FLORIDA COASTAL EVERGLADES LTER

FCE V 2025 ANNUAL REPORT

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Mangrove forest, Photo by Anthony Sleiman

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Accomplishments

Major goals of the project

Since 2000, the Florida Coastal Everglades Long Term Ecological Research (FCE LTER) program has discovered how accelerating rates of sea-level rise interact with climate variability and freshwater management to drive gradients of coastal ecosystem production, movement of energy through food webs, and value of ecosystem services to growing human populations. FCE long-term data, experiments, and models have shown how rapid changes from sea-level rise, extreme events, and freshwater flow diversion affect wetland habitats, food webs, above- and below-ground carbon stocks, ecosystem services, and human decisions. The new FCE V will add to this knowledge by integrating disturbance ecology and ecosystem development theories to understand how increases in fresh and marine hydrologic presses and pulses from storms and human decisions impact ecosystem structure, function, services and coastal social-ecological trajectories and resilience. Everglades restoration is increasing seasonal freshwater presses and pulses, and sea-level rise and saltwater intrusion coupled with storms deliver marine presses and pulses, allowing an unprecedented landscape-scale test of the overarching question: **How can increasing climate- and human-driven hydrologic presses and pulses cause disturbance legacies that influence long-term resilience and trajectories of coastal social-ecological systems?** Five predictive themes, seven questions, and hypotheses test (1) how climate variability and water management drive (2) hydrologic presses and pulses, (3) how disturbance legacies can result from hydrologic changes to influence (4) how governance of fresh water and changing values of ecosystem services interact with structural and functional responses in social-ecological landscapes to (5) influence resilience and long-term ecosystem trajectories. Questions will be tested through continued long-term and new data, human dimensions research, landscape experiments, process and landscape-scale modeling and scenarios, and a large suite of collaborative projects sponsored by leveraged funding.

The proposed research expands understanding of disturbance legacies by integrating theories of disturbance ecology and ecosystem development. Social-ecological systems are linked by disturbance, disturbance may change system vulnerability to other environmental drivers, and feedbacks among ecosystems and disturbance drivers can influence resilience and trajectories of ecosystems. The proposed research predicts that freshwater restoration will reduce the effects of sea-level rise on saltwater intrusion (a hydrologic press), and that fresh and marine hydrologic pulses will control resource distribution and long-term trajectories of coastal social-ecological systems and services.

Increasing hydrologic presses and pulses from freshwater restoration, accelerated sea-level rise, and extreme events provide a landscape-scale assessment of resilience. Synthesis efforts will use data from national and international research networks 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:

- We expanded our analysis of precipitation variability and trends across Florida and the southeastern US to investigate the mechanisms contributing to declining March precipitation.

Hydrologic Resources & Stressors:

- Continued collection and analysis of FCE water nutrient, DOC, and salinity data to examine press and pulse patterns with landscape-scale changes in water levels and sources.
- Analysis comparison of methods used to quantify surface water TP.
- We used multi-sensor remote sensing observation to measure water levels and evaluate the quality of the measurements over the Everglades.

Vegetation:

- We continued to collect long-term data on mangrove, freshwater marsh, seagrass and microbial mat productivity.
- We continued to develop high-precision spatially explicit and exhaustive hydrological time-series (5-m spatial resolution and 1-day temporal resolution) to derive water depth and hydroperiod variables at spatial and temporal scales that relate to community-level responses.
- We derived very-high-resolution plant community maps from remotely sensed data to better model spatial dynamics of plant communities across the larger landscape, and to calculate effective distances between communities.
- We modeled various spatial expansion processes of *Rhizophora mangle* into adjacent vegetated and open freshwater prairies and marshes in response to hydrological variables that are related to freshwater delivery and saltwater intrusion driven by sea-level rise.
- We continued modeling the coastal creek dynamics of the Shark-Harney River creek system over the past ~75 years to establish connectivity metrics that affect regional metacommunity dynamics. We then modeled the expansion patterns of riverine mangroves along newly developed creek segments.

- We studied the recovery of mangrove communities after disturbance (tropical storm)
- We continued to collect major plant species' functional trait data along hydrologic gradients in the freshwater prairies and marshes.
- We continued to assemble data sets to model spatially explicit hydrological variables that inform spatial models on plant community transitions and productivity.
- We established an additional seagrass monitoring site at Rabbit Key.
- We contributed Florida Bay seagrass sediment biogeochemistry data to global C stocks and burial rates.
- We used remote sensing observations to detect the extent of mangrove forest damage induced by the 2017 Hurricane Irma throughout the coastal Everglades and monitor mangrove recovery over time.
- We modeled spatial expansion patterns of *Rhizophora mangle* in response to distance from the coast (a proxy for coarse salinity gradient) and the interactions with long-term water depth and hydroperiod. These models will be used to predict future trajectories, and to scale up the relationships of environmental drivers on mangrove productivity.
- We used remote sensing to determine the effects of fire frequency on the resilience of pine forests.

Consumers:

- We continued data collection and animal tagging for long-term datasets that evaluate consumer movements throughout the Everglades (Rehage et al., 2025; EDI).
- We deployed 23 longlines and captured 27 juvenile bull sharks to expand our long-term shark datasets (Heithaus et al., 2023; EDI). We also collected muscle, fin, and blood samples from each shark for stable isotope analysis, building on another long-term dataset for these sharks (Heithaus et al., 2023; EDI). All sharks tagged for animal movement studies were also swabbed for fecal matter analysis to gather taxa-specific dietary information. This was done using 121 samples, 89 using fish primers for DNA metabarcoding and a subset of 32 of the same shark fecal DNA were also run with invertebrate primers for greater resolution of diet.
- We tagged an additional 10 common snook and 10 Florida largemouth bass with internal acoustic telemetry tags as part of our long-term movement data (Rehage et al., 2025; EDI). These tagged fish will allow us to continue to track animal movements, space use and distribution in response to hydroclimatic variation. All tagged animals are fin-clipped providing valuable data to strengthen temporal comparisons of biomarkers such as isotopic tracers.

- We published a new dataset that estimates the nitrogen and phosphorus excretion rates of bass and snook (White et al., 2025; EDI).
- We completed our 7th year of food web sampling, targeting consumer and producer species in marsh, mangrove, and seagrass habitats at 9 FCE LTER sites. Our stable isotope data set associated with this project (Rezek et al., 2024; EDI) reached 2500 rows of data with over 100 unique species or sources of organic matter.
- We continued our long-term electrofishing sampling in SRS (Rehage et al., 2025; EDI) that tracks ecotonal fish community structure, the magnitude of freshwater prey pulses, and the abundance of important fishery species such as common snook and Florida largemouth bass.
- We continued to examine the population dynamics and niche role of invasive fishes, focusing on the dominant invasive fish in the region, peacock eels (*Macrognathus siamensis*). More recent fish invasions focused on Asian swamp eels (*Monopterus albus*).
- Undergraduate students quantified caloric content of native and non-native prey fishes to help us better understand the flow of energy across trophic levels and determine how non-native species alter food web structure. To date this project has processed roughly 70 individual fish for whole body nutrient content.

Detritus & Microbes:

- We analyzed DNA/RNA sequences for floc microbial communities from FCE ridge and slough marshes. A manuscript is in revision.
- We extracted DNA/RNA from surface soils collected from FCE and REMAP sites.
- We manipulated salinity and temperature gradients on soil CO_2 and CH_4 fluxes from all FCE sites.
- We completed a litter decomposition study mixing *Cladium jamaicense* and *Typha* spp. from higher- and lower-P marshes transplanted and incubated in FCE marsh sites to test C loss rates of native and invasive species with different foliar P concentrations in marshes with different environmental P availabilities.

Eco-Geomorphology:

- We continued to monitor long-term water level, sawgrass productivity and salinity along the TS transect and at satellite sites where SETs were established. We continued to monitor SET sites.
- We established the infrastructure, secured the external funding, and hired the team to support the long-term, landscape scale experiment to evaluate adaptive capacity of salinizing marl-forming marshes. We have conducted baseline measurements and preparing for the experimental manipulation.

- We are finalizing revisions on our manuscript focused on application of the Coastal Wetland Equilibrium Model in our mangrove sites to evaluate ecosystem trajectories of wetland elevation and use of long-term mangrove sites for model verification.
- A PhD student is examining landscape scale implications of destabilized salinizing peat marshes with work to explore C loss in benchtop experiments and field assessments.

Social-Ecological Landscape:

- We completed ecosystem service valuation for Lake Okeechobee and the Florida Everglades. Two additional manuscripts are in development: 1) estimating South Florida households' willingness to pay for various ecosystem services associated with Lake Okeechobee management, and 2) the cost-benefit analysis of different restoration alternatives for the Florida Everglades.
- Wakefield published her book *Miami in the Anthropocene* (University of Minnesota Press), which explores how urban planners and residents are building resilience to sea level rise. We held a data visualization workshop. Wakefield, Gann, and postdoc Sarah Bogen began assembling data for creating an initial prototype visualization of the shifting urban development-Everglades dynamic in South Florida over the past 15 years.
- Kevin Grove continued analyzing interview data from Everglades scientists to understand diverse values and conceptions of nature.

Specific Objectives

Climate Variability: Our research over the past year aligns with the goals of FCE V by quantifying how directional climate change and climate variability are altering the exogenous drivers of hydrologic presses and pulses across South Florida. Building on prior analyses documenting wet-season intensification and late dry-season drying, we focused on diagnosing the mechanisms driving observed precipitation changes, particularly the statistically significant decline in March rainfall over the last ~45 years. Using long-term station observations together with gridded precipitation datasets and modern reanalysis products, our objective this year was to determine whether the March drying signal is linked to shifts in large-scale atmospheric circulation and changes in the frequency and precipitation contribution of extratropical weather systems that deliver much of Florida's dry-season rainfall.

In addition, we sought to determine whether long-term warming trends differ systematically between urban and rural environments in South Florida and whether these differences are associated with changes in wet-season rainfall characteristics. Specifically, we aimed to (1) compare trends in daytime maximum and nighttime minimum temperatures at urban and rural sites, (2) assess whether wet-season rainfall frequency and intensity respond differently across early and late wet-season periods, and (3) interpret these patterns in the context of climate-driven presses that may alter the timing and structure of hydrologic connectivity across the Everglades landscape. These objectives directly support FCE V by linking climate change mechanisms to hydrologic processes that influence ecosystem resilience and restoration outcomes.

Hydrologic Resources & Stressors:

- We continued to monitor water levels and rainfall along each of our transects. We developed a space-based multi-sensor for monitoring water level changes in the Everglades (Wdowinski and Palomino, 2025).
- We began quantifying dissolved organic P to characterize organic and inorganic contributions to increasing TP, as well as investigated a comparison on two analytical methods for TP that vary in sensitivity to changes in DOM.
- We characterized variation in DOM (C and nutrient) sources and concentrations using long-term water chemistry measurements along SRS and TS/Ph (Kominoski et al., in revision)

Vegetation:

To test the metacommunity and productivity hypotheses, our main objectives for this year focused on the production of standardized hydrological metrics and compilation of long-term plant community cover data to generate spatially exhaustive datasets across the larger Everglades domain at the highest possible resolution that will allow us to determine effective metacommunity connectivity and to scale up long-term data derived relationships and models to the larger landscape.

To model temporal dynamics of spatial processes across scales and to determine operational scales of geomorphic and plant community processes, we extended the delineation of hydrological variables (water depth and hydroperiod) at 5 m resolution up to the coast using the Mike Marsh Model for Everglades National Park (M3ENP; Tachiev, Bahm, and Kotun 2018). These products were then used to detect and model various spatial expansion patterns of mangroves into adjacent freshwater communities across the southeastern coastal Everglades. Vegetation dynamics were detected at scales between 1 m^2 and 16 m^2. These vegetation maps together with the hydrological variables will allow us to detect operational scales of spatial processes that are spatially dependent. These data layers together with benthic habitat maps now provide a seamless terrestrial and coastal interface to integrate process models from our long-term datasets to the larger land- and seascapes.

The integration of the terrain hydrology and vegetation models at such high spatial resolution will serve as the basis for calculation of functional connectivity for our metacommunity analyses. The metacommunity plot-level species-specific data for macrophyte and microbial mats were gathered for the larger Everglades over two decades under long-term monitoring projects.

Consumers:

- Our work with animal movement data aims to determine whether increased hydrologic connectivity reduces constraints on consumer movement. Increased connectivity may impact production across the landscape, potentially enhancing food web coupling and the importance of consumer-driven nutrient transport across biogeochemical gradients.
- Work on invasive species in freshwater marshes aims to expand our understanding of food web energy dynamics, as shifts in hydrology alter the suitable habitat for native and non-native aquatic species.
- Our examination of prey quality and the caloric energy of native and non-native prey species in aquatic communities is helping us understand how invasions are shifting energy flows.

Detritus & Microbes:

- We are analyzing water column microbial community data and focused on long-term datasets of soil-and sediment microbial communities and functional guilds to determine trajectories of microbial communities in response to disturbances.
- We continue to analyze how disturbance legacies influence detrital and microbial processing rates, we will quantify chemical and functional attributes of particulate organic matter (POM) at FCE long-term sites and nearby sites impacted by disturbances.
- We continued our long-term research using reciprocal transplant of dominant macrophyte leaf litter across environmental gradients of P to test for functional changes in species composition and C loss.
- Carbon Partitioning experiments will begin in spring 2026. To further partition organic matter breakdown pathways to methane, and subsequent methane oxidation in freshwater marshes and its disturbance response, we will conduct a new ^{13}C tracer microcosm incubations with model substrates reflective of degradability of different organic matter classes (cellobiose, N-acetylglucosamine, vanillin) across seasons, allowing us to follow substrates into CO_2, CH_4, and microbial biomass. These experiments will be led by our subcontracted partners at NCSU. Methane production and oxidation rates will be determined in parallel microcosms in partnership with Yale University.

Eco-Geomorphology:
We are advancing objectives that relate to predictive themes 1-5 and address Question 6 (Eco-geomorphology): How do increases in marine and freshwater presses and pulses interact with disturbance legacies to drive fluxes and net ecosystem storage of carbon that influence resilience and trajectories of coastal wetlands?

Social-Ecological Landscape:
In this first year of FCE V, the Social-Ecological Landscape Working Group began foundational research activities aligned with Question 7: How do disturbance legacies, climate impacts and restoration activities impact values of ecosystem services and decisions that drive social-ecological resilience in urban coastal communities? Our activities focused on: (1) completing and finalizing analyses from FCE IV examining how Everglades restoration and ecosystem services are increasingly valued culturally and economically; (2) conducting literature reviews to refine our co-production framework integrating diverse cultural and economic valuations of ecosystem services; (3) beginning stakeholder scoping to identify and engage expanded partnerships with urban resilience planners, tribal communities, designers, and other stakeholders for the planned data visualization process; and (4) initiating preliminary data collection to inform the multi-stage visualization and co-design workshops we will work on throughout this project.

Significant Results

Climate Variability:

- Florida March precipitation time series derived from hourly ERA5-Land data confirm a persistent decline in late dry-season rainfall. This decline is explained by decreased cyclone-associated rainfall and enhanced background subsidence.

Hydrologic Resources & Stressors:

- Satellite-based altimetry data measure water levels in the Everglades with 6-15 cm level of accuracy (Wdowinski and Palomino, 2025).
- Comparisons of field and laboratory methodological differences for two analytical approaches to measuring TP compared to ICP-MS reveal differences.
- Silica concentrations are both low and not reacting to acidification at FCE sites (**Fig. 1**).

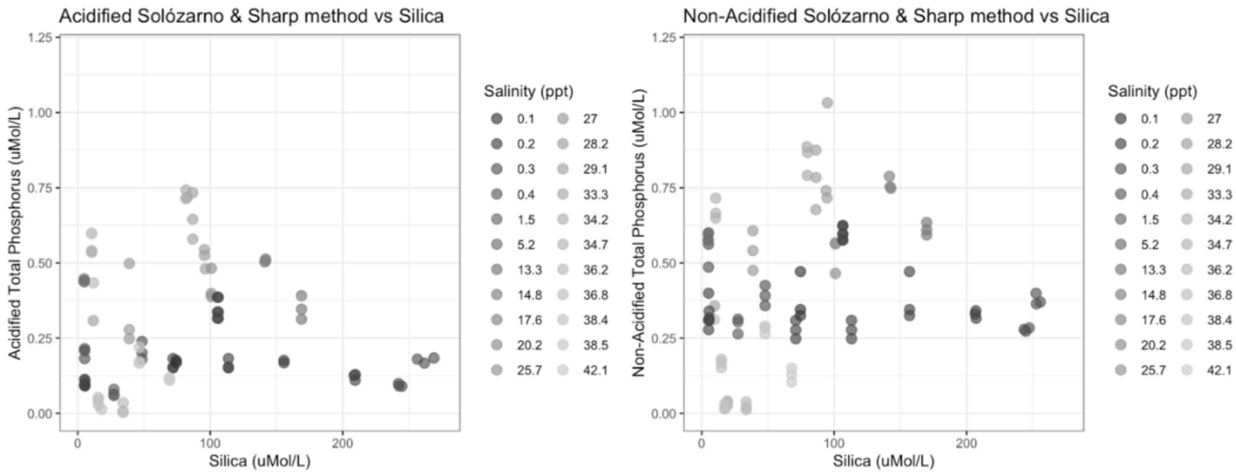

Figure 1. Comparison of field acidified and non-acidified phosphorus concentrations from surface water across FCE sites that vary in salinity concentrations. Data are replicate samples collected from July-September 2025 analyzed using [Solórzano and Sharp (1980)] method (which FCE has used since before 2000).

