.

James, W.R., J. Rodemann, G. Badlowski, V. Bautista, N. Castillo, S.V. Costa, A. Distrubell, C. Eggenberger, L. Kabat, J. Linenfelser, N. Rivas, M. Sandquist, J. Sturges, S. Trabelsi, M. White, J.S. Rehage, and R.O. Santos. 2023. Seasonal variation in trophic niche size and overlap in a seagrass food web. Benthic Ecology Meeting, Miami, Florida, April 29, 2023.

James, W.R., M. Coppola, G. Badlowski, R. Rezek, J.S. Rehage, and R.O. Santos. 2023. Spatiotemporal patterns of seagrass seascape state and stability in South Florida. Coastal and Estuarine Research Federation (CERF) Conference, Portland, Oregon, November 14, 2023.

Kahmann, G. 2023. Population trends and trophic ecology of invasive Peacock Eels (Macrognathus siamensis) in the Florida Everglades. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 18, 2023.

Kahmann, G., J.S. Rehage, J. Massie, J. Nelson, R.O. Santos, N. Viadero, W.R. James, R. Boucek, D. Crane, J. Hutchens, and R. Rezek. 2023. Population trends and trophic ecology of invasive peacock eels (*Macrognathus siamensis*) in the Florida Everglades. Coastal and Estuarine Research Federation (CERF) Conference, Portland, Oregon, November 13, 2023.

Kleindl, P. 2023. The role of benthic periphyton mats in regulating macrophyte communities in a marl prairie wetland. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 19, 2023.

Kominoski, J. 2023. Hurricane Trends: Is it all Doom and Gloom? Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 19, 2023.

Krause, J.R. 2023. Burial flux estimates from sediment cores suggest carbonate production partially offsets blue carbon potential of seagrass meadows across South Florida seascape. ASLO Aquatic Sciences Meeting 2023, Palma de Mallorca, Spain, June 9, 2023.

Krause, J.R., A. Roden, and J.W. Fourqurean. 2023. Climate oscillations drive nutrient availability and seagrass abundance across the South Florida seascape. Coastal and Estuarine Research Federation (CERF) Conference, Portland, Oregon, November 15, 2023.

Lamb-Wotton, L. 2023. Assessing vulnerability of Everglades coastal peat marsh: A framework for local-to-regional scale evaluation. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 19, 2023.

Lamb-Wotton, L., T. Troxler, C. Coronado-Molina, and S.E. Davis. 2023. Hydrogeomorphic condition indicates alternate stable states in a non-tidal, brackish marsh of the Florida Coastal Everglades. Coastal and Estuarine Research Federation (CERF) Conference, Portland, Oregon, November 14, 2023.

Lara, M. 2023. Determining the dominant source(s) of freshwater to a coastal estuary: Biscayne Bay, Florida. Geological Society of America Northeastern and Southeastern Sectional Meeting, Reston, Virginia, March 17, 2023.

Lara, M. 2023. Using geochemical tracers to differentiate freshwater inputs to a coastal estuary. Florida Undergraduate Research Conference, Miami, Florida, February 18, 2023.

Lara, M., and R.M. Price. 2023. Using geochemical tracers to identify freshwater inputs between the dry and wet seasons in a coastal estuary: Biscayne Bay, Florida. Florida International University Undergraduate Research Conference, Miami, Florida, April 4, 2023.

Madden, C.J. 2023. Modeling analysis of algal bloom effects on light and seagrass productivity in Florida Bay. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 19, 2023.

Malone, S.L. 2023. Mangrove forests are an unlikely source of CH_4 to the atmosphere in the subtropical Florida Everglades. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 19, 2023.

Malone, S.L., J.H. Matthes, S. Metzger, C. Florian, and Y. Oh. 2023. Understanding patterns in CH_4 emissions across natural ecosystems. Ecological Society of America Annual Meeting 2023, Portland, Oregon, August 8, 2023.

Malone, S.L., R. Varner, Y. Oh, K.A. Arndt, G. Burba, R. Commane, A.R. Contosta, H. Loescher, G. Starr, and L. Bruhwiler. 2023. Gaps in network infrastructure limit our understanding of biogenic methane emissions across the United States. Blux Flux Team Meeting, Washington DC, September 2023.

Malone, S.L., R. Varner, Y. Oh, K.A. Arndt, G. Burba, R. Commane, A.R. Contosta, H. Loescher, G. Starr, and L. Bruhwiler. 2023. Gaps in network infrastructure limit our understanding of biogenic methane emissions across the United States. ESIIL 2023 Innovation Summit, Boulder, Colorado, May 23, 2023 - May 25, 2023.

Malone, S.L., R. Varner, Y. Oh, K.A. Arndt, G. Burba, R. Commane, A.R. Contosta, H. Loescher, G. Starr, and L. Bruhwiler. 2023. Gaps in network infrastructure limit our understanding of biogenic methane emissions across the United States. European Geophysical Union, Vienna, Austria, April 25, 2023.

Massie, J. 2023. Getting the timing right: Matches and mismatches for consumers and prey subsidies in the Everglades. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 19, 2023.

McLeod, M.G. 2023. Fire history and climate drive patterns in post-fire recovery. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 18, 2023.

Mesa, X. 2023. Environmental heterogeneity and spatial patterns of woody vegetation in the Greater Everglades. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 19, 2023.

Mock, A. 2023. Wet-season hydrology predicts mercury concentrations with effects on breeding success of Cape Sable Seaside Sparrow. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 20, 2023.

Montenegro, K., J. Kominoski, K.R.T. Whelan, and M.C. Prats. 2023. Increasing marine hydrologic connectivity influences physical and biogeochemical processes in coastal mangrove soils. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 20, 2023.

Moore, C. 2023. Coastal community transitions across a salinizing coastal freshwater short- hydroperiod wetland in the Southeastern Everglades: Implications for ecosystem structure and function. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 20, 2023.

Nocentini, A., J. Redwine, E.E. Gaiser, T. Hill, S. Hoffman, J. Kominoski, J.P. Sah, D. Shinde, and D.D. Surratt. 2023. Rehydration drives landscape-scale shifts in wetland vegetation relative to patch-scale effects of chemistry and fire. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 20, 2023.

Onwuka, I. 2023. Particulate and phosphorus dynamics in the water column and sediments of Greater Everglades Ecosystem canals. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 18, 2023.