- TP values are reduced with acidification but are higher than ICP (**Fig. 2**).

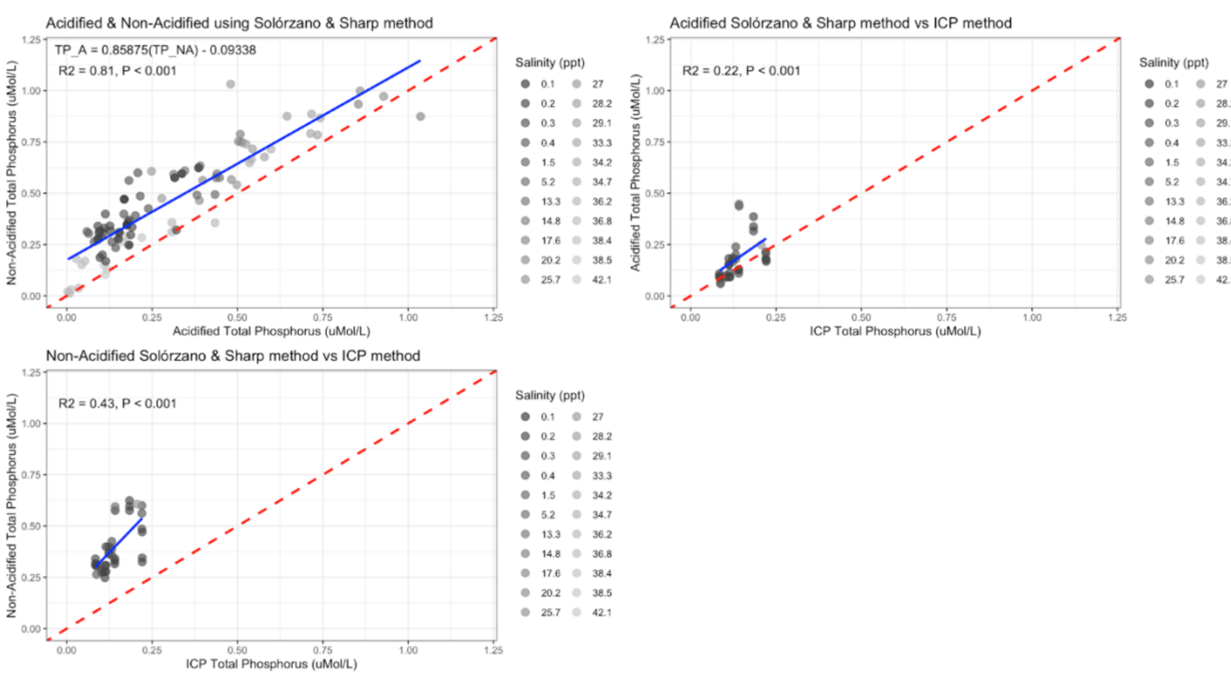

Figure 2. Comparison of surface water phosphorus concentrations for field acidified and non-acidified samples across FCE sites using two methods (Solórzano and Sharp, 1980; Inductively Coupled Plasma (ICP) ICP-MS. Data are replicate samples collected from July-September 2025.

- DOM (2012-2022) varied with seasonal (wet-dry season) hydrology and pulsed inputs from freshwater restoration (**Fig. 3**).

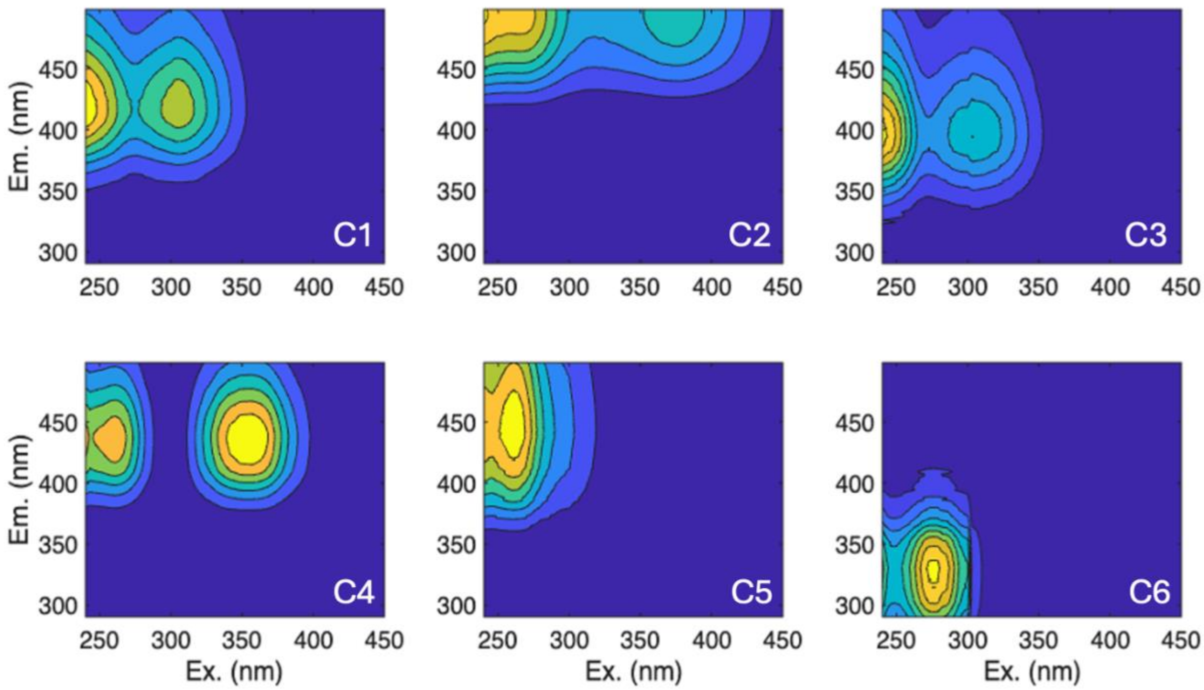

Figure 3. Contour plots of a revised parallel factor analysis (PARAFAC) model from surface water dissolved organic matter from the Florida Coastal Everglades Long Term Ecological Research Network (FCE LTER). The 6-component PARAFAC model (n = 774) was constructed from samples collected from 2012-2022 and analyzed for optical fluorescence properties using excitation-emission matrices.

- Small increases in humic-like and lower autochthonous productivity occurred at mangroves of TS/Ph and seagrasses. DOM from marsh and mangrove/marine sites of SRS was similar over time. DOM at mangrove and seagrass sites retained protein-like and gradual increases in humic-like and microbial sources, suggesting increased freshwater DOM from upstream marshes (**Fig. 4**).

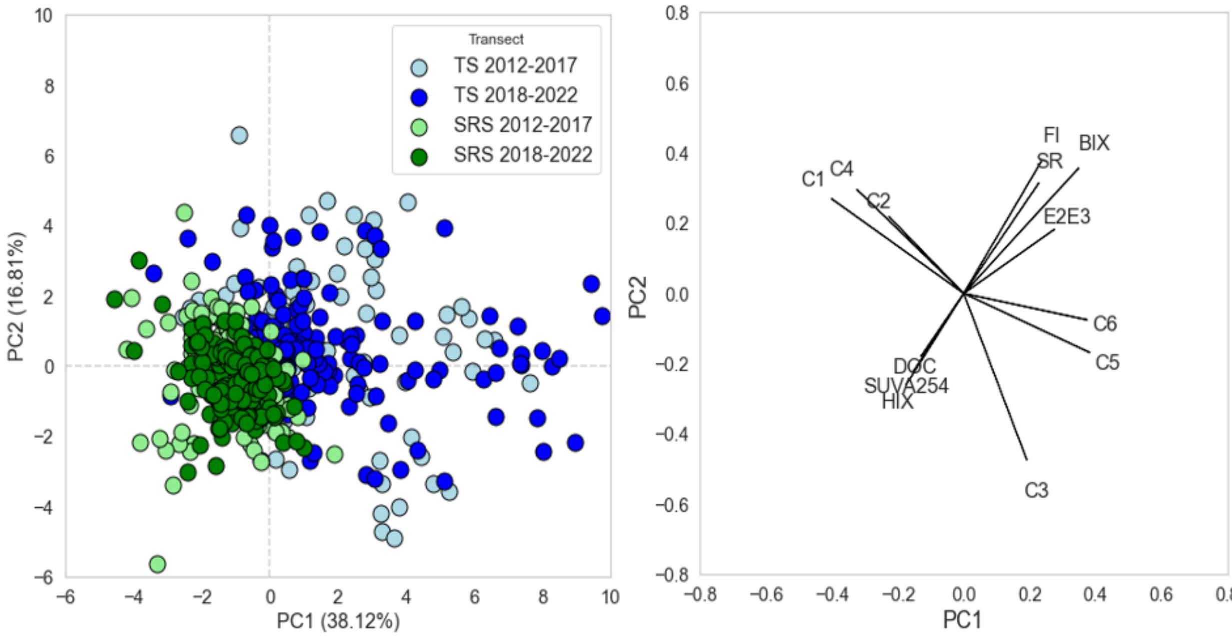

Figure 4. Principal component analysis (PCA) of key DOM parameters. PCA score plots show (a) differences between 2012-2017 and 2018-2022. PCA loading plot (b) depicts the distribution of variables including EEM-PARAFAC components and select DOM fluorescence indices. Axes are labeled with the percent variability explained by each principal component.

Vegetation:

- Algal metacommunity assembly and spatial structure were regulated by abiotic and biotic processes (15-year, 100 locations) and had spatially synchronous interannual fluctuations associated with largescale disturbances (Shannon 2025).
- Mean sawgrass ANPP was lower in shorter-hydroperiod than in longer-hydroperiod marshes. Models that quantify basin-specific temporal trends in ANPP, site-specific deviations, and effects of soil TP and water depth, explained 61.5% of the deviance in long-hydroperiod and 74.2% in short-hydroperiod marsh. Greater declines in ANPP in short-hydroperiod marshes and positive depth effects in upstream longer-hydroperiod marshes were detected (**Fig. 5**).

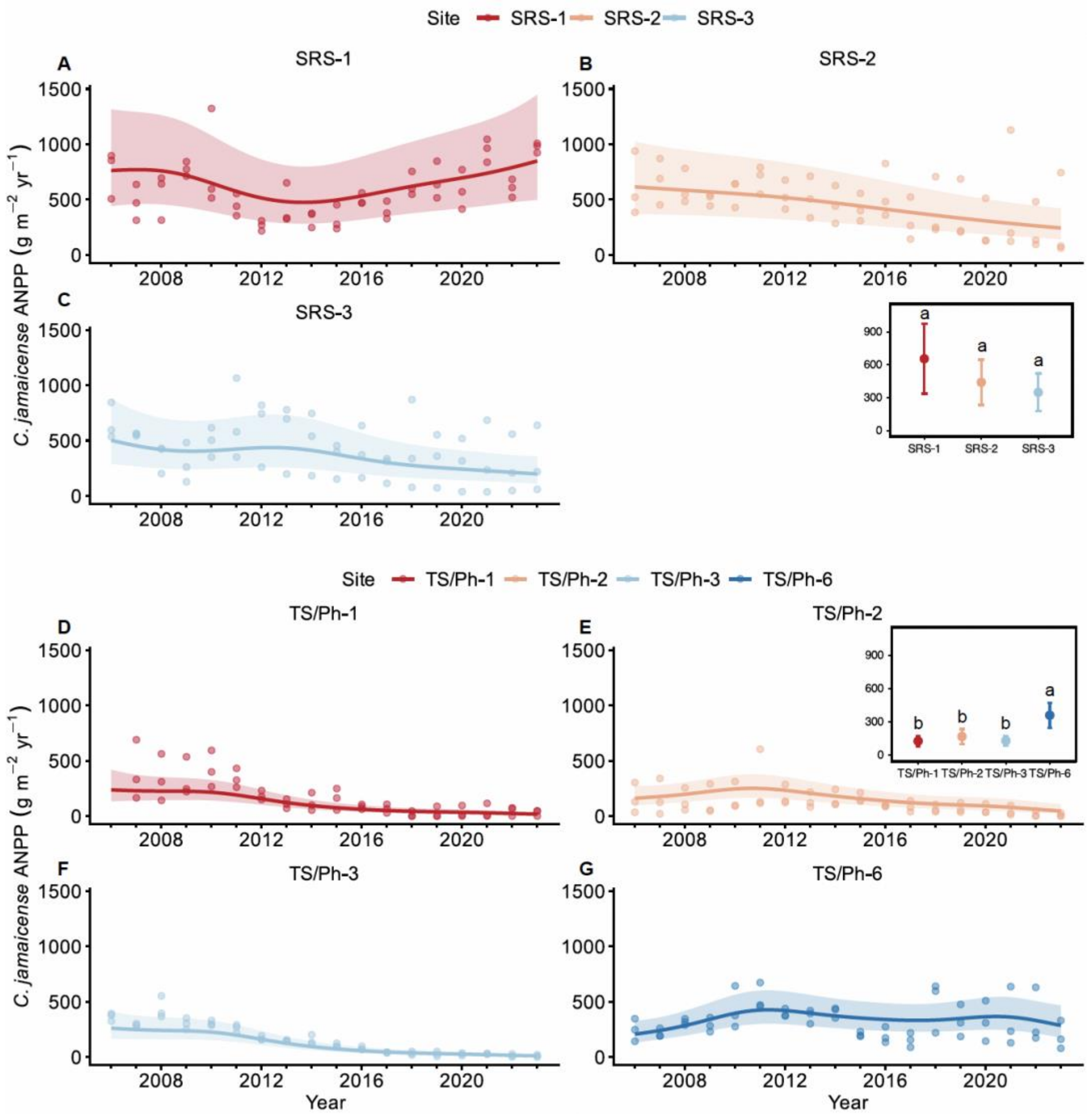

Figure 5. Hierarchical generalized additive model (HGAM) predictions of *Cladium jamaicense* aboveground net primary production (ANPP) from 2006 to 2023 in Shark River Slough (SRS): (A) SRS-1, (B) SRS-2, and (C) SRS-3; and in Taylor Slough/Panhandle (TS/Ph): (D) TS/Ph-1, (E) TS/Ph-2, (F) TS/Ph-3, and (G) TS/Ph-6 in Everglades National Park, Florida, USA. Points represent observed values, solid lines represent HGAM predictions, and the shaded bands in each plot indicate the 95% confidence intervals. Model predictions and confidence intervals are back-transformed to the response scale. Insets show estimated marginal means (± SE) derived from HGAMs; different letters indicate significant differences ($p < 0.05$).

- NDVI values (indicator of primary productivity) were significantly influenced by fire history. More frequent and more recent fires had higher NDVI values compared to less frequently burned (McLeod et al. 2025).
- Post-hurricane growth rates of *R. mangle* seedlings and both *R. mangle* and *L. racemosa* saplings increased with light. *A. germinans* growth rates were unaffected. *R. mangle* and *L. racemosa* saplings were influenced by porewater

P, while growth of both seedlings and saplings was unaffected by porewater salinity and sulfide (Restrepo et al. 2025). Spatio-temporal analysis of a decade-long Landsat-8 data using NDVI and NDMI observations revealed seasonal changes, hurricane-induced decline, and slow recovery of mangrove forests before and after the 2017 Irma Hurricane (Chavez et al., 2025**, Fig. 6**).

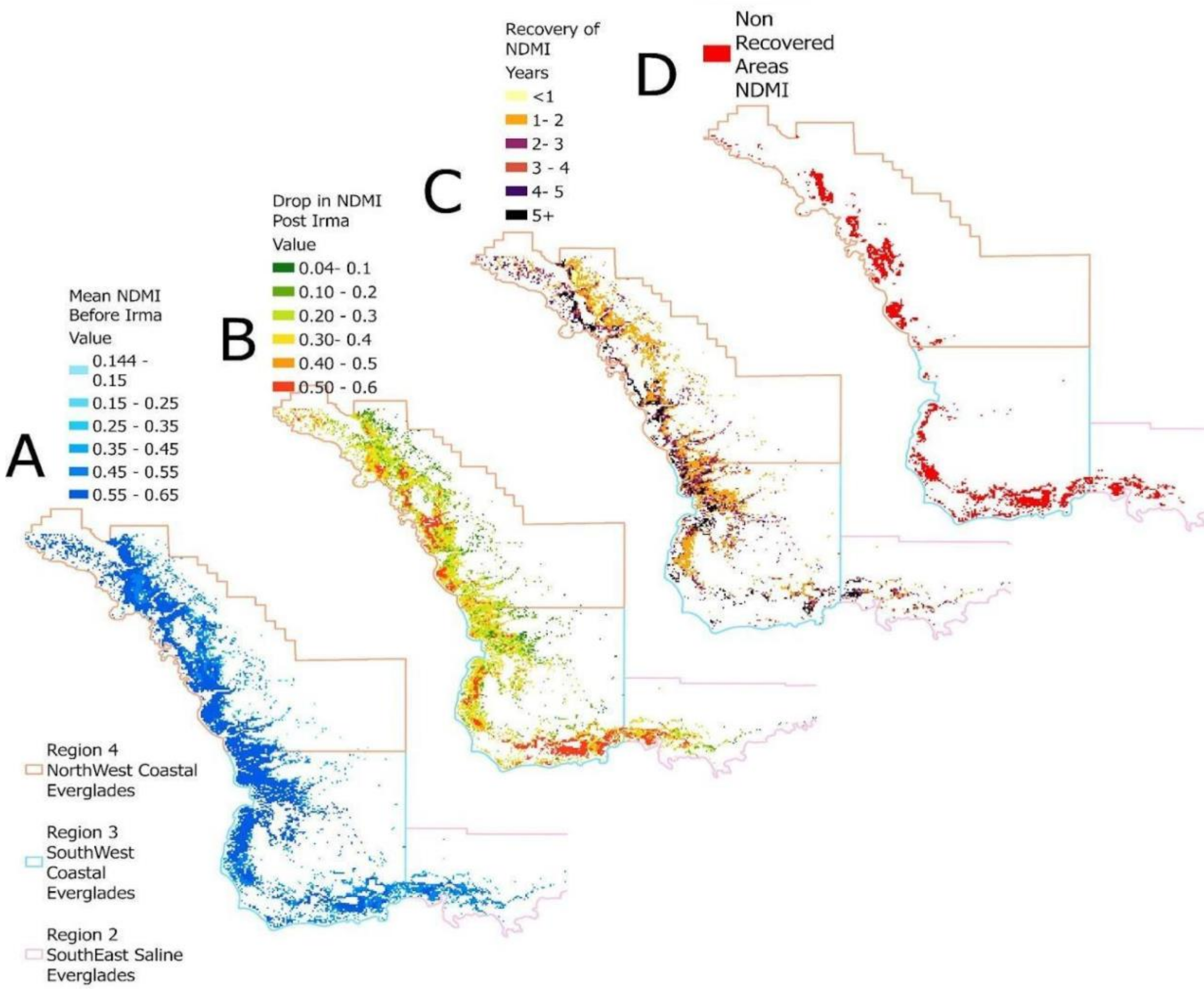

Figure 6. Regional maps of different metrics of NDMI calculated from the best-fit models for all pixels in our study area. A) represents mean NDMI before Hurricane Irma, B) drops in NDMI value post-Hurricane Irma, C) displays recovery of pixels in years, and D) represents areas that have not recovered within our study's period. Source: Chavez et al. (2025)

- Considering the productivity differences between graminoid marsh and mangrove forest (**Fig. 7**), vegetation shifts in coastal fresh- and brackish water regions from graminoid to mangrove forests could be an indicator of system-wide productivity shifts. Radial expansion from existing mangroves peaked in shallow water depths (<20 cm), where long periods of suitable conditions combined with relatively infrequent inundation facilitated successful propagule anchoring (**Fig. 8**). Infilling of open and low-density graminoid marsh was most pronounced at moderate water depths (20-40 cm), occurring under shorter suitable periods (<100 events) but more frequent inundation (**Fig. 8**).

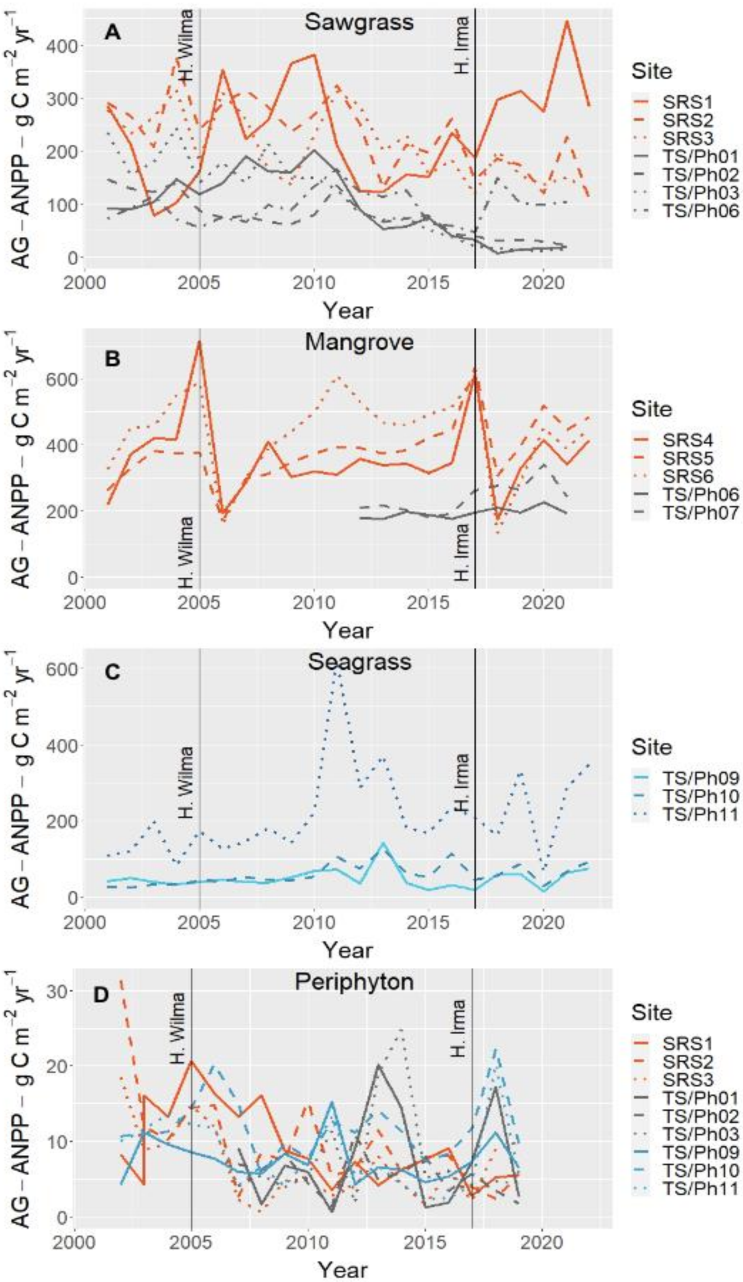

Figure 7. Above-ground annual net primary productivity (AG-ANPP) in (A) sawgrass, (B) mangrove. Sawgrass AG-ANPP is higher in SRS (reduced production towards the coast) than TS/Ph (reduction except for TS/Ph-6). Mangrove AG-ANPP responds to hurricane disturbances in both SRS and TS/Ph. Overall, in SRS AG-ANPP for Sawgrass ranged between ~ 100 and 450 gCm-2yr-1 while during the same period mangrove ANPP ranged between ~200 to 700 gCm-2yr-1.

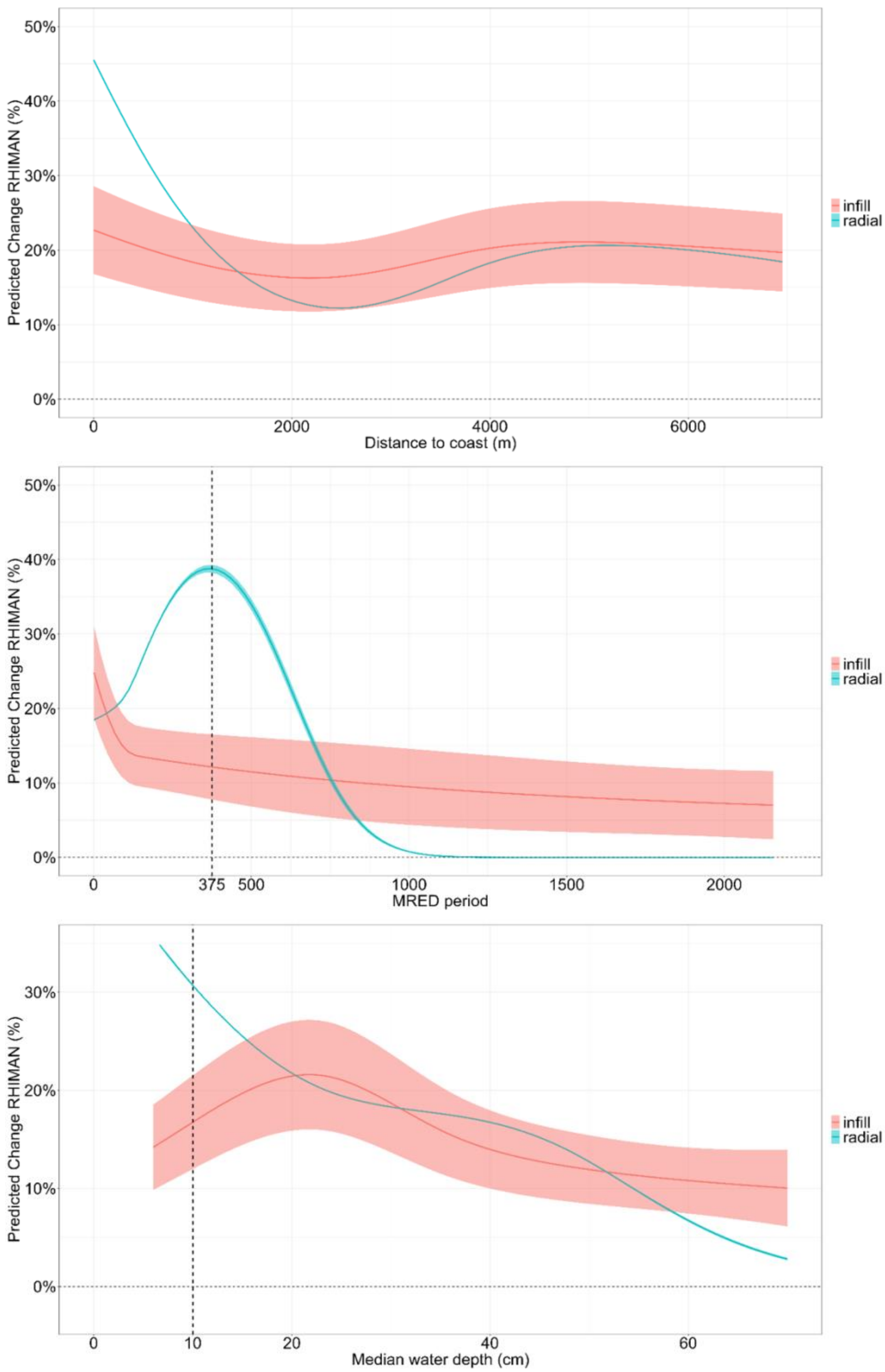

Figure 8. Partial plots of predicted change of *R. mangle* (RHIMAN) modeled with distance from coast (top), and longest period of Minimum *Rhizophora* Establishment Depth (MRED) (center), and water depth (bottom) established from daily water levels between 1999 to 2012. The blue lines represent radial dispersal, and red lines infilling. The dashed line rin the bottom plot represents the MRED of 10 cm.

- Florida Bay seagrasses have among the largest sedimentary C stocks in the world (Krause et al. 2025a), and seagrass abundance covaries with interannual variability in nutrient-runoff relationships (Krause et al., 2025b).

Consumers:

- Salinity (<8.7 ppt), low daily salinity variation (<1.3 SD), and marsh water levels (11.4–27.7 cm) are the strongest predictors of 8 years of bass presence. Wet years expanded suitable habitat to 15.3 km², average years provided 4.4 km², and drought years compressed it to 1.7 km² (Viadero et al. 2025, **Fig. 9**).

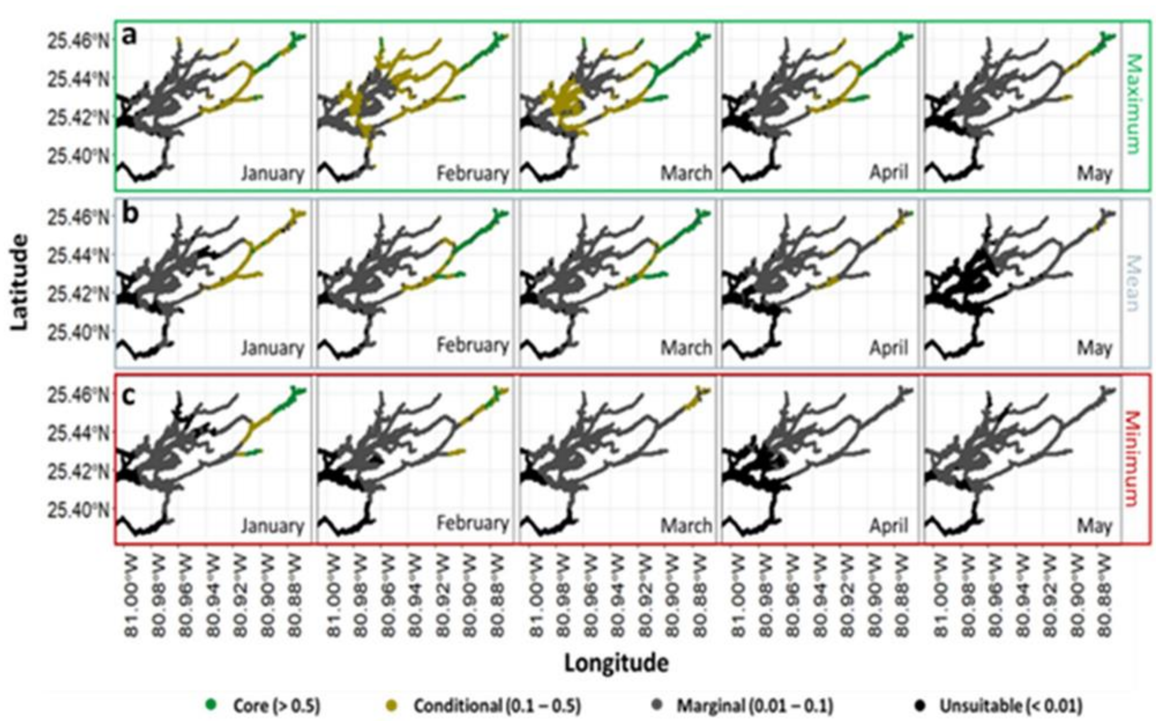

Figure 9. Florida largemouth bass predicted habitat areas in SRS, based on boosted regression tree results, shown across months of the dry season and for a maximum, minimum, and mean habitat area year (highlighted by colored box: maximum = green, minimum = red, and mean = light gray). Shading in the maps corresponds to habitat classifications (core habitat = green, conditional habitat = gold, marginal habitat = dark gray, and unsuitable habitat = black) (Viadero et al. 2025).

- Snook are crepuscular, and bass are diurnal. Diet data (12 yrs) showed that fish prey were more common at low-water levels and cooler temperatures, while invertebrates dominated diets during high marsh stages and in smaller snook. Models indicate invertebrate-based diets require more prey biomass than fish-based diets (White et al. 2025, **Fig. 10**).

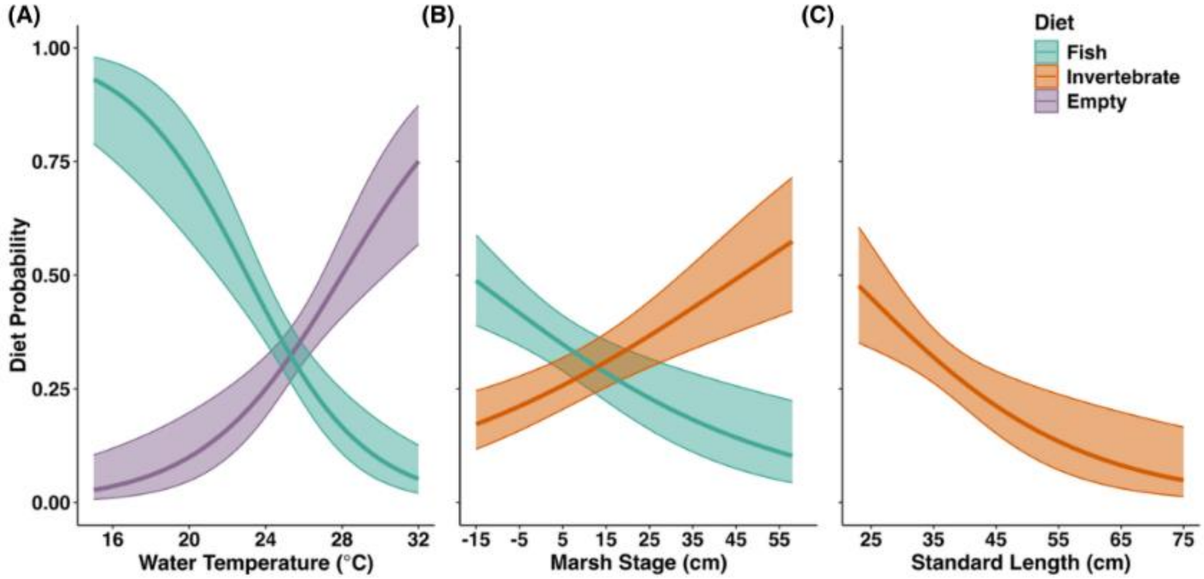

Figure 10. Marginal effects plots showing the relationship between selected explanatory variables and the diets of Common Snook. The individual panels depict the probability of fish, invertebrates, and empty stomachs observed during gastric lavage as a function of: (a) water temperature, (n) marsh stage, and (c) standard length. The colored lines and shading represent the mean and 95% confidence intervals, respectively, for each response variable (White et al. 2025).