Ortiz Munoz, L., J. Kominoski, K. Capps, S. Chen, K. Hopkins, R. Hale, J. Morse, A. Quick, C. Rizzie, and A. Roy. 2023. Stormwater infrastructure and seasonal hydrology transform dissolved organic carbon and nutrients in urban coastal waters. Freshwater Sciences 2023, Brisbane, Australia, June 3, 2023 - June 7, 2023.

Paduani, M. 2023. Microplastic sequestration by mangroves in the L-31E flow-way of Biscayne Bay. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 19, 2023.

Paduani, M., and M.S. Ross. 2023. Microplastic sequestration by mangroves and plastic management alternatives in the southeastern Everglades. Ecological Society of America Annual Meeting 2023, Portland, Oregon, August 8, 2023.

Price, R.M. 2023. Hydraulic conductivity of Everglades peats. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 20, 2023.

Pullido, C. 2023. Assessing plant taxonomic and functional diversity along hydrologic gradients: An integrated field and remote sensing approach. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 19, 2023.

Quick, A., A. Roy, R. Hale, K. Capps, K. Hopkins, J. Kominoski, J. Morse, S. Chen, C. Rizzie, and L. Ortiz Munoz. 2023. Spatial and temporal variation in quantity and bioavailability of dissolved organic carbon within a metropolitan area. Freshwater Sciences 2023, Brisbane, Australia, June 3, 2023 - June 7, 2023.

Rehage, J.S. 2023. Temperature and flooding duration mediate the structure of a marsh prey subsidy in the coastal Everglades. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 19, 2023.

Restrepo, V., E. Castañeda-Moya, J. Kominoski, and E. Solohin. 2023. Quantifying post-hurricane regeneration of mangrove species along phosphorus fertility gradients in the Florida Coastal Everglades. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 19, 2023.

Reyes, J. 2023. Landward creek expansion in the Southern Everglades and distribution of halophytic communities. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 19, 2023.

Rezek, R., J. Massie, J. Nelson, R.O. Santos, N. Viadero, W.R. James, R. Boucek, and J.S. Rehage. 2023. Temperature and flooding duration mediate the structure of a floodplain spatial prey subsidy. Coastal and Estuarine Research Federation (CERF) Conference, Portland, Oregon, November 15, 2023.

Richey, A., J. Kominoski, S. Oberbauer, P.C. Olivas, and S.L. Malone. 2023. Hydrologic effects on net ecosystem exchange of CO_2 in the Southeastern Saline Everglades. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 19, 2023.

Rodemann, J. 2023. Multi-scale habitat selection of Spotted Seatrout in an area of seagrass recovery. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 19, 2023.

Ross, M.S. 2023. Dynamics of vegetation composition and diversity during coastal transgression in the C111 Watershed since 1995. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 18, 2023.

Ross, M.S., S. Stoffella, R. Vidales, and P.L. Ruiz. 2023. Dynamics of vegetation composition and diversity during coastal transgression in the C111 watershed since 1995. Ecological Society of America Annual Meeting 2023, Portland, Oregon, August 8, 2023.

Rugemalila, D. 2023. Local and spatial variability in vegetation species composition in relation to environmental heterogeneity in the Everglades Ecosystem. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 19, 2023.

Rugemalila, D., J.P. Sah, S. Stoffella, S. Castaneda, K. Castrillon, B. Constant, J. Heffernan, and M.S. Ross. 2023. Local, spatial, and temporal variability in vegetation species composition in relation to environmental heterogeneity in the Everglades ecosystem. Ecological Society of America Annual Meeting 2023, Portland, Oregon, August 8, 2023.

Sah, J.P. 2023. Long-term vegetation dynamics in Cape Sable Seaside Sparrow habitat: Lessons learned and implications for Everglades restoration. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 20, 2023.

Sah, J.P., C. Pulido, M.S. Ross, S. Stoffella, and R. Vidales. 2023. Effects of hydrologic changes on vegetation and soil characteristics along marl prairie-Slough gradients in

Everglades, Florida. Ecological Society of America Annual Meeting 2023, Portland, Oregon, August 10, 2023.

Santos, R.O. 2023. Shift in trophic niche characteristics of Common Snook and Atlantic Tarpon in Everglades coastal lakes. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 20, 2023.

Santos, R.O., and W.R. James. 2023. Influence of ecosystem state and habitat complexity on trophic dynamics. Coastal and Estuarine Research Federation (CERF) Conference, Portland, Oregon, November 14, 2023.

Santos, R.O., W.R. James, C. Eggenberger, C.J. Madden, and J.S. Rehage. 2023. Testing for overlap in juvenile tarpon and snook resource use: the role of hydrological connectivity and nutrients. Benthic Ecology Meeting, Miami, Florida, April 26, 2023 - April 29, 2023.

Strickland, N.D. 2023. Evaluating the effects of habitat stratification on sampling bias for estimations of aquatic animal populations. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 19, 2023.

Strickland, N.D., D. Gann, and J.C. Trexler. 2023. Evaluating the effects of habitat stratification on sampling bias for estimations of aquatic animal population metrics. Ecological Society of America Annual Meeting 2023, Portland, Oregon, August 8, 2023.

Trexler, J.C. 2023. Illustrating impacts of the boom-and-bust dynamics of African Jewelfish in the Shark River Slough. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 18, 2023.

Troxler, T. 2023. Investigating adaptive capacity of salinizing coastal wetlands in natural and urban environments. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 20, 2023.

Vorseth, C. 2023. Tight lines and survey designs: Estimating the recreational economic value of Lake Okeechobee. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 18, 2023.

Vorseth, C., A. Stainback, and M. Bhat. 2023. Beyond willingness to pay: Social, cultural, ecological, and economic values of an impaired lake in Florida, USA. International Society for Ecological Economics, Santa Marta, Colombia, October 26, 2023 - October 28, 2023.

Vorseth, C., B. Sosa, L. DeVito, and M. Bhat. 2023. Valuing ecosystem services of Everglades restoration: Regional and national policy implications. 2023 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, February 27, 2023.

Wakefield, S. 2023. Anthropocene critical urban theory/practice: Tools for a thawing world. Keynote presentation at Radical Science in the Anthropocene workshop, University of Bergen, Paris, France, April 15, 2023.

Dissertations and Theses

Master's Theses

McLeod, M. Grace. 2023. Fire history and climate drive patterns of post-fire recovery in fire-dependent subtropical upland ecosystems. Master's thesis, Florida International University.