- Lower trophic space-use specialization during dry than wet season and increasing specialization with water depth increases (11 yrs data). Space-use specialization was negatively correlated with trophic niche size and reliance on fewer prey types (Santos et al. 2025b, **Fig. 11**).

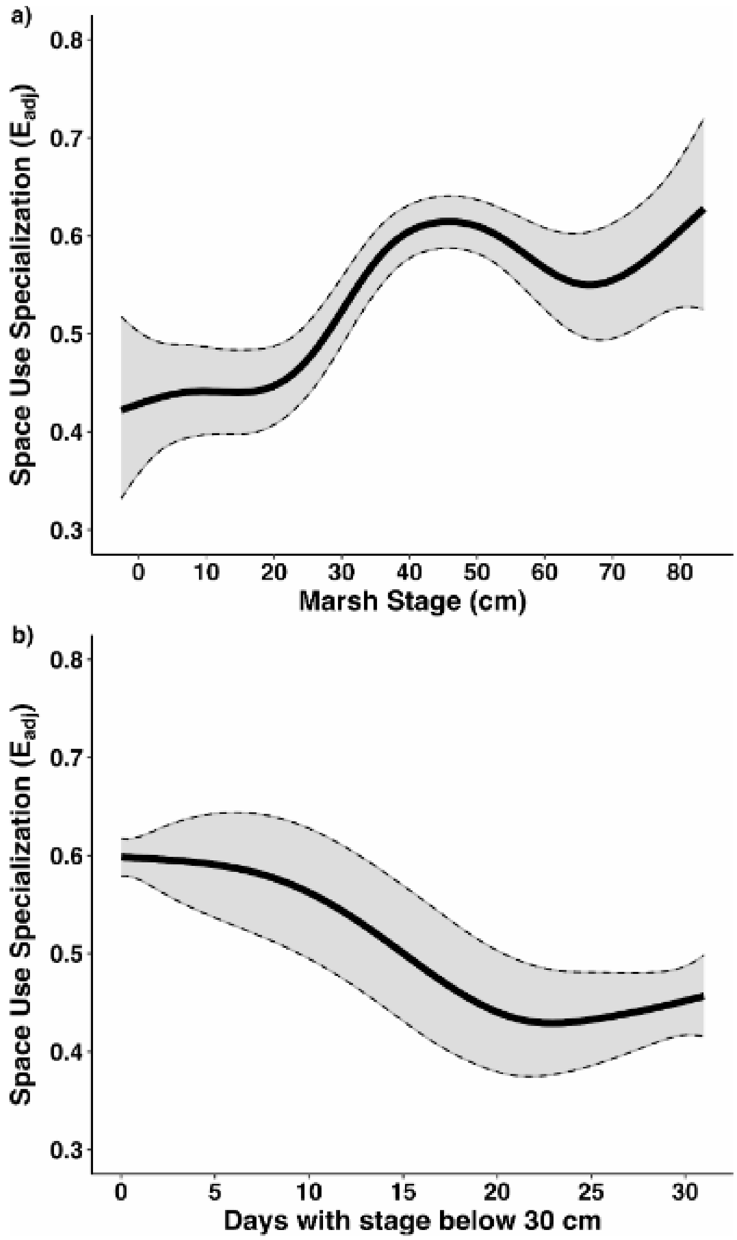

Figure 11. Marginal effect plots from generalized additive models (GAMs) for hydrological effects on individual space use specialization (Eadj) of common snook in SRS). Panel (a) depicts the relationship between mean marsh stage (cm) and individual space use specialization. Panel (b) depicts the relationship between days with mean river stage < 30 cm and individual space use specialization. Solid black lines indicate the estimated mean response, dotted black lines show the 95% confidence intervals, and grey shading illustrates the dispersion around the mean (Santos et al. 2025b).

- Bass home ranges contracted with rising water levels, while snook had greater variability and expanded their home ranges nonlinearly as water levels increased (13 yrs data). Spatial overlap was low (<15%) for both intra- and interspecific comparisons, and overlap decreased significantly with higher water levels, suggesting reduced competition under wetter conditions (**Fig. 12**).

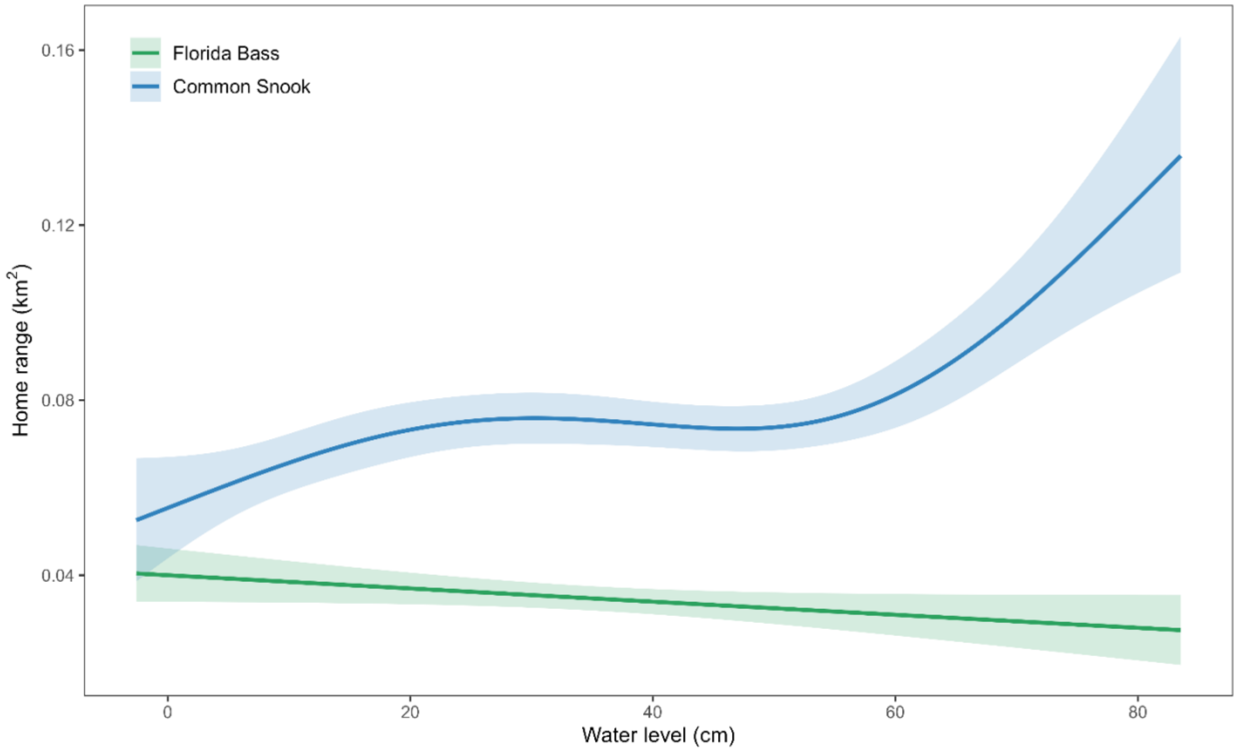

Figure 12. GAM predictions of Florida largemouth bass and common snook core home-ranges throughout the lower SRS (KDE50%) across water levels. Shading around prediction lines are 95% confidence intervals. (Atkinson et al., In review).

- Discharge and total phosphorus interactively drive distinct consumer biomass patterns in sloughs (Fernandez et al. 2025, **Fig. 13**).

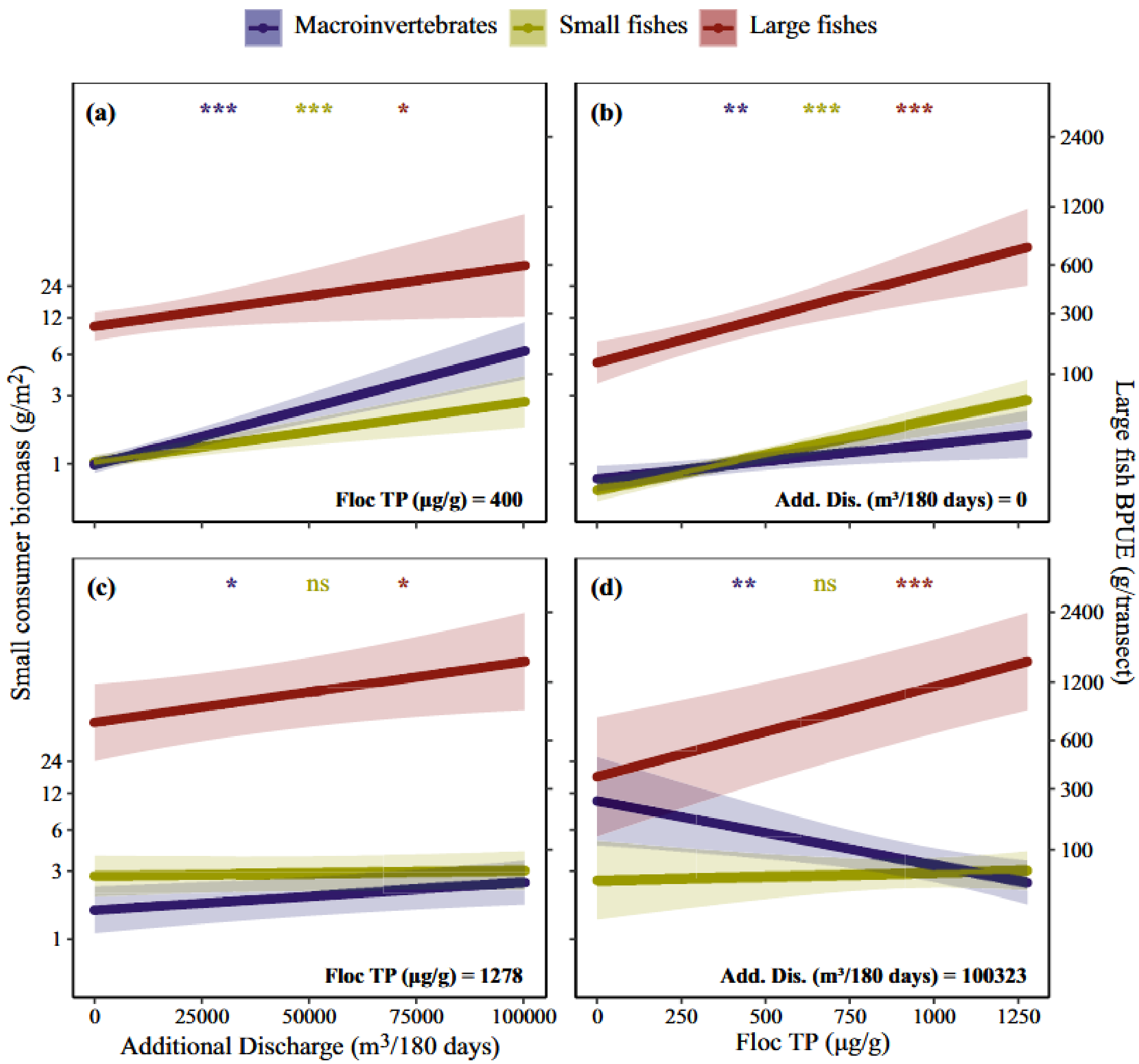

Figure 13. Macroinvertebrate, small fish, and large fish biomass as a function of additional discharge at a set level of (a) low (400 µg g^{-1}) and (c) high floc total phosphorus (TP) (1278 µg g^{-1}) and as a function of floc TP at a set level of (b) low (0 m^3 180 d^{-1}) and (d) high discharge (100,323 m^3 180 d^{-1}) plotted on Box-Cox transformed scales. Lines are from the model outputs that include the interactive effects of discharge and floc TP for macroinvertebrate and small fish biomass and the additive effects of discharge and floc TP for large fish biomass-per-unit-effort (BPUE). Levels were chosen based on the 5 and 95 percentiles represented in our data set except for low floc TP. Significance levels are shown at * = 0.05, ** = 0.01, *** = 0.001, and ns = non-significant. The y-axis on the left represents units for small fish and macroinvertebrate biomass while the y-axis on the right represents units for large fish BPUE. Shaded regions represent 95% confidence intervals. (Fernandez et al. 2025).

- Invasion by predatory Asian swamp eels (*Monopterus albus/javanensis*) has altered hydrology-mediated prey production (26 yrs data). Mean fish and decapod richness declined by ~25%, and communities shifted to a new state dominated by grass shrimp and a few species of small fishes. Total biomass of small fishes and decapods declined by ~68%, and biomass of the primary prey species for nesting wading birds declined by ~80% (Pintar and Dorn 2025, **Fig. 14**).

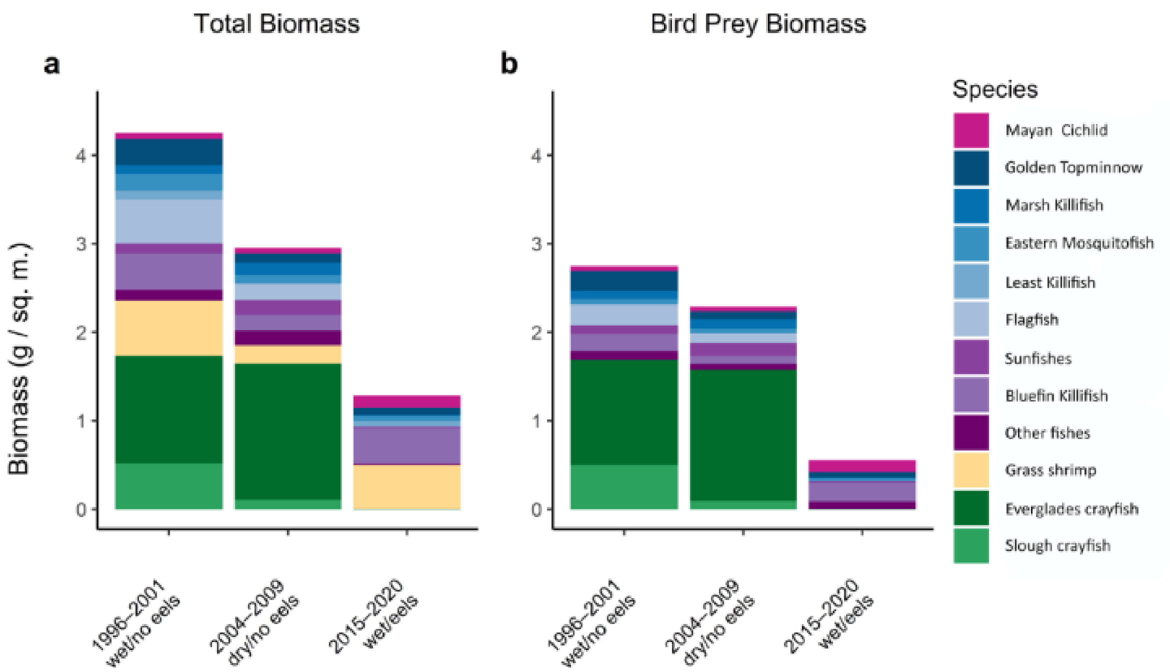

Figure 14. Stacked bar charts of species contributions to prey biomass densities in TS during all sampling seasons in throwtrap sampling: a is the total biomass of all fishes and decapods; b is the biomass of bird prey (fish > 20 mm SL, crayfish carapace length > 10 mm). Data are separated into three 6-year periods based on the presence of swamp eels and prevailing hydrologic conditions in Taylor Slough (Pintar and Dorn, 2025).

- Long-term (2004-2021) environmental variability influences the relative abundance of common snook, which decreased with water level and increased with temperature, and extreme events (e.g., prolonged flooding, droughts, and cold spells) causing sharp short-term declines (Massie et al. 2025, **Fig. 15**).