Richey, Amanda. 2023. The effect of water level and salinity on carbon dynamics in a subtropical brackish ecotone wetland. Master's thesis, Florida International University.

Ph.D. Dissertations

Anjuman, Afia. 2023. Characterization of dissolved organic matter percolated from periphyton in Everglades and interaction with mercury. Ph.D. dissertation, Florida International University.

Castillo, Nicholas. 2023. Examining the threat of pharmaceutical contaminants to bonefish (Albula vulpes) throughout South Florida and the Caribbean Basin. Ph.D. dissertation, Florida International University.

Garcia Barcia, Laura. 2023. Investigating mercury and selenium interactions in sharks and shark-derived products to improve health risk assessments. Ph.D. dissertation, Florida International University.

Massie, Jordan. 2023. Patterns and cues in the riverine movements of Common Snook: Investigating the role of environmental variation and disturbance on migrations and resource use in the Florida Everglades. Ph.D. dissertation, Florida International University.

Onwuka, Ikechukwu. 2023. Effects of discharge on water quality and sediments in South Florida's Everglades canals. Ph.D. dissertation, Florida International University.

Rodemann, Jonathan. 2023. How do fish use seascapes: drivers and consequences of spatial patterning of submerged habitats in Florida Bay. Ph.D. dissertation, Florida International University.

Wagner Coello, Helen Urpi. 2023. Citizen science as a gateway for mosquito monitoring in Miami-Dade County households. Ph.D. dissertation, Florida International University.

Other publications

Barton, M. B., J. A. Goeke, N. J. Dorn, M. I. Cook, S. Newman, and J. C. Trexler. 2023. Evaluation of the impact of aquatic- animal excretion on nutrient recycling and retention in stormwater treatment wetlands. Ecological Engineering 197:107104. DOI: 10.1016/j.ecoleng.2023.107104

Hormiga, S. 2022. Caponea caribbea. In Diatoms of North America. Retrieved October 13, 2023, from https://diatoms.org/species/caponea-caribbea.

Johnson, K., Gaiser, E., Tobias, F. 2022. Encyonema silesiacum var. elegans. In Diatoms of North America. Retrieved October 13, 2023, from https://diatoms.org/species/encyonema-silesiacum-var-elegans.

Hormiga, S. 2022. Seminavis eulensteinii. In Diatoms of North America. Retrieved October 13, 2023, from https://diatoms.org/species/seminavis-eulensteinii.

Kleindl, P. 2022. Tetramphora. In Diatoms of North America. Retrieved October 13, 2023, from https://diatoms.org/genera/tetramphora.

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.

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 200 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.

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
Clement, Amy	Faculty
Dorn, Nathan	Faculty
Gann, Daniel	Faculty
Heithaus, Michael	Faculty
Kirtman, Ben	Faculty
Malone, Sparkle	Faculty
Martens-Habben, Willm	Faculty
Nelson, James	Faculty
Oberbauer, Steven	Faculty
Obeysekera, Jayantha	Faculty
Oehm, Nicholas	Faculty
Olivas, Paulo	Faculty

Name	Most Senior Project Role
Osburn, Chris	Faculty
Parkinson, Randy	Faculty
Price, Rene	Faculty
Raymond, Peter	Faculty
Richards, Jennifer	Faculty
Santos, Rolando	Faculty
Simmons, Beth	Faculty
Starr, Gregory	Faculty
Staudhammer, Christina	Faculty
Stingl, Ulrich	Faculty
Troxler, Tiffany	Faculty
Wakefield, Stephanie	Faculty
Wdowinski, Shimon	Faculty
Acevedo Delrio, Santiago	Graduate Student (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)
De Vito, Lauren	Graduate Student (research assistant)
Deprado, Lorenzo	Graduate Student (research assistant)
Distrubell, Andy	Graduate Student (research assistant)
Eggenberger, Cody	Graduate Student (research assistant)
Garcia Barcia, Laura	Graduate Student (research assistant)

Name	Most Senior Project Role
Garriga, Marbelys	Graduate Student (research assistant)
Gewirtzman, Jonathan	Graduate Student (research assistant)
Hormiga, Samantha	Graduate Student (research assistant)
Innocent, Hanna	Graduate Student (research assistant)
King, Jordon	Graduate Student (research assistant)
Kleindl, Paige	Graduate Student (research assistant)
Lamb-Wotton, Luke	Graduate Student (research assistant)
Mcleod, Madeline	Graduate Student (research assistant)
Mesa, Ximena	Graduate Student (research assistant)
Moore, Courtney	Graduate Student (research assistant)
Olivera, Rigoberto	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, Will	Graduate Student (research assistant)
Shannon, Thomas	Graduate Student (research assistant)
Sosa, Brandon	Graduate Student (research assistant)
Stingu, Shanna	Graduate Student (research assistant)
Sturges, James	Graduate Student (research assistant)
Trabelsi, Shakira	Graduate Student (research assistant)
Turner, Jessica	Graduate Student (research assistant)
Vorseth, Chloe	Graduate Student (research assistant)
Wagner, Helen	Graduate Student (research assistant)

Name	Most Senior Project Role
White, Mackenzie	Graduate Student (research assistant)
Wright, Ashli	Graduate Student (research assistant)
Guimar√£es, Beatriz	K-1 Teacher
Hernandez, Amanda	K-1 Teacher
Pavon, Jose	K-1 Teacher
Simpson, Lacey	K-1 Teacher
Valdes, Walfrido	K-1 Teacher
Whelan, Cristina	K-1 Teacher
Daniels, Andre	Other Professional
Gastrich, Kirk	Other Professional
Johnson, Katie	Other Professional
Kamener, Gabriel	Other Professional
Rugge, Michael	Other Professional
Shoemaker, Barclay	Other Professional
Standen, Emily	Other Professional
Tobias, Franco	Other Professional
Travieso, Rafael	Other Professional
Bernardo, Melissa	Postdoctoral (scholar, fellow or other Postdoctoral position)
Charles, Sean	Postdoctoral (scholar, fellow or other Postdoctoral position)
Choi, Change Jae	Postdoctoral (scholar, fellow or other Postdoctoral position)
Gillespie, Breahna	Postdoctoral (scholar, fellow or other Postdoctoral position)

Name	Most Senior Project Role
James, Ryan	Postdoctoral (scholar, fellow or other Postdoctoral position)
Krause, Johannes	Postdoctoral (scholar, fellow or other Postdoctoral position)
Massie, Jordan	Postdoctoral (scholar, fellow or other Postdoctoral position)
Palomino, Sebastian	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)
Ying, Qing	Postdoctoral (scholar, fellow or other Postdoctoral position)
Zhao, Jun	Postdoctoral (scholar, fellow or other Postdoctoral position)
Binder, Benjamin	Staff Scientist (doctoral level)
Fitz, H. Carl	Staff Scientist (doctoral level)
Ishtiaq, Khandkar	Staff Scientist (doctoral level)
Julian, Paul	Staff Scientist (doctoral level)
Poulter, Benjamin	Staff Scientist (doctoral level)
Redwine, Jed	Staff Scientist (doctoral level)
Zhao, Junbin	Staff Scientist (doctoral level)
Dominguez, Gustavo	Technician
Enright, Brooke	Technician
Goldner, Victoria	Technician
Gomez-Gonzalez, Eric	Technician
Heidbreder, Brian	Technician

Name	Most Senior Project Role
Lindo, Evan	Technician
Lundsten, Vanessa	Technician
McCain, Peyton	Technician
Reisa, Caitlin	Technician
Stumpf, Sandro	Technician
Unger, Steven	Technician
Vaz, Malaika	Technician
Barksdale, Graceanne	Undergraduate Student
Battifora, Raquelle	Undergraduate Student
Castillo, Ethan	Undergraduate Student
Dominguez, Sandra	Undergraduate Student
Feliciano, Christopher	Undergraduate Student
Hemsi, Sophia	Undergraduate Student
Jack, Vishal	Undergraduate Student
Lam, Sue-Lin	Undergraduate Student
Lara, Melaney	Undergraduate Student
Mendez, Eber	Undergraduate Student
Ramiz, Brenden	Undergraduate Student
Rodriguez, Colleen	Undergraduate Student
Stinson, Deirdre	Undergraduate Student
Wennstrom, Marina	Undergraduate Student
Bermudez, Christopher	Research Experience for Undergraduates (REU) Participant
Gabb, Mia	Research Experience for Undergraduates (REU) Participant

Collaborating Organizations

Bonefish and Tarpon Trust
Miami, Florida

College of William & Mary
Williamsburg, Virginia

East Carolina University
Greenville, North Carolina

EcoLandMod, Inc.
Fort Pierce, Florida

Everglades National Park
Homestead, Florida

Florida Gulf Coast University
Fort Myers, Florida

Florida State University
Tallahassee, Florida

Georgia Tech
Atlanta, Georgia

Lower Keys Guide Association
Sugarloaf, Florida

Mote Marine Laboratory
Sarasota, Florida

National Audubon Society - Tavernier Science Center
Tavernier, Florida

National Science Foundation
Alexandria, Virginia

North Carolina State University
Raleigh, North Carolina

Oklahoma State University
Stillwater, Oklahoma

The Pennsylvania State University
University Park, Pennsylvania

UNAVCO
Boulder, Colorado

Coastal Carolina University
Conway, South Carolina

The Deering Estate
Miami, Florida

Eckerd College
St. Petersburg, Florida

Everglades Foundation
Palmetto Bay, Florida

Florida Atlantic University
Boca Raton, Florida

Florida Keys Fishing Guide Association
Islamorada, Florida

Georgia Southern University
Statesboro, Georgia

Louisiana State University
Baton Rouge, Louisiana

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

NASA Goddard Space Flight Center
Greenbelt, Maryland

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

National Tropical Botanical Gardens
Coconut Grove, Florida

Oak Ridge National Laboratory
Oak Ridge, Tennessee

Ocean First Foundation
Key Largo, Florida

South Florida Water Management District
West Palm Beach, Florida

University of Alabama
Tuscaloosa, Alabama

University of California, Davis
Davis, California

University of Central Florida
Orlando, Florida

University of Hawaii at Manoa
Honolulu, Hawaii

University of South Carolina
Columbia, South Carolina

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

U.S. Geological Survey
Reston, Virginia

University of California, Los Angeles
Los Angeles, California

University of Florida
Gainesville, Florida

University of Louisiana at Lafayette
Lafayette, Louisiana

University of South Florida
Tampa, Florida

University of Wisconsin
Madison, Wisconsin

Yale University
New Haven, Connecticut

Appendix: FCE LTER Data Packages in the EDI Repository

DOI	Authors	Title
https://doi.org/10.6073/pasta/705982cd2283522fd897664bbd65aef2		NOAA Daily Surface Meteorologic Data at NCDC Everglades Station (ID-082850)(FCE LTER), South Florida from February 1924 to 2017
https://doi.org/10.6073/pasta/38f75cb0611aa740d3b2717c4c06cc75		NOAA Daily Surface Meteorologic Data at NCDC Flamingo Ranger Station (ID-083020) (FCE), South Florida, USA, January 1951 - ongoing
https://doi.org/10.6073/pasta/2b0c8f68ad01dcd49e528ba385d6847d		NOAA Daily Surface Meteorologic Data at NCDC Miami International Airport Station (ID-085663), South Florida, USA, January 1948 - ongoing
https://doi.org/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
https://doi.org/10.6073/pasta/dd507279ead6dab518823bdcafec8071		NOAA Daily Surface Meteorologic Data at NCDC Tavernier Station (ID-088841)(FCE), South Florida from June 1936 to May 2009
https://doi.org/10.6073/pasta/93436a5ebe22529ee014c25e56f5ac11	Briceno, Henry	Surface Water Quality Monitoring Data collected in South Florida Coastal Waters (FCE LTER), Florida, USA, June 1989-ongoing
https://doi.org/10.6073/pasta/3f0e0898e39240fdd350179bef704745	Briceno, Henry	Microbial Sampling from Shark River Slough and Taylor Slough, Everglades National Park, South Florida, USA (FCE LTER), January 2001 - ongoing
https://doi.org/10.6073/pasta/798f9f64020e34a67a6ca325ff83004d	Heithaus, Michael; Matich, Philip; Rosenblatt, Adam	Large consumer isotope values, Shark River Slough, Everglades National Park (FCE LTER), Florida, USA, May 2005 - ongoing