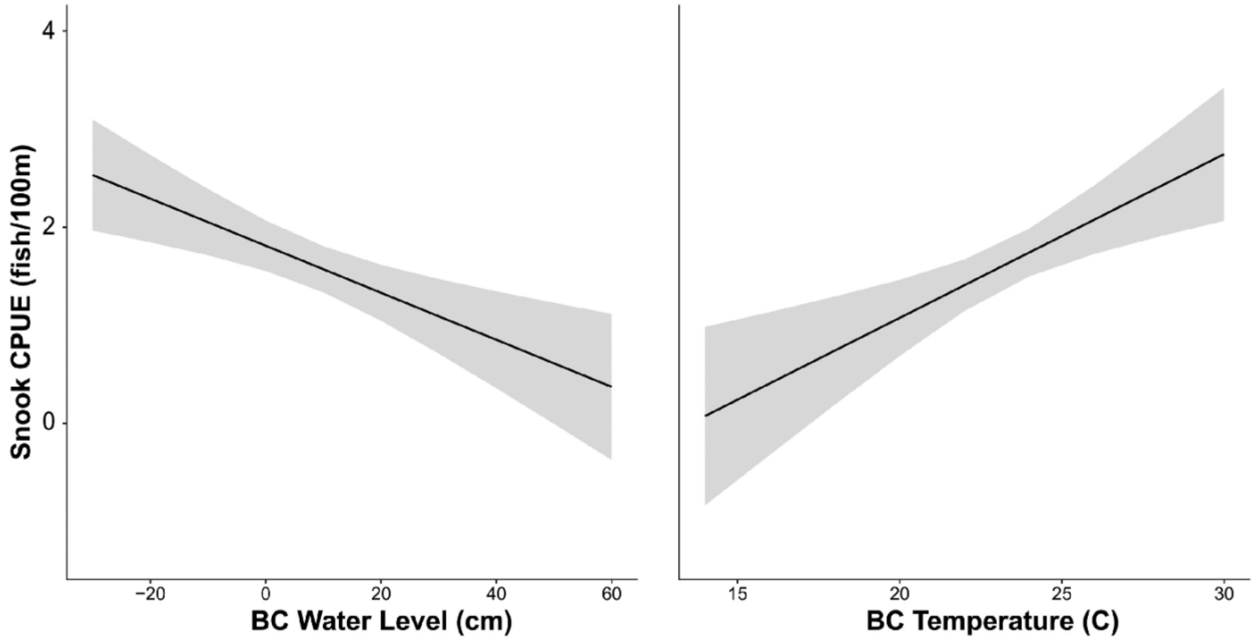

Figure 15. Bottle Creek (BC) water levels and temperature variables plotted for the best fitting generalized linear model for the relative abundance of Common Snook in the SRS (catch per unit effort [CPUE]) bounded by a 95% CI. The individual effects of each variable that was retained in the best model were assessed by holding the other variables at a fixed mean value. Together, these variables explain 46% of the long- term variability in CPUE (Massie et al. 2025).

- Bull shark long-line catch data show that sizes are similar across the wet and dry seasons but wet-season catch is smaller (**Fig. 16**).

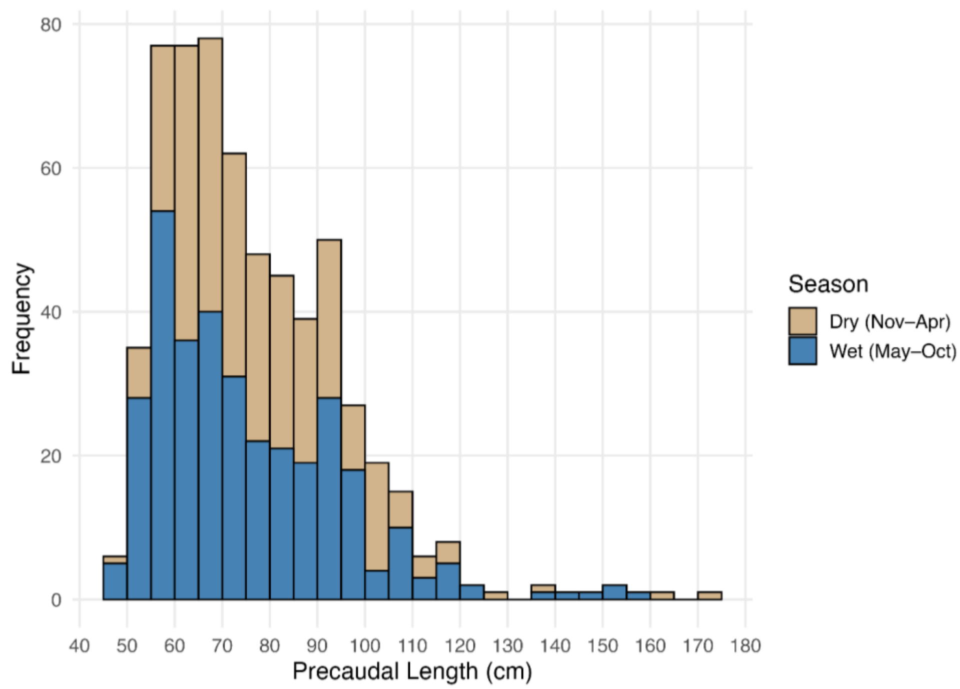

Figure 16. Frequency histogram of precaudal lengths for all bull sharks captured in the Shark River Estuary for the duration of the dataset, 2005-Present, color coded by season.

Detritus & Microbes:

- Bacterial and archaeal communities had greater seasonal variation than eukaryotic communities, which varied more spatially. Floc carbon and nutrient concentrations, and microbial respiration rates varied with water depth and were associated with differences in floc-specific microbial communities (**Fig. 17**).

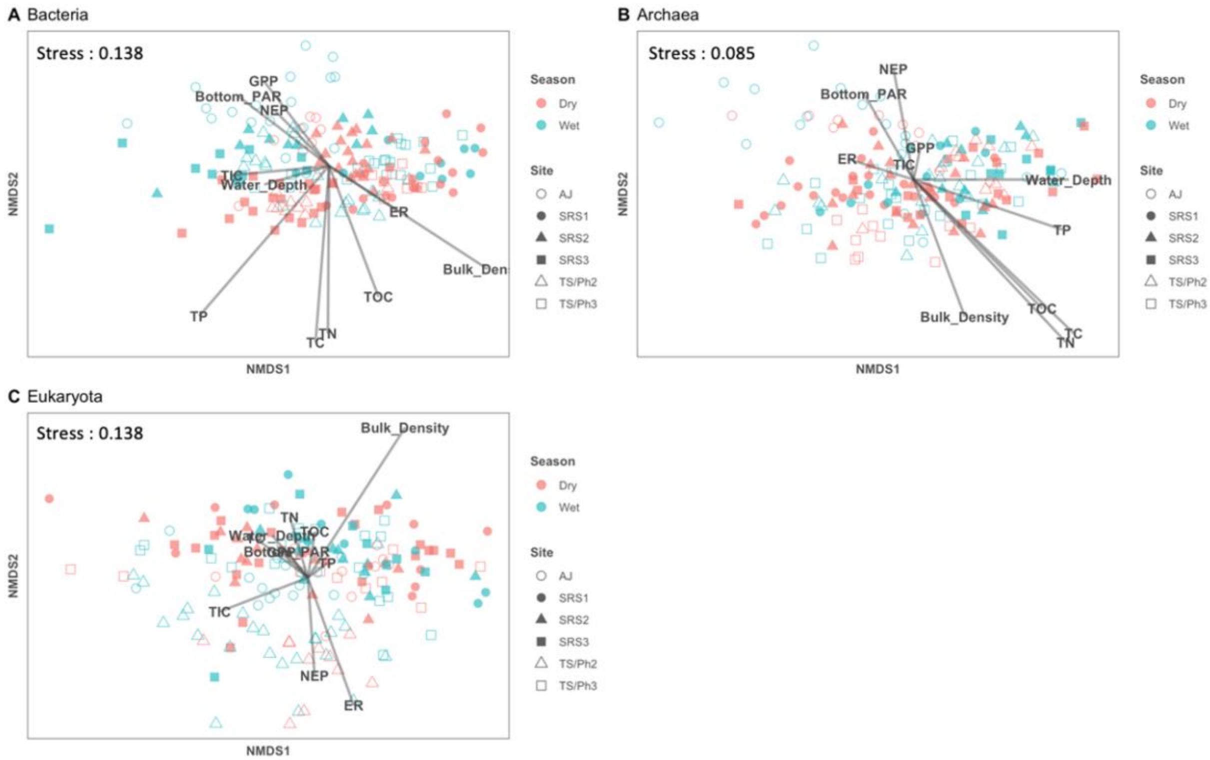

Figure 17. A three-dimensional non-metric multidimensional scaling (NMDS) based on Bray-Curtis dissimilarities of floc-specific (**A**) Bacteria, (**B**) Archaea and (**C**) Eukaryota taxa based on 16S rRNA genes and ITS genes from 3 sites in Shark River Slough (SRS) [SRS-1, SRS-2, SRS-3] and 3 sites in Taylor Slough Panhandle (TS/Ph) [TS/Ph-2, TS/Ph-3, Aerojet (AJ)], from quarterly samples ranging from January 2023 to October 2023, which is a representation of the wet (May-November) and dry seasons (December-April). Vectors are lines that originate from the center represent the influence of environmental variables such as water depth, bottom/benthic photosynthetic active radiation (PAR), floc-specific biogeochemical variables [total carbon (TC), total organic carbon (TOC), total inorganic carbon (TIC), total phosphorus (TP), total nitrogen (TN), bulk density] and floc-specific metabolic reactivity [gross primary productivity (GPP), ecosystem respiration (ER) and net ecosystem productivity (NEP)], microbial community abundance among sites and seasons.

- Root-associated compartments foster distinct microbial assemblages with implications for key ecosystem processes, including methanogenesis (**Fig. 18**).

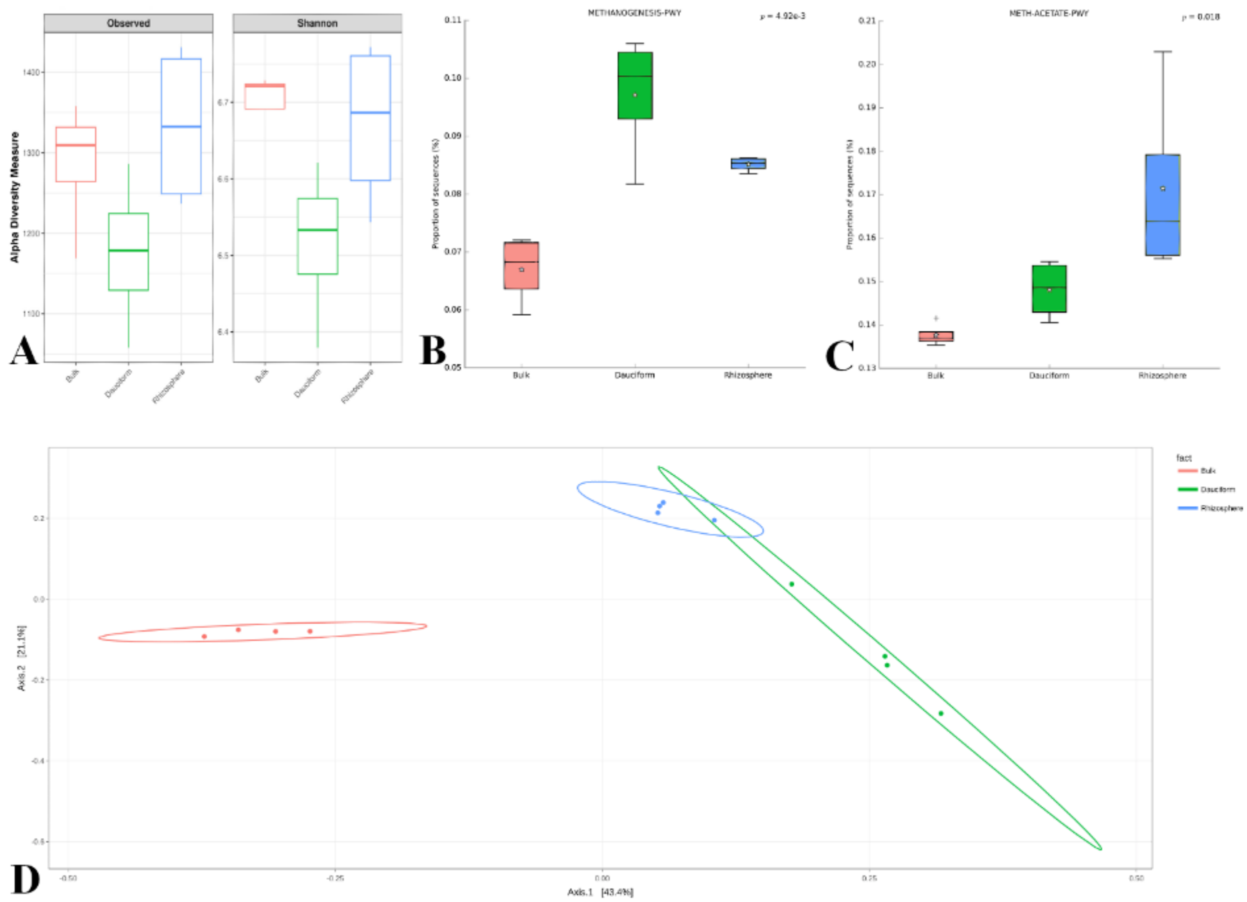

Figure 18. Community structure and functional potential for methanogenesis across soil compartments 2A. Observed richness did not differ significantly among compartments. In contrast Shannon diversity was significant (*), indicating that dauciform roots harbored lower diversity compared to bulk and rhizosphere samples. 2B. Hydrogenotrophic methanogenesis pathway is significantly enriched (**) in dauciform root samples. 2C. Predicted acetate-dependent methanogenesis pathways show enriched abundance in rhizosphere soils (*), reflecting a potential functional distinction of microbial communities across root-compartments. 2D. PCoA ordination reveals distinct clustering by compartment, supported by PERMANOVA (**), with bulk soil forming the most distinct assemblages.nMethanogenesis pathways were generated using PICRUSt2. Statistical comparisons were performed in rANOMALY and STAMP. Asterisks denote significance: $p < 0.05$ (*), $p < 0.01$ (**).

Eco-Geomorphology:

- *Cladium* aboveground biomass reveals interesting spatial and temporal patterns (**Fig. 19**). Lower rates of elevation gain at coastal ecotone sites (BW, RR, and HR) in sawgrass peat marsh are being observed with a long-term trend toward declining elevation in the BW site (**Fig. 20).**

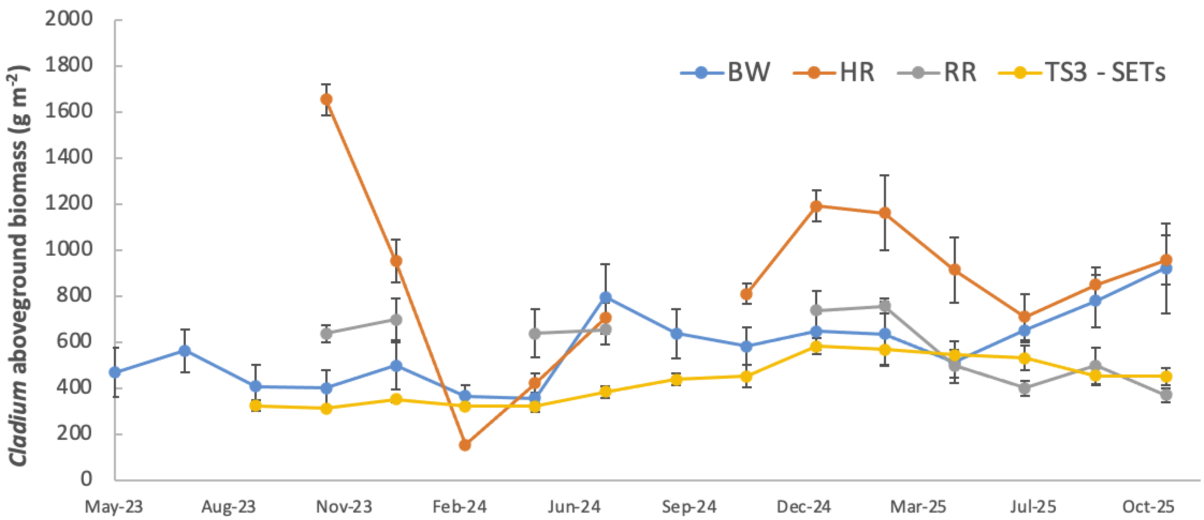

Figure 19. Aboveground *Cladium* biomass at coastal ecotone satellite sites near West Lake (BW), in Harvey River (HR) and Roberts River (RR), along with FCE LTER site Taylor Slough 3 (TS3).