DOI	Authors	Title
https://doi.org/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
https://doi.org/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
https://doi.org/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
https://doi.org/10.6073/pasta/276054adea70428074111409e8231305	Anderson, William	Pond Cypress C-111 Basin, Everglades (FCE), South Florida Dendroisotope Data from 1970 to 2000
https://doi.org/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
https://doi.org/10.6073/pasta/bc7e38fe4b8f5f976f1adb9e6395a8f8	Trexler, Joel	Consumer Stocks: Physical Data from Everglades National Park (FCE), South Florida from February 1996 to April 2008
https://doi.org/10.6073/pasta/b0e2ae3fb140447717b8dd9fdc3f4ac5	Trexler, Joel	Consumer Stocks: Fish Biomass from Everglades National Park (FCE), South Florida from February 2000 to April 2005
https://doi.org/10.6073/pasta/4c6f16f6825cc77204ef76f21e86b75a	Trexler, Joel	Consumer Stocks: Fish Biomass from Everglades National Park (FCE), South Florida from February 1996 to March 2000
https://doi.org/10.6073/pasta/7ff817fdf10aac0ad84a64acd6ca1c95	Trexler, Joel	Consumer Stocks: Wet weights from Everglades National Park (FCE), South Florida from March 2003 to April 2008

DOI	Authors	Title
https://doi.org/10.6073/pasta/573c6fa340a6bad8c462b44425b08d6b	Price, René	Rainfall Stable Isotopes collected at Florida International University-MMC (FCE LTER), Miami, Florida, USA, October 2007 - ongoing
https://doi.org/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
https://doi.org/10.6073/pasta/5ac956aa74367024e592c201e5f72721	Gaiser, Evelyn; Childers, Daniel; Travieso, Rafael	Water Quality Data (Porewater) from the Shark River Slough, Everglades National Park (FCE LTER), Florida, USA, January 2001 - ongoing
https://doi.org/10.6073/pasta/120743e4f3cf757bdcc090b0384c162b	Gaiser, Evelyn; Childers, Daniel; Travieso, Rafael	Sawgrass Above and Below Ground Total Nitrogen and Total Carbon from the Shark River Slough, Everglades National Park (FCE LTER), Florida, USA, September 2002 - ongoing
https://doi.org/10.6073/pasta/8bcc9c9a041dfa943f16db2d77648301	Gaiser, Evelyn; Childers, Daniel; Travieso, Rafael	Sawgrass Above and Below Ground Total Phosphorus from the Shark River Slough, Everglades National Park (FCE LTER), Florida, USA, September 2002 - ongoing
https://doi.org/10.6073/pasta/e2c4fde5c0568398c9d8d107bcf907ec	Gaiser, Evelyn; Childers, Daniel; Travieso, Rafael	Water Quality Data (Extensive) from the Shark River Slough, Everglades National Park (FCE LTER), Florida, USA, October 2000 - ongoing
https://doi.org/10.6073/pasta/29ded9394cc8196632d23aaee58e0422	Gaiser, Evelyn; Childers, Daniel; Travieso, Rafael	Water Quality Data (Grab Samples) from the Shark River Slough, Everglades National Park (FCE LTER), Florida, USA, May 2001 - ongoing
https://doi.org/10.6073/pasta/a4fb94408a8798c99b5c1449c7559582	Troxler, Tiffany	Water Quality Data (Extensive) from the Taylor Slough, Everglades National Park (FCE LTER), Florida, USA, April 1996 - ongoing
https://doi.org/10.6073/pasta/9ce4c3b60f48e7e40d19f7b86d7d384a	Troxler, Tiffany; Childers, Daniel	Water Quality Data (Grab Samples) from the Taylor Slough, Everglades National Park (FCE LTER), Florida, USA, May 2001 - ongoing

DOI	Authors	Title
https://doi.org/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
https://doi.org/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
https://doi.org/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
https://doi.org/10.6073/pasta/1d53e1d8535de6789e9ba53b14926297	Troxler, Tiffany	Water Quality Data (Extensive) from the Taylor Slough, Everglades National Park (FCE LTER), Florida, USA, July 1999 - ongoing
https://doi.org/10.6073/pasta/9c2d7b049da2ab0bdcd3831e610861d1	Troxler, Tiffany	Water Quality Data (Grab Samples) from the Taylor Slough, Everglades National Park (FCE), Florida, USA, September 1999 - ongoing
https://doi.org/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
https://doi.org/10.6073/pasta/7cc54c25287161e7e8ced745ca6c88d0	Troxler, Tiffany; Childers, Daniel	Sawgrass Above and Below Ground Total Phosphorus from the Taylor Slough, Everglades National Park (FCE LTER), Florida, USA, March 2002 - ongoing
https://doi.org/10.6073/pasta/23e4effadfd4e74b2c92579cf8b2e0fc	Troxler, Tiffany; Childers, Daniel	Sawgrass Above and Below Ground Total Nitrogen and Total Carbon from the Taylor Slough, Everglades National Park (FCE LTER), Florida, USA, March 2002 - ongoing
https://doi.org/10.6073/pasta/466cfd25d404131995dcc89ac8b4cb63	Gaiser, Evelyn; Childers, Daniel; Travieso, Rafael	Sawgrass above ground biomass from the Shark River Slough, Everglades National Park (FCE LTER), South Florida, USA, November 2000 - ongoing

DOI	Authors	Title
https://doi.org/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
https://doi.org/10.6073/pasta/468096edabcc03e130f50552d9e80ec3	Troxler, Tiffany; Childers, Daniel	Sawgrass above ground biomass from the Taylor Slough, Everglades National Park (FCE LTER), Florida, USA, August 1999 - ongoing
https://doi.org/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
https://doi.org/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
https://doi.org/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
https://doi.org/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
https://doi.org/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
https://doi.org/10.6073/pasta/e671e454df548a65fbb331745b7f713f	Price, René; Childers, Daniel	Precipitation from the Shark River Slough, Everglades National Park (FCE LTER), South Florida, USA, November 2000 - ongoing
https://doi.org/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

DOI	Authors	Title
https://doi.org/10.6073/pasta/472cfad9e0de0c8a7e4aad4eae84b8bc	Kominoski, John; Price, René; Childers, Daniel	Water Depths and Water Temperatures near Soil Surface from Shark River Slough, Everglades National Park (FCE LTER), Florida, USA, October 2000 - ongoing
https://doi.org/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
https://doi.org/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
https://doi.org/10.6073/pasta/8a627703c9281c7261a5622abb99c768	Troxler, Tiffany; Childers, Daniel	Precipitation from the Taylor Slough, Everglades National Park (FCE LTER), Florida, USA, July 2000 - ongoing
https://doi.org/10.6073/pasta/68651a68e16582c50dda550b471c1a81	Troxler, Tiffany; Childers, Daniel	Water Depths from the Taylor Slough, Everglades National Park (FCE LTER), Florida, USA, August 1999 - ongoing
https://doi.org/10.6073/pasta/b244a3eb610cdfb419088f2ebab00d34	Jaffé, 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
https://doi.org/10.6073/pasta/6d2e26bc8c8cd2322981d22a095ab968	Jaffé, 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)
https://doi.org/10.6073/pasta/1bb7981116c89e6f414964b0a113b294	Jaffé, 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

DOI	Authors	Title
https://doi.org/10.6073/pasta/22916d1d52d8a756020b8c7537b1bd87	Jaffé, 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
https://doi.org/10.6073/pasta/76696c297746734756f827ec748eb20f	Jaffé, 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
https://doi.org/10.6073/pasta/07272b339cff887abca38b8676789a56	Jaffé, 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
https://doi.org/10.6073/pasta/da883a9edecd3c2a2be661531b16a780	Jaffé, 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
https://doi.org/10.6073/pasta/cc9f23891b8bb977eaf5d7eb6f76005f	Jaffé, 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
https://doi.org/10.6073/pasta/f2fe7c89644d4fa89b9d37d12c33031b	Gaiser, Evelyn; Tobias, Franco	Periphyton Productivity from the Shark River Slough and Taylor Slough, Everglades National Park (FCE LTER), South Florida, USA, October 2001 - ongoing
https://doi.org/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

DOI	Authors	Title
https://doi.org/10.6073/pasta/e7898d1958661abfec2910d778cb2991	Gaiser, Evelyn	Periphyton data collected from Northeast Shark Slough, Everglades National Park (FCE LTER) from September 2006 to September 2008
https://doi.org/10.6073/pasta/b3debdca5457a909a4b5087579596073	Gaiser, Evelyn; Tobias, Franco	Periphyton Accumulation Rates from Shark River Slough, Taylor Slough and Florida Bay, Everglades National Park (FCE LTER), South Florida, USA, January 2001 - ongoing
https://doi.org/10.6073/pasta/b9c86dfafc9578cbfe199cf0a6d399e2	Gaiser, Evelyn; Tobias, Franco	Periphyton Biomass Accumulation from the Shark River and Taylor Sloughs, Everglades National Park (FCE LTER), South Florida, USA, January 2003 - ongoing
https://doi.org/10.6073/pasta/576e132c5cfec39bf4b5e266fb83803c	Collado-Vides, Ligia	Macroalgae Production in Florida Bay (FCE LTER), South Florida, USA, May 2007 - April 2023
https://doi.org/10.6073/pasta/3eb132bbb2f6c76ca3059c0264001fa8	Castañeda, Edward; Rivera-Monroy, Victor; Twilley, Robert	Mangrove Forest Growth from the Shark River Slough, Everglades National Park (FCE), South Florida, USA, January 1995 - ongoing
https://doi.org/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
https://doi.org/10.6073/pasta/542c044a50f7081beb454d1314fddff2	Castañeda, 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
https://doi.org/10.6073/pasta/5216fd3249994b4823da387ae23af621	Frankovich, Thomas	Florida Bay Physical Data, Everglades National Park (FCE), South Florida from January 2001 to February 2002
https://doi.org/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

DOI	Authors	Title
https://doi.org/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
https://doi.org/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
https://doi.org/10.6073/pasta/c40d320f5d15fdd36a65ef7a2ef93f17	Smith, Ned	Evaporation Estimates for Long Key C-MAN Weather Station, Florida Bay (FCE) from July 1998 to May 2004
https://doi.org/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
https://doi.org/10.6073/pasta/c0cb8ff0f150e429674ecf0db15bedc5	Saunders, Colin	Radiometric Characteristics of Soil Sediments from Shark River Slough, Everglades National Park (FCE) from 2005 and 2006
https://doi.org/10.6073/pasta/e8f697869b4be3ac9c0cecff377d94d8	Saunders, Colin	Macrofossil Characteristics of Soil from Shark River Slough, Everglades National Park (FCE) from July 2003 to February 2006
https://doi.org/10.6073/pasta/2bcdb06ad4018aac1783c25701fa086b	Saunders, Colin	Isotopic Variation of Soil Macrofossils from Shark River Slough, Everglades National Park (FCE) in December 2004
https://doi.org/10.6073/pasta/cbb5a96608f5080be978be269db8df14	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), Florida, USA, August 2004 - ongoing
https://doi.org/10.6073/pasta/d2a6335ca19ba9f2ac8b279861386d2e	Fourqurean, James	Florida Bay Nutrient Data, Everglades National Park (FCE LTER), Florida, USA, September 2000 - ongoing

DOI	Authors	Title
https://doi.org/10.6073/pasta/f28a680c3e9091487f66491394b4b426	Fourqurean, James	Florida Bay Braun Blanquet, Everglades National Park (FCE LTER), South Florida, USA, September 2000 - ongoing
https://doi.org/10.6073/pasta/26997880d3d74951e5dade8327d9159c	Fourqurean, James	Florida Bay Productivity Data, Everglades National Park (FCE LTER), Florida, USA, September 2000 - ongoing
https://doi.org/10.6073/pasta/f383077338c6dfb450f78a10e0a0dfba	Fourqurean, James	Florida Bay Stable Isotope Data Everglades National Park (FCE LTER), Florida, USA, September 2000 - ongoing
https://doi.org/10.6073/pasta/3b08e9c120d28e705e3c90db0a21875f	Fourqurean, James	Florida Bay Physical Data, Everglades National Park (FCE LTER), Florida, USA, September 2000 - ongoing
https://doi.org/10.6073/pasta/6835c0725b0f24a6c2f860a2290d78d7	Fourqurean, James	Florida Bay Seagrass Canopy Temperature Data, Everglades National Park (FCE LTER), South Florida, USA, September 2000 - ongoing
https://doi.org/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
https://doi.org/10.6073/pasta/f2dea22c72b4ba72fed419f15cbabb60	Price, René	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
https://doi.org/10.6073/pasta/f0a076ef1cdb35abafab8b0b61fde59f	Price, René	Water flow velocity data, Shark River Slough (SRS) near Chekika tree island, Everglades National Park (FCE LTER) from January 2006 to Present
https://doi.org/10.6073/pasta/18c744af8da6cbfb986ff2a2fb20eded	Price, René	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