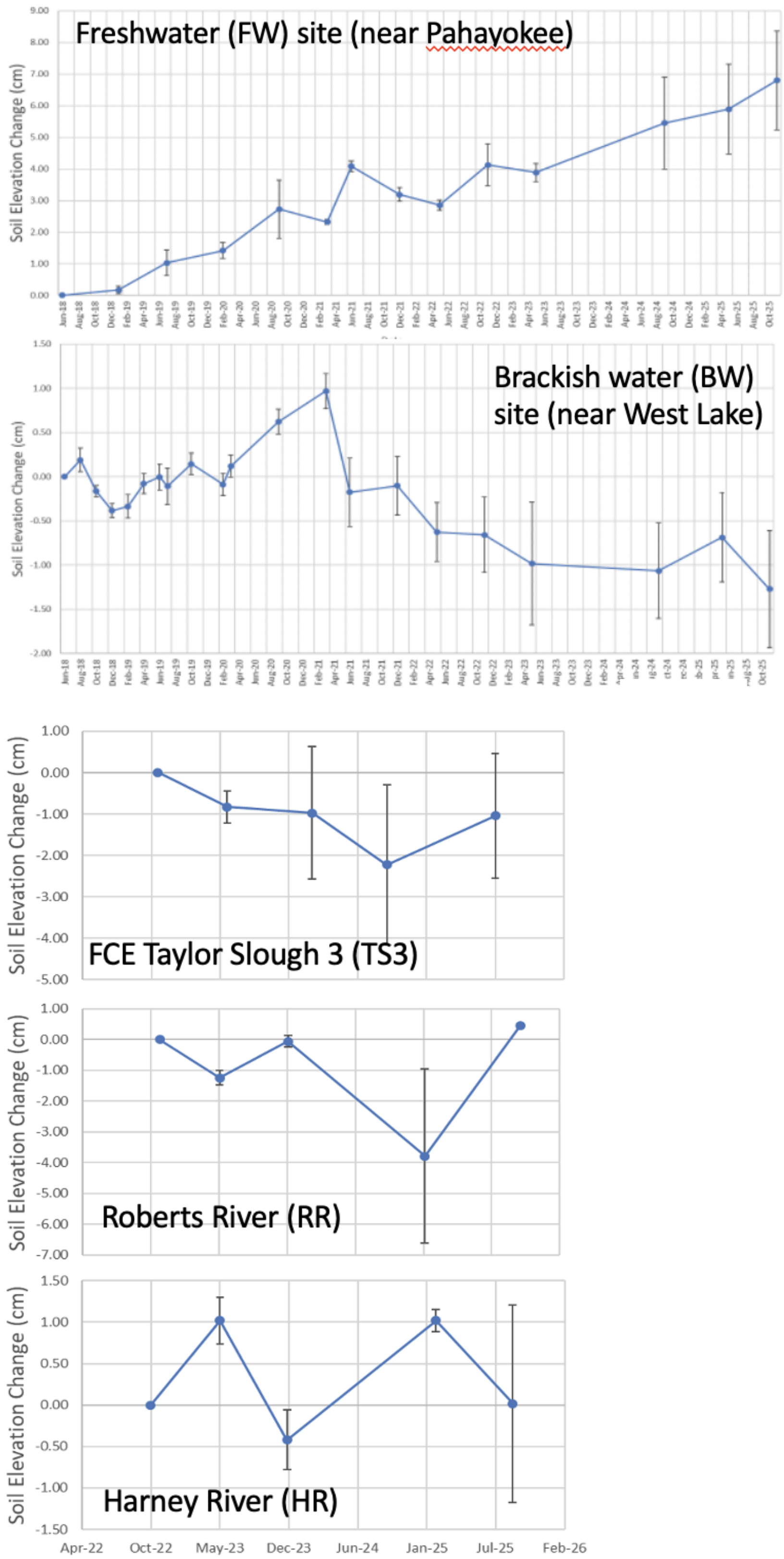

Figure 20. Change in soil elevation (SET) at four satellite sites (FW, BW, RR and HR) and FCE site TS3. SET monitoring began in 2018 at FW and BW and in 2022 at TS3, RR, and HR.

- A baseline survey of initial site conditions of the subplots and macroplots of the landscape experiment (**Table 1**): including water depth (**Fig. 21**), soil biogeochemical characteristics, soil elevation, and stem counts (*Cladium, Eleocharis and Rhizophora*; **Fig. 22**).

Table 1. Summary of initial conditions at the Mangrove Experimental Manipulation Exercise (MEME)

Parameter	Unit	Mean ± SE	n	Data Range
Water depth	cm	55.16 ± 0.40	144	39 – 62
Soil temperature	°C	29.35 ± 0.09	12	29.0 – 29.9
Soil pH	—	6.66 ± 0.07	12	6.60 – 6.80
Soil redox potential (Eh)	mV	131.95 ± 6.78	12	93.2 – 181.8
Porewater temperature	°C	32.22 ± 0.30	12	31.0 – 33.7
Porewater salinity	ppt	0.44 ± 0.02	12	0.3 – 0.5
Specific conductivity	μS/cm	908.83 ± 13.83	12	645 – 998
Porewater pH	—	6.94 ± 0.01	12	6.87 – 6.99
Plant Density (*E. cellulosa*)	average density per m^2 (#/m^2)	84.08 ± 4.04	48	39 – 141
Plant Density (C. *jamaincense*)	average density per m^2 (#/m^2)	7.78 ± 1.28	48	1 – 29
Distance to Canal	Meter	98.96 ± 1.37	48	84.04 – 114.69

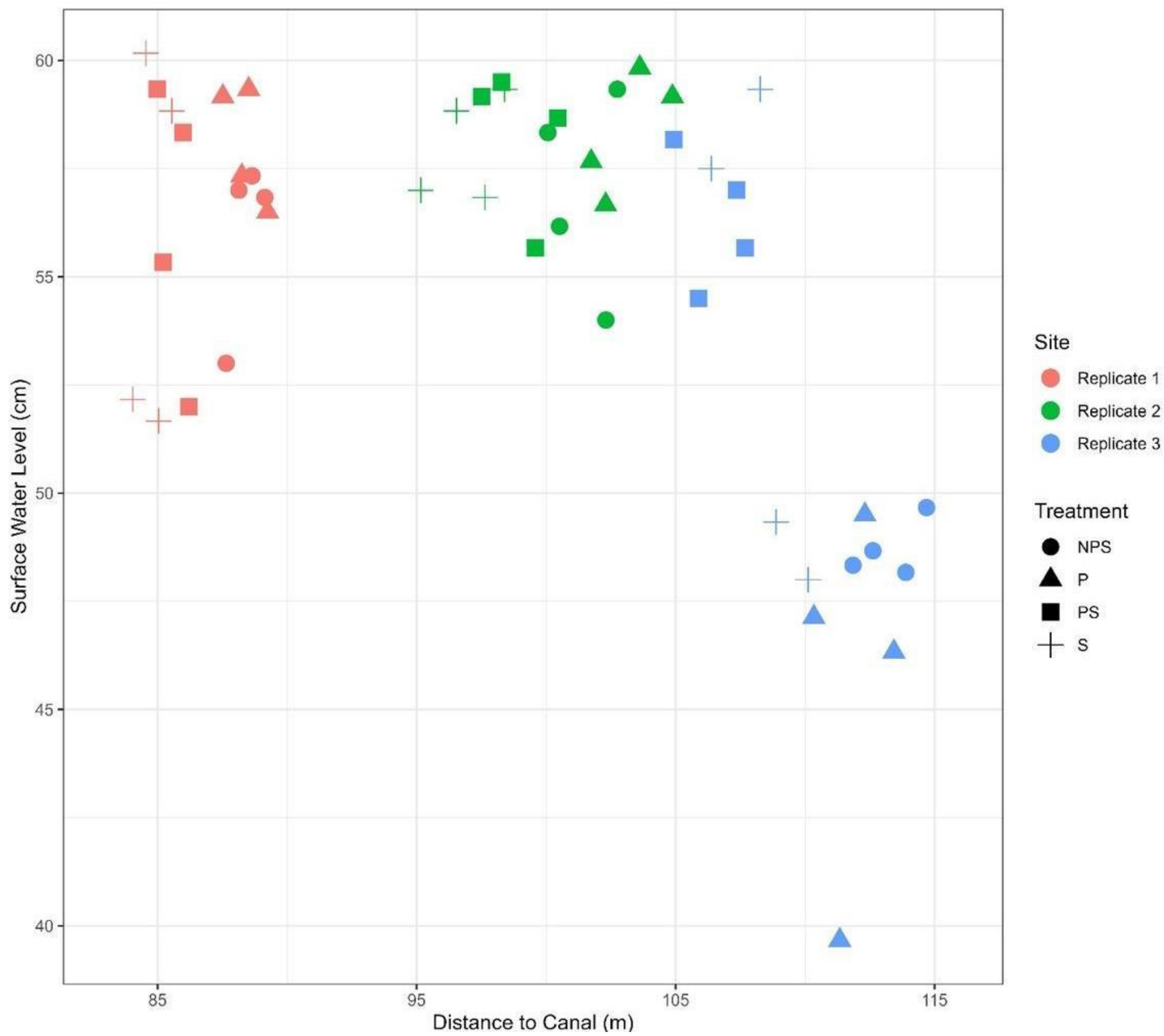

Figure 21. Relationship between surface water level and distance to the canal across Replicates. Scatter plot depicting the spatial gradient of surface water levels (cm) relative to the distance from the nearest canal (m).

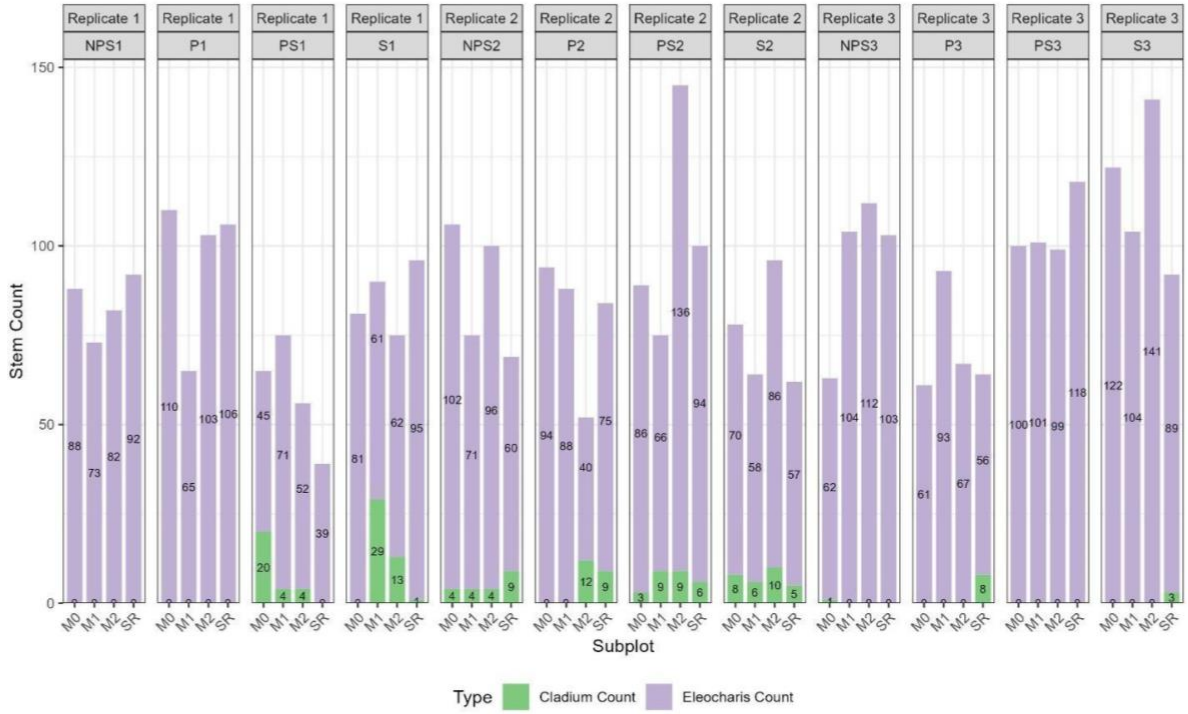

Figure 22. Aboveground stem density. Total stem counts for the two dominant macrophyte taxa, *Eleocharis cellulosa* (purple) and *Cladium jamaicense* (green), measured across all sampling subplots (M0, M1, M2, SR).

- Salinity and dry down manipulations show DIC and DOC release by the second dry down event and within 45 d of incubation (**Fig. 23**). Mass loss of DIC was greater than DOC in brackish peat cores.

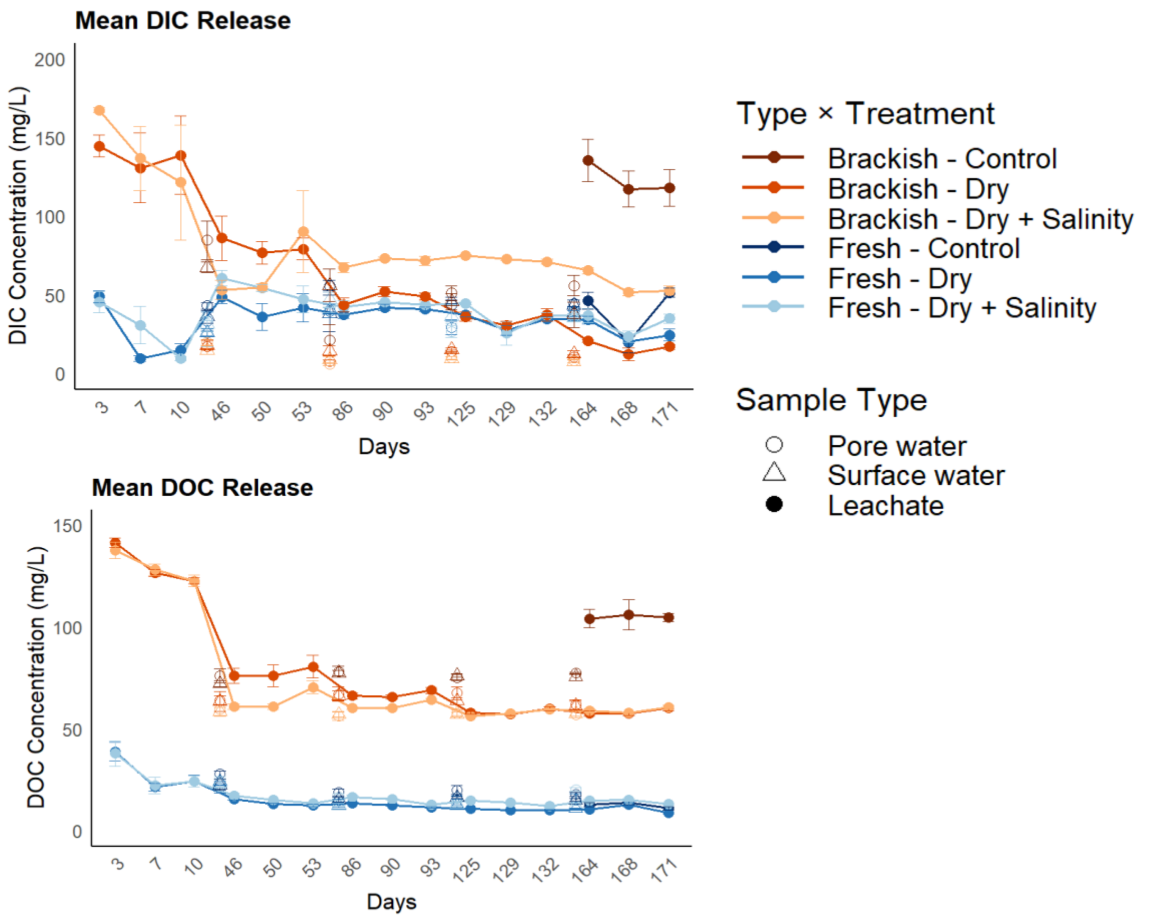

Figure 23. Mean concentration of DOC and DIC leachate (mg/L; solid fill) in benchtop incubations with brackish peat and freshwater cores exposed to salinity and dry down manipulations.

Social-Ecological Landscape:

- In 2019, recreational fishing generated about $369 million in economic output, supporting 2,700 jobs and $122 million in earnings. Annual willingness to pay (WTP) was $123 million for a 50% reduction in polluted discharges and $160 million for a 50% improvement in Lake Okeechobee's ecological health.
- Individuals with more ecocentric views—those scoring higher on NEP—were significantly more supportive of ecological restoration outcomes (**Fig. 24**).
- Wakefield's book, *Miami in the Anthropocene*, explored the social, environmental, and technical transformations involved in climate adaptation infrastructure.

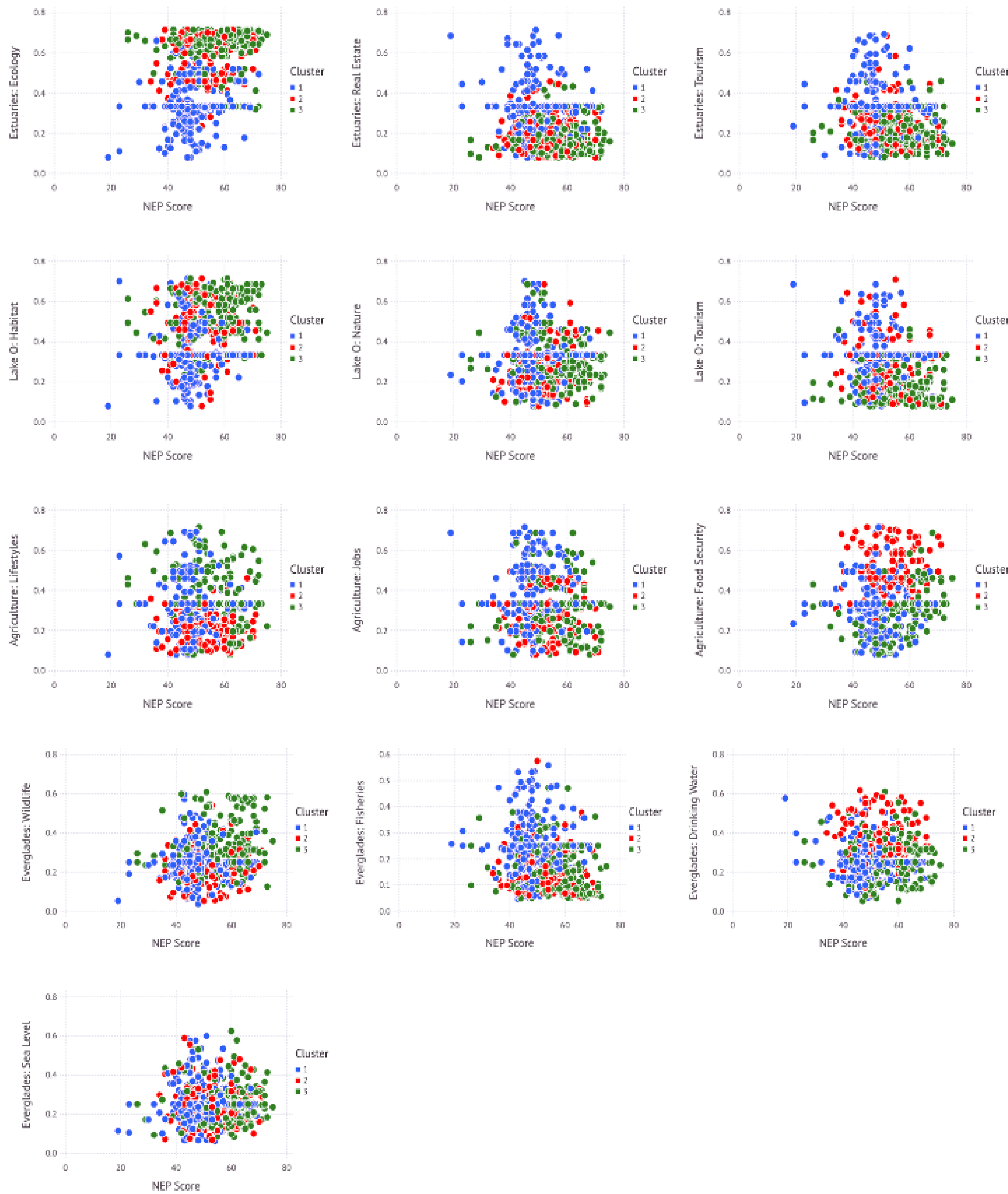

Figure 24. Cluster analysis results comparing criteria preferences using New Ecological Paradigm score.