DOI	Authors	Title
https://doi.org/10.6073/pasta/bdc327b2f493cfd4f51e3820fcbe4a0c	Price, René	Water flow velocity data, Shark River Slough (SRS) near Gumbo Limbo Island, Everglades National Park (FCE) from October 2003 to Present
https://doi.org/10.6073/pasta/fbb12ce7f9595d2b9c6ec6011b9236e1	Price, René	Water flow velocity data, Shark River Slough (SRS) near Satinleaf Island, Everglades National Park (FCE LTER) from July 2003 to December 2005
https://doi.org/10.6073/pasta/06938136601cdd81eb37837b7ea4b5fb	Price, René	Non-continuous TS/Ph7b Weather Tower Data, Everglades National Park (FCE LTER), South Florida from May 2008 to 2017
https://doi.org/10.6073/pasta/d5a224eed0f1bec5b69ce963493d9af1	Price, René	Non-continous meteorological data from Butternut Key Weather Tower, Florida Bay, Everglades National Park (FCE LTER), April 2001 through August 2013
https://doi.org/10.6073/pasta/2b42a17496155b8a7ce2191ae90e193b	Price, René	Groundwater and surface water phosphorus concentrations, Everglades National Park (FCE), South Florida for June, July, August and November 2003
https://doi.org/10.6073/pasta/274fb25dec72d09d8226f147cdfbecb1	Rosenblatt, Adam	Water Temperature measured at Shark River, Everglades National Park (FCE) from October 2007 to August 2008
https://doi.org/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
https://doi.org/10.6073/pasta/a50dd41d188c25bc122deee65c2c73a9	Rosenblatt, Adam	Water Temperature measured at Shark River, Everglades National Park (FCE) from July 2007 to June 2011
https://doi.org/10.6073/pasta/7682f3f1180f6048716b39531328a0b4	Barr, Jordan; Fuentes, Jose; Zieman, Joseph	Radiation measurements at Key Largo Ranger Station, South Florida (FCE) for July 2001

DOI	Authors	Title
https://doi.org/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
https://doi.org/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
https://doi.org/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
https://doi.org/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
https://doi.org/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
https://doi.org/10.6073/pasta/e9498a3ecfd1d497c6b4c266901c9d4b	Frankovich, Thomas	Gastropod Biomass and Densities found at Rabbit Key Basin, Florida Bay (FCE) from March 2000 to April 2001
https://doi.org/10.6073/pasta/2bf2a1f1d9c7904b12b137ba58956203	Frankovich, Thomas	Seagrass Epiphyte Accumulation for Florida Bay, South Florida (FCE) from December 2000 to September 2001
https://doi.org/10.6073/pasta/0d88f0cd8f29d6f227e19050bde91896	Frankovich, Thomas	Mean Seagrass Epiphyte Accumulation for Florida Bay, South Florida (FCE) from December 2000 to September 2001
https://doi.org/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

DOI	Authors	Title
https://doi.org/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
https://doi.org/10.6073/pasta/393fd3bbbd5a520e5cf372483113f2ce	Frankovich, Thomas	Florida Bay, South Florida (FCE) Seagrass Epiphyte Light Transmission from December 2000 to February 2002
https://doi.org/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
https://doi.org/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
https://doi.org/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
https://doi.org/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
https://doi.org/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
https://doi.org/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
https://doi.org/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

DOI	Authors	Title
https://doi.org/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
https://doi.org/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
https://doi.org/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
https://doi.org/10.6073/pasta/bea7dc7f6f3d40065d560d6c8809642e	Castañeda, 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
https://doi.org/10.6073/pasta/4cea140ee7fe0b59d63de5ef089d2c45	Castañeda, 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
https://doi.org/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
https://doi.org/10.6073/pasta/3238e49beee764aacab539c462e3f06b	Castañeda, 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), Florida, USA, December 2000 - ongoing
https://doi.org/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

DOI	Authors	Title
https://doi.org/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
https://doi.org/10.6073/pasta/3938d3bb664d57584afc749c6a768f31	Jaffé, Rudolf	Monthly monitoring fluorescence data for Shark River Slough and Taylor Slough, Everglades National Park (FCE) for October 2004 to February 2014
https://doi.org/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
https://doi.org/10.6073/pasta/6f53efdbf6f9bcb8ea71c5044949f271	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
https://doi.org/10.6073/pasta/1d696e0668ed238469adeaed24dd7bc1	Onsted, Jeff	FCE Redlands 1994 Land Use, Miami-Dade County, South Florida
https://doi.org/10.6073/pasta/ab8e1dea7bc3301919512575093460fc	Onsted, Jeff	FCE Redlands 1998 Land Use, Miami-Dade County, South Florida
https://doi.org/10.6073/pasta/f5831e56dffab52a99bbe8a1a2563b1d	Onsted, Jeff	FCE Redlands 1998 Roads, Miami-Dade County, South Florida
https://doi.org/10.6073/pasta/b7e35d8321a2db2138748b869993dacd	Onsted, Jeff	FCE Redlands 2006 Land Use, Miami-Dade County, South Florida
https://doi.org/10.6073/pasta/c1e2b4bdf4d5a1ad441e69b7417cdfab	Onsted, Jeff	FCE Redlands 2006 Roads, Miami-Dade County, South Florida

DOI	Authors	Title
https://doi.org/10.6073/pasta/54138174a44f11a0000279a7e480b632	Onsted, Jeff	FCE Redlands Flood Zones, Miami-Dade County, South Florida
https://doi.org/10.6073/pasta/b1c64a9c7c616829ace724de8d41785b	Onsted, Jeff	FCE Redlands 2001 Land Use, Miami-Dade County, South Florida
https://doi.org/10.6073/pasta/f0c0fcaaca44b472112745262c372628	Onsted, Jeff	FCE Redlands 2008 Slope Mosaic, Miami-Dade County, South Florida
https://doi.org/10.6073/pasta/e6e6563f64ae6d6aa4cb07b294f1ec95	Onsted, Jeff	FCE Redlands 2001 Zoning, Miami-Dade County, South Florida
https://doi.org/10.6073/pasta/e7856aad78610c7c365cf620f47a5ef5	Onsted, Jeff	FCE Redlands 1994 Land Use, Miami-Dade County, South Florida
https://doi.org/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
https://doi.org/10.6073/pasta/8afc200ae6ff6d9151a9884f0e2ff1a6	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
https://doi.org/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.
https://doi.org/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.