Key outcomes or other achievements

Climate Variability:

- Florida-mean March precipitation has declined since 1979, with the most pronounced and spatially coherent drying emerging after the late 1990s, confirming March as the month exhibiting the strongest late dry-season drying signal (**Fig. 25**).

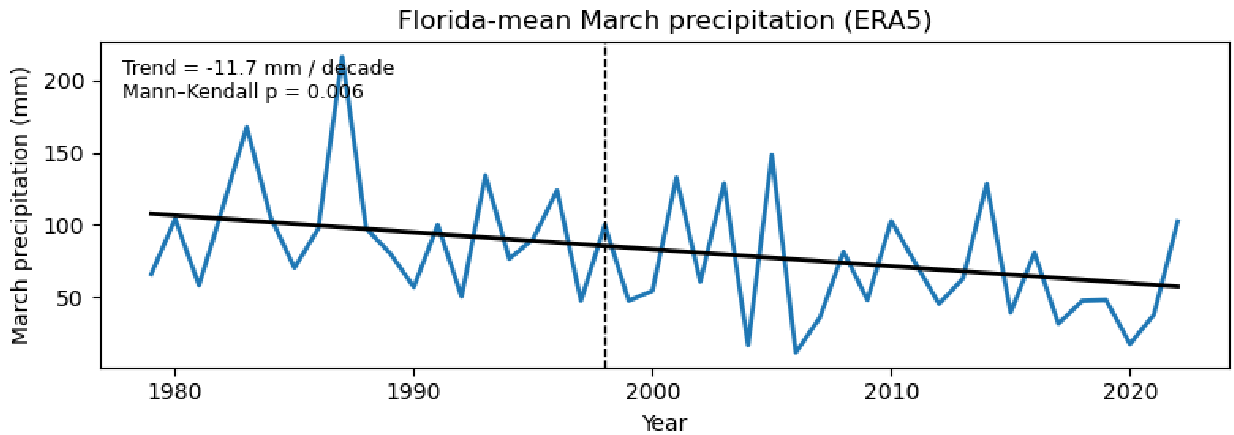

Figure 25. Area weighted and annually averaged hourly precipitation for peninsular Florida for the period 1979 - 2022 (blue line) and linear trend (black line) from ERA5-Land hourly reanalysis.

- Moisture budget analyses further indicate that declining March precipitation is not driven by reduced moisture supply. Evaporation has increased over the same period, and vertically integrated moisture fluxes do not show a compensating decline in moisture availability. Instead, the lack of enhanced moisture convergence over Florida points to dynamically driven suppression of precipitation (**Fig. 26**).

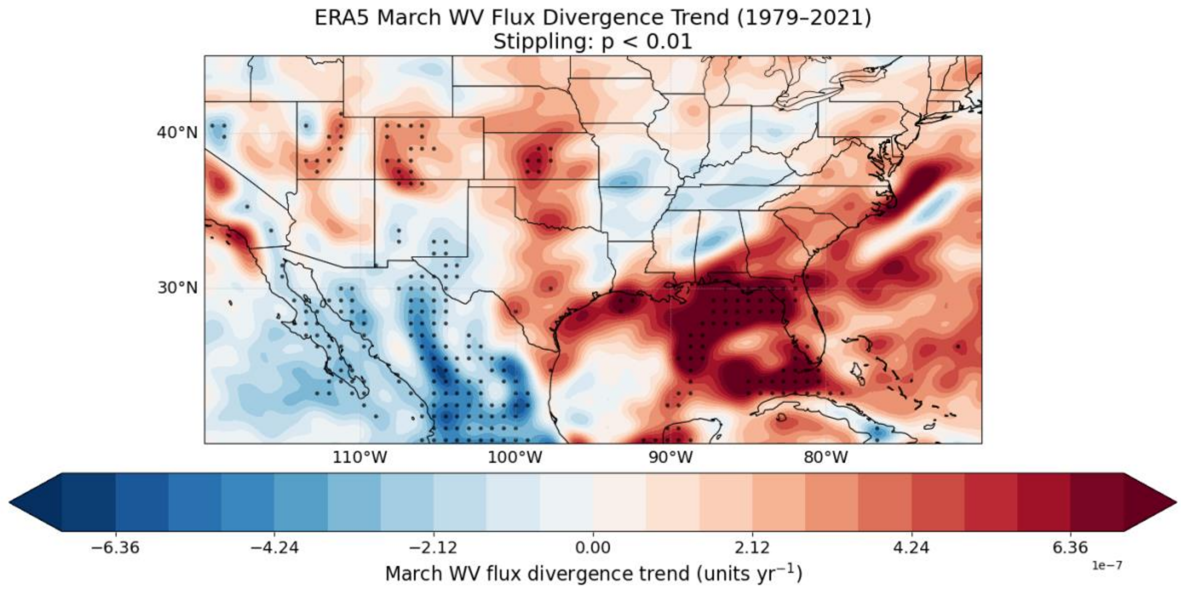

Figure 26. Linear least squares trend of divergence of water vapor flux from ERA5 monthly mass consistent moisture budget from 1979 to 2021

- The decline in March rainfall is not driven by reduced extratropical cyclone frequency; instead, cyclone-associated rainfall has decreased, indicating reduced storm rainfall efficiency (**Fig. 27**).

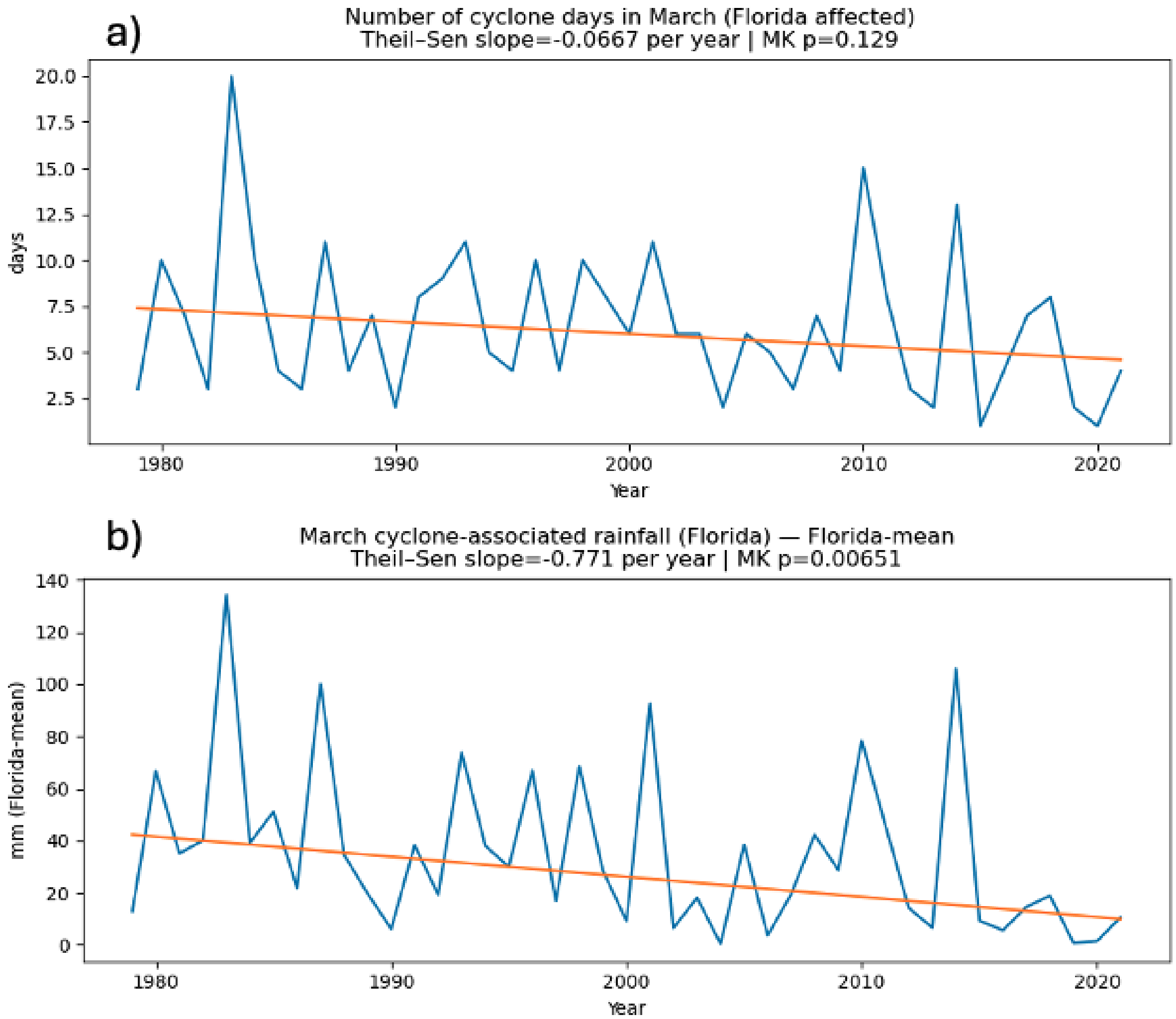

Figure 27. a) number of March days affected by extratropical cyclones (storm center within 500km of Florida) from the Cyclone Network Extraction Tool (CNECT), applied to the ERA5 reanalysis (blue line) and linear least squares trend (orange line). B) March monthly mean hourly rainfall directly attributable to extratropical cyclones from ERA5 hourly data (blue line) with linear least squares trend (orange line).

- Mid-tropospheric subsidence (ω_{500}) during March has increased over Florida and the southeastern United States, pointing to dynamically driven suppression of late dry-season precipitation rather than moisture limitation (**Fig. 28**).

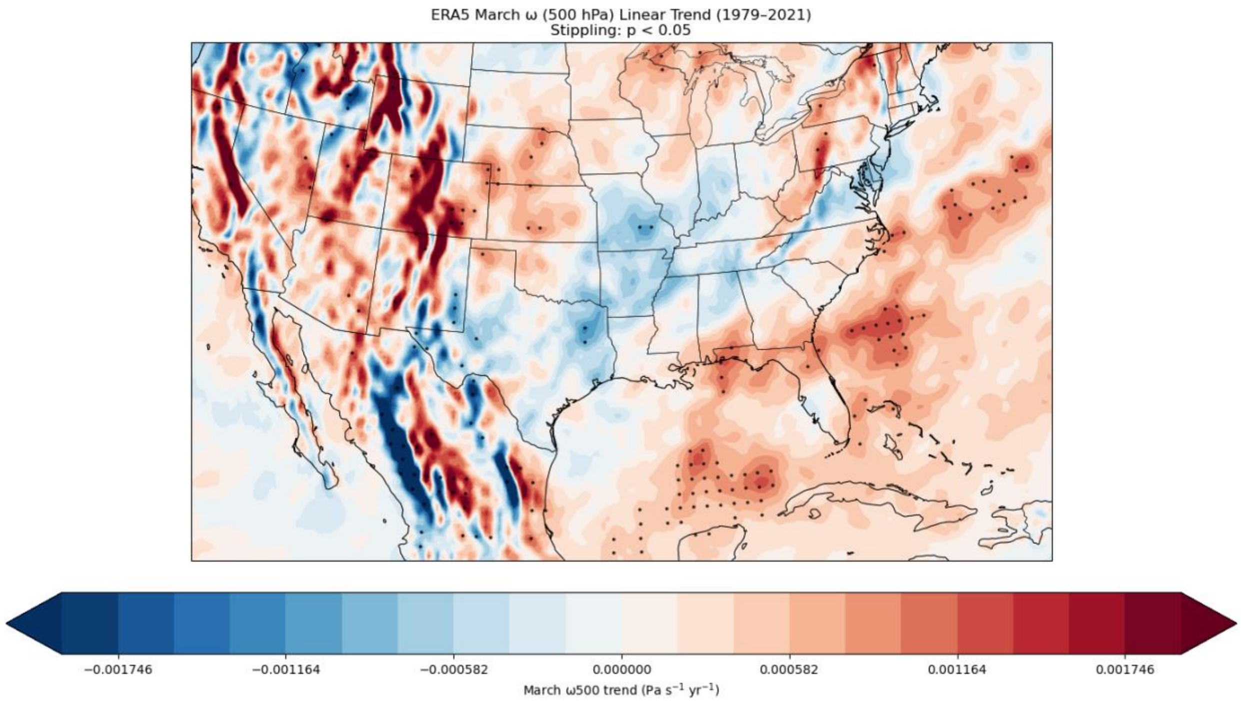

Figure 28. Linear least squares trend of vertical velocity (dp/dt) at 500hPa from ERA5 monthly reanalysis from 1979-2021.

- Identified a clear urban–rural asymmetry in warming, with enhanced nighttime warming in urban Miami (**Table 2**) and stronger daytime warming in the rural Everglades (**Table 3**).
- Demonstrated that wet-season rainfall frequency has increased at the urban site, especially during the early wet season, while rainfall intensity remains unchanged (**Table 4**).

Table 2. Miami and Royal Palm daily minimum temperature ordinary least squares trends

Station	Tmin Trend (°C/decade)	p-value	Significance
Miami Airport (urban)	**+0.39 °C/decade**	< 0.001	Highly significant
Royal Palm (rural)	**+0.05 °C/decade**	< 0.001	Significant but weak

Table 3. Miami and Royal Palm daily maximum temperature ordinary least squares trends

Station	Tmax Trend (°C/decade)	p-value	Significance
Miami Airport	**+0.23 °C/decade**	< 0.001	Statistically significant
Royal Palm (Everglades)	**+0.29 °C/decade**	< 0.001	Statistically significant

Table 4. Miami and Royal Palm wet season wet day (≥1.0mm/day) trends

Site	Precipitation Trend (days/decade)	p-value	Interpretation
Miami Airport (urban)	**+2.6 days/decade**	**0.003**	**Significant increase**
Royal Palm (rural)	+1.0 days/decade	0.38	Not significant

- Showed that rural warming does not produce compensating increases in rainfall, suggesting increased evaporative demand without increased freshwater inputs.
- Advanced an integrated attribution framework linking station observations, reanalysis diagnostics, and land-use (urban – rural) context to climate-driven hydrologic presses and pulses.
- Provided an updated observational benchmark for evaluating how future climate change and urban expansion may influence hydrologic connectivity, ecosystem stress, and restoration outcomes across the Everglades social–ecological system.

Hydrologic Resources & Stressors:

- Landscape-level changes in Everglades hydrology are detectable from satellites.
- DOM is shifting with hydrologic changes, which may be influencing methodological detection of TP using the Solórzano and Sharp (1980) method.
- Pulses of fresh water interact with rising sea levels to alter DOM transport and transformation in estuarine and coastal waters.

Vegetation:

- Basin- and site-specific models of ANPP revealed spatiotemporal shifts in sawgrass productivity, with greater declines in the short-hydroperiod marshes, where water depth had stronger negative effects on ANPP, and positive depth effects in upstream longer-hydroperiod marshes.
- More frequent fires not only promoted faster post-fire recovery of Everglades pinelands but also enhanced their productivity.