DOI	Authors	Title
https://doi.org/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
https://doi.org/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
https://doi.org/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
https://doi.org/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
https://doi.org/10.6073/pasta/b7679b4c91e75a027ffecc4661b4e2da	Castañeda, Edward; Rivera-Monroy, Victor; Twilley, Robert	Mangrove Litterfall from the Shark River Slough and Taylor Slough, Everglades National Park (FCE), South Florida, USA, January 2001 - ongoing
https://doi.org/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
https://doi.org/10.6073/pasta/dc3a992e2eb71472a89e70f837d3010f	Rehage, Jennifer	Movements of aquatic mesopredators within the Shark River estuary (FCE LTER), Everglades National Park, South Florida, USA, February 2012 - ongoing
https://doi.org/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
https://doi.org/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

DOI	Authors	Title
https://doi.org/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
https://doi.org/10.6073/pasta/6245b948053c5ddf89dfc7576c5231cd	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), Florida, USA, August 2008 - ongoing
https://doi.org/10.6073/pasta/4ad1a469ff103d2e8f0c3971f703ec16	Fourqurean, James; Howard, Jason	Cross Bank Benthic Aboveground Biomass, Everglades National Park (FCE LTER), South Florida from 1983 to 2014
https://doi.org/10.6073/pasta/3a9bb697bbb8295bffdf6031ff1ae644	Fourqurean, James; Howard, Jason	Cross Bank Sediment Characteristics, Everglades National Park (FCE LTER), South Florida from 2014
https://doi.org/10.6073/pasta/756edd5f40dbf69ca478d8c48f6ee6ba	Price, René	Monthly water balance data for southern Taylor Slough Watershed (FCE LTER) from January 2001 to December 2011
https://doi.org/10.6073/pasta/e84cc609ffbc63bb45bd484810e6746b	Jaffé, 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
https://doi.org/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
https://doi.org/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

DOI	Authors	Title
https://doi.org/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
https://doi.org/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
https://doi.org/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
https://doi.org/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
https://doi.org/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
https://doi.org/10.6073/pasta/0edc80f91191e66eea6b4b0ebd407a0d	Coronado, Carlos A; Sklar, Fred	Sediment Elevation Change (SET Method) from Northeastern Florida Bay (FCE) from 1996 to Present
https://doi.org/10.6073/pasta/70cdfca241ed9dffefdb7b3608d20ef1	Trexler, Joel; Sanchez, Jessica	Periphyton Nutritonal Data across the freshwater Everglades (FCE): June 2016-Feb 2017
https://doi.org/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)
https://doi.org/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

DOI	Authors	Title
https://doi.org/10.6073/pasta/94d1f65d4c822af1150bc9e7694e59d1	Yoder, Landon; Roy Chowdhury, Rinku	Institutional Dimensions of Restoring Everglades Water Quality - Interview Notes (FCE), September 2014-July 2015
https://doi.org/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
https://doi.org/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
https://doi.org/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
https://doi.org/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
https://doi.org/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
https://doi.org/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
https://doi.org/10.6073/pasta/5b8516a19f01e4208b669904a320cdee	Pope, Julia; 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

DOI	Authors	Title
https://doi.org/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
https://doi.org/10.6073/pasta/2eb6663175051c21427304e75d0840fb	Castañeda, 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
https://doi.org/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
https://doi.org/10.6073/pasta/a537d1b6a5bb9bf78f008806e606bc3c	Pope, Julia; 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, USA, September 2006 - ongoing
https://doi.org/10.6073/pasta/27f6332609eb1ef6d398c7855855f2e3	Hogan, James A; Castañeda, 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
https://doi.org/10.6073/pasta/27afcea3bab0adc058457705506248f8	Kominoski, John	Saltwater Coastal Carbon Flux Synthesis
https://doi.org/10.6073/pasta/4097433552819a3c6958b5dbd0b8ef86	Kominoski, John Stephen	Freshwater Subtropical Ridge and Slough Wetland Metabolism, South Florida, USA: 2014-2016

DOI	Authors	Title
https://doi.org/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
https://doi.org/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
https://doi.org/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
https://doi.org/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
https://doi.org/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).
https://doi.org/10.6073/pasta/38ed2d0808a8b4c3cb46d8049c4f7d26	Fitz, H. Carl	Everglades Landscape Model (ELM) Code and Documentation
https://doi.org/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
https://doi.org/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
https://doi.org/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

DOI	Authors	Title
https://doi.org/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
https://doi.org/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
https://doi.org/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
https://doi.org/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
https://doi.org/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
https://doi.org/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
https://doi.org/10.6073/pasta/6fe45693ddb454a0e151bd722243de37	Price, René M; Reio, Dillon	Groundwater and surface water chemistry from the Hole-in-the-Donut and nearby Taylor Slough in Everglades National Park, Florida, USA: 2015-2016
https://doi.org/10.6073/pasta/354993e29b6156a47ea629cf75931153	Kominoski, John; Gaiser, Evelyn; Childers, Daniel; Travieso, Rafael	Water Quality Data (Rainfall-driven autosampler) from the Shark River Slough, Everglades National Park (FCE LTER), Florida, USA, June 2003 - ongoing

DOI	Authors	Title
https://doi.org/10.6073/pasta/82c13533b7323a4a7f39934c752f0da0	Rugge, Michael G; Russell, Timothy M	Florida Coastal Everglades LTER Research Sites in Everglades National Park, Florida, USA, January 2003 - ongoing
https://doi.org/10.6073/pasta/3b303590e5f6834661cf9002ec2594f4	Strickland, Bradley; Trexler, Joel; Flood, Peter	Alligator pond food-web sampling in Shark River Slough and Taylor Slough, Everglades National Park, Florida, USA, 2018-2019
https://doi.org/10.6073/pasta/b5038017157f91ef92ff495dde6122b0	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 Contrasting invasion histories and effects of three non-native fishes observed with long-term monitoring data