- Mangrove regeneration post-disturbance is explained by spatial differences in subsidies and stressors and the composition of species and life stages, underscoring complex regeneration strategies in mixed-species forests.
- Two distinct hydrological controls (shallow <20 cm and moderate 20-40 cm water depths) on *R. mangle* lead to two different spatial expansion patterns: radial expansion and infilling.
- Lessons learned from long-term seagrass monitoring at the FCE LTER informed the new specification of seagrass cover and composition as an Essential Ocean Variable (EOV) (Duffy et al., 2025).
- ICESat-2 and Global Ecosystem Dynamics Investigation (GEDI) altimetry data measure water levels in the Everglades with 6-15 cm level of accuracy depending on the vegetation (Wdowinski and Palomino, 2025)

Consumers:

- Our 10 publications this year are giving us insight on the coupling of movement and trophic ecology, the role of nonnative taxa, and the influence of hydrology on consumer dynamics.
- A significant amount of new movement data has been gathered and published, enabling analyses of nutrient transport mechanisms, variations in movement and foraging strategies, social network dynamics, and further contributions to the objectives of FCE V. The movement dataset that tracks bass, snook, and bull sharks reached over 40 million detections across the 46 deployed receivers, making it one of the largest movement datasets in the FACT network.
- Social network analysis of juvenile bull sharks has shown significant preferential association across multiple years. Manuscript currently in preparation.

Eco-Geomorphology:

- Significant contribution to Everglades restoration planning processes
- Significant contribution to applying FCE data to inform coastal wetland adaptive capacity with manuscript nearing publication in Ecological Applications
- Completion of PhD experimental work improving our understanding of response of aquatic C across freshwater-brackish gradient and to peat collapse, filling a critical gap in knowledge on C cycling in dynamic Everglades coastal ecosystems
- Initiated planning for the 3rd ILTER Open Science Meeting

Social-Ecological Landscape:

- Developed estimates of regional economy-wide impacts of HAB-induced water quality reduction in Lake Okeechobee benefits.

- Completed monetary estimates of values that South Florida residents attach to maintaining high water quality and adequate water supply from Lake Okeechobee for agriculture and the Everglades.
- Completed the first visualization workshop for developing a communication tool concerning the linkage between Everglades restoration and urban resilience.
- Developed a manuscript on the stochastic benefit-cost analysis of the Everglades restoration alternatives.
- Shared the results of FCE LTER cultural and economic values work among a variety of stakeholders, including policy makers, academia, urban planners, seniors and students.
- Graduated a doctoral student who worked on the Florida Everglades and Lake Okeechobee management and economic analysis.
- Published book monograph with leading academic publisher on urban-nature relations

Opportunities for training and professional development

The FCE Education & Outreach Program is designed to empower STEM talent to fully participate in science and engineering. In FCE V, we are developing new programs and adapting the existing ones to focus more specifically on addressing the goals of increasing accessibility, enhancing capacity, and developing the talent to unleash the talent that will advance America's STEM workforce through the following efforts that are designed to train, support, retain, evaluate, and track students that engage with our programs.

Training of Undergraduates and Early Career Scientists: FCE research is an integral part of the biology curriculum at FIU. Over the last year, 4,413 students learned about FCE-based research in 267 course sections (**Table 5**).

Table 5. FIU courses taught by FCE faculty

	Undergraduate	Graduate	Total
# of Instructors	48	26	74
# of Courses	54	41	95
# of Sections	97	170	267
Student Enrollment	3751	662	4413

Early in 2025, we proposed two new interdisciplinary internship courses developed with our colleagues in FIU's STEM Transformation Institute. The courses are offered as variable credit to provide maximum flexibility to our students who may enroll in 0-6 credits to select an experience that fits their individual need. The zero-credit option recognizes a student's work by including it as an internship on their transcripts without incurring enrollment fees. Those students work closely with their mentor to set their goals and expectations. For those students that wish to have a more in-depth experience with additional expectations may choose to enroll for credit.

ISC 3941: STEM Research and Communication

STEM Research and Communication is co-taught by Education and Outreach Coordinator Nicholas Oehm and PI Kominoski and designed to offers hands-on experience in FCE research and science communication. The students with an FCE mentor to design and implement a project, attend workshops/seminars and participate in discussions. By the end of the course, students will submit a capstone project, research report, public outreach material, and/or give an oral presentation.

In this course students are conducting real-world research, gaining insights into laboratory and field methodologies, data analysis, and scientific writing. Alongside research, students are also working the Education and Outreach Coordinator Oehm to develop their science communication skills, learning how to translate complex scientific ideas for various audiences, including peers, educators, policymakers, and the public. Through seminars, workshops, and collaborative projects, interns will enhance their ability to convey scientific information via presentations, reports, multimedia, and digital platforms.

The course aims to foster critical thinking, scientific literacy, and effective communication—preparing students for future careers in research, science journalism, education, and outreach. By the end of the internship, students will complete a capstone project that showcases their research findings and communication skills.

ISC 3951: STEM Engagement & Community Service

This course explores the intersection of STEM disciplines and community service, equipping students with the skills and knowledge to apply their scientific, technological, engineering, and mathematical expertise to address real-world challenges in our community. Students engage in hands-on projects, collaborate with FCE partner organizations, and explore how STEM can promote continuing education, environmental sustainability, and outreach in our community.

Through reflective discussions, project-based learning, and community partnerships, participants will examine the role of STEM professionals as agents of positive change. Emphasis is placed on developing solutions to community-identified problems and inspiring interest in the FCE research program.

By the end of the course, students will have a deeper understanding of how FCE can drive community impact, experience in interdisciplinary teamwork, and the tools to design and implement service-based initiatives that bridge FCE and society.

PCB 3034: Ecology + Lab

Approximately one-third of undergraduates enrolled with our scientists consisted of students in our undergraduate *PCB 3034: Ecology* lecture class (n=1,362). Over half of the Ecology students were co-enrolled in the corresponding lab (n= 701) which requires them to participate in a day-long field trip to Everglades National Park. On that trip, they visit each of the major ecological communities found along a natural salinity gradient where they witness the firsthand impacts of our work while hiking and slogging through the marsh.

Partner Training Programs for Undergraduates and Early Career Scientists

FCE Education and Outreach works closely with the undergraduate and early career scientist training programs based in FIU's Institute of Environment. Our researchers mentor students in the *Centers of Research Excellence in Science and Technology-Center for Aquatic Chemistry and Environment* (CREST- CAChE; NSF# 2111661), *Coastal Ecosystems Research Experience for Teachers in Biology Site* (Coastal BIORETS; NSF# 2240593), and *Coastal Research Experience for Undergraduates Site* (Coastal REU; NSF# 2149700) in FCE-related research projects. Over the last year CREST-CAChE provided 34 graduate fellowships and 108 student affiliates with research supplies, travel to conferences, analyses at the CAChE Lab, and publication fees.

The Coastal REU is our core program for developing undergraduates into leaders of the next generation of interdisciplinary scientists. While the formal programming was paused in 2025, a limited number of REUs were supported through FCE funding (n=2) and the Everglades Foundation Marshall Fellowship (n=1). We have since resumed our recruiting for the Coastal REU through the *NSF Education & Training Application (ETAP)* system to attract new participants to expand the geographic and institutional access of undergraduates engaging with our research and anticipate a full cohort of 16 students for the upcoming summer program. The Everglades Foundation's Marshall Fellowship will recruit candidates directly from Miami Dade College (MDC), Broward College (BC), and College of the Florida Keys (CFK). Additionally, the Coastal BIORETS has expanded those efforts to include 8 new teachers since the previous reporting period.

<u>Evaluation:</u>
In collaboration with FIU's STEM Transformation Institute, we are conducting Research on STEM Education to study the impacts of our Education and Outreach programs such as the RET and REU. Specifically, we are currently engaging a graduate student to evaluate the strengths, weaknesses, opportunities, and challenges of our RET program. As part of our Formal Education and Research Training, the RET programs align with the LTER Network's goals for education, by promoting training, teaching, learning about long-term ecological research and the Earth's ecosystems, and educating the next generation of scientists (SanClements et al., 2022).

The *STEM Research and Communication* and *STEM Engagement & Community Service* are designed as complementary courses to address both the education and outreach needs of FCE. Through these courses we are providing an additional layer of support by having the students work directly with our Education and Outreach Coordinator. We are developing instruments to provide feedback and evaluate the effectiveness of our programs at strengthening their FCE identity by connecting them to FCE's network of students working in other research groups.

Post-doctoral and early career 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. Mentoring activities for postdocs Dr. James & Dr. Rodemann included coaching on faculty position applications and faculty job interview talk, feedback on publications submitted, and leadership opportunities.

Communicating results to communities of interest

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

Drs. Fache and Bhat presented their work on ecosystem service valuation in both graduate and undergraduate classes during the reporting year. Vorseth, Bhat, and Stainback presented their Lake Okeechobee economic impact study at the Greater Everglades Ecosystem Research Conference in April 2025. Wakefield and Bhat also shared their research at the FCE LTER All Scientists Meeting. Additionally, Bhat presented the story of the Florida Everglades restoration for the past 40 years and its status with a group of seniors at a local temple. Wakefield also presented her work on the Everglades to urban resilience at the Florida Planning Conference, the Association of American Geographers Annual Meeting, in an invited keynote lecture at University of Heidelberg, and at a workshop on planetary urbanization and environmental change at University of Ottawa.

Plans to accomplish goals during the next reporting period

Climate Variability: During the next reporting period, we will extend our hydroclimate diagnostics to more explicitly quantify how changes in precipitation seasonality and storm-driven rainfall translate into shifts in the magnitude, frequency, and timing of freshwater hydrologic pulses and presses affecting the Everglades coastal gradient. Specifically, we will

1. expand reanalysis-based attribution analyses to evaluate changes in storm-track behavior, moisture transport, and large-scale circulation patterns associated with March drying;
2. assess whether wet-season intensification is accompanied by shifts in wet-season timing, rainfall concentration, and extreme-event contributions; and
3. develop a framework for comparing observed changes against downscaled and/or CMIP-based future projections to evaluate the likelihood of continued divergence between wet-season intensification and dry-season drying.

These efforts will directly support FCE V by improving predictability of climate-driven hydrologic disturbances and their potential to generate disturbance legacies that influence ecosystem resilience, restoration outcomes, and long-term coastal social-ecological trajectories.

Hydrologic Resources & Stressors:

- Complete a comparison of TP using two analytical methods (Solórzano and Sharp 1980; persulfate) using surface water collected from all FCE sites from November 2025-May 2026.
- Identify Si- or Fe-derived molecules and their respective concentrations that are interfering with TP values obtained using the Solórzano and Sharp (1980) method.
- Compare surface and groundwater fluorescent DOM.
- Continue to analyze and publish long-term surface and groundwater chemistry data.

Vegetation:

Metacommunity:

- We will generate spatially explicit and exhaustive connectivity metrics for macrophyte and microbial communities across large extents within ENP to explore and model the effect of hydrological connectivity on metacommunity structure and seasonal to interannual variabilities.
- We will integrate plot-level community data sets with long-term data to model the contribution of spatial connectivity to community structure and synchrony.
- We will further extend the high-resolution landscape integration to water conservation area 3A (WCA3A) just North of ENP to extend modeling of spatial dynamics of freshwater communities to the larger domain that is culturally relevant and important to native communities.

Productivity:

- We will use productivity models established from FCE LTER long-term data in combination with hydrological time-series data to predict productivity of *Cladium jamaicense* and *Rhizophora mangle* communities across the broader FCE domain. Together with the spatial expansion models of *Rhizophora mangle* we aim to predict productivity shifts in the south-eastern coastal Everglades.
- We will establish seagrass cover-productivity relationships at FCE LTER sites with the goal of formulating predictive models.
- We will map seagrass extent in Florida Bay.

Consumers:

- We will continue long-term monitoring of bull sharks, common snook, and Florida largemouth bass population structure and movement through passive acoustic telemetry. For bull sharks we will continue quarterly longline sampling, mark-recapture methods, and fecal swabs. For bass, snook, and other fishes we will continue monthly electrofishing efforts to characterize change in the community.
- Continued augmentation of the acoustic telemetry array with loaned receivers through collaboration with the Ocean Tracking Network is planned through 2026. This will allow for higher resolution of commuting downstream movements of sharks for analysis of rate of travel and any periodicity.
- We intend to start tagging and tracking lemon sharks. Collection of data on lemon shark movements and residence time through acoustic telemetry will allow for a comparison of habitat use, residency, movement tactics, and interspecific interaction with bull shark data.

- We will continue to collect fecal biomarkers across wet and dry seasonal variations to maintain multi-year, fine-scale, species-level comparisons of prey and potential shifts in freshwater-mediated prey in bull sharks.
- We will continue to collect muscle, fin, and blood samples for stable isotopic analysis (^{34}S, ^{13}C, and ^{15}N) to examine spatiotemporal trends in trophic niches.
- Assess long-term, multi-year, catch rates of juvenile bull sharks in relation to environmental parameters to build predictive models of nursery habitat use.
- Further incorporate animal-borne data loggers, environmental monitoring, and active tracking to investigate whether dynamic energy landscapes influence the fine-scale movements and activity patterns of bull sharks and other species.
- Monitor trends in bull shark behavioral and social dynamics through social network and genetic analyses.
- Publish at least two FCE-related scientific papers, dissertations, or theses in 2026, and present our findings at scientific conferences and workshops. One of the papers in prep is to be titled: *Juvenile Everglades Bull Sharks Display Preferential Associations in an Estuarine Environment*. Authors: Hemsi, S., Roose, R., Sample, W., Gastrich, K., Garcia Barcia, L., & Heithaus, M.
- We will continue to measure nutrient excretion rates in macropredators and whole-body nutrient content of native and non-native prey species to better understand the role of consumer mediated nutrient transport. This will be used to better understand secondary biomass production in the system.
- We will continue to collect long-term electrofishing data and plan to analyze it with community trajectory analysis, a multivariate approach that estimates compositional stability of consumer assemblages. This will provide a better view of stability in the system.

Eco-Geomorphology:

- Continue long-term measurements
- Continue the Mangrove Experimental Migration Exercise (MEME)
- Continue PhD work
- Continue modeling studies

Social-Ecological Landscape:

- Submit the two manuscripts which are being either completed or drafted to refereed journals for review and publication. The results will also be presented at regional and national conferences and workshops.
- Complete first social-ecological landscape data visualization project
- Conduct interviews that will be used as background data for future work on cultural ecosystem services valuation and visualizations

Impacts

Impact on the development of the principal disciplines

FCE supported datasets are leading the way for long-term monitoring efforts, which are needed to contextualize findings and meet restoration objectives in the greater Everglades.

Our work evaluates the impact on non-native species introductions, a critical aspect for protecting natural ecosystems.

Our synthesis of consumer mediated nutrient dynamics is influencing how we think about nutrient budgets across marine ecosystems.

The economic models and results developed under the study are used to enrich graduate level courses offered in the Department of Earth and Environment.

The project advanced the principal disciplines of environmental economics and ecological valuation by integrating ideological constructs into non-market valuation frameworks. It demonstrated how stakeholder worldviews influence economic preferences, enriching valuation models with psychological insights. The research also contributed to urban studies and climate adaptation by linking ecological futures with infrastructure design. The project also advanced urban design and human geography by strengthening an explicitly social-ecological conception of the South Florida landscape in which infrastructure, land use change, hydrology, and environmental governance are treated as an integrated spatial system rather than separate domains. FCE LTER science, especially long-run observations of ecological transformation, disturbance regimes, and coupled land–water dynamics, has provided an empirical basis for rethinking the urban region not as an “edge” outside ecology but an active driver of ecological production and vulnerability. Overall, it fostered interdisciplinary collaboration and promoted more inclusive, context-sensitive approaches to ecosystem management and policy.

Impact on other disciplines

The Economic and Cultural Value research component has made a strong interdisciplinary impact across environmental economics, ecological science, and urban studies. It quantified the economic losses from harmful algal blooms, linking land use and water quality to tourism and regional livelihoods. It also advanced ecosystem service valuation by integrating ideological constructs and stakeholder heterogeneity into economic modeling. The use of NEP revealed how environmental worldviews shape public support for restoration, bridging psychology and policy. The above work also informed communication strategies and survey design, improving outreach and engagement in water management. Finally, Wakefield's urban analysis expanded the conversation to climate adaptation, connecting ecological futures with urban design and resilience.

The project overall influences urban design, geography, and environmental economics by providing one of the most robust long-term empirical foundations in the US for understanding the Everglades as an evolving socio-ecological and infrastructural system. This work reframes the Everglades not as "nature" adjacent to urbanization but as a managed, engineered, and historically produced landscape in which ecological dynamics, development patterns, and restoration decisions are inseparable. For urban design and planning, this increases the importance of hydrological governance, stormwater and coastal water quality, and green infrastructure as central drivers of urban futures and resilience.

Impact on the development of human resources

Active Recruitment

FCE is working across the K-20 spectrum to ***Improve Accessibility*** across all segments of our community and our scientists play a key role in the active recruitment, educating and training a large talent pool that is prepared for today's workforce. We are engaging and mentoring undergraduates from all communities in our research and recruiting them directly into our graduate programs. Our ***Geographic and Institutional Partnerships*** give our researchers access to a large talent pool of STEM majors and the opportunity to discuss and directly recruit students enrolled in courses taught by 59 FCE collaborators at 31 universities distributed across 18 states (AL, AZ, CA, CT, DC, FL, GA, HI, IL, LA, MD, MS, NC, OK, PA, SC, TN, UT, and VA), DC, Germany, Netherlands, and Canada (**Fig. 29**).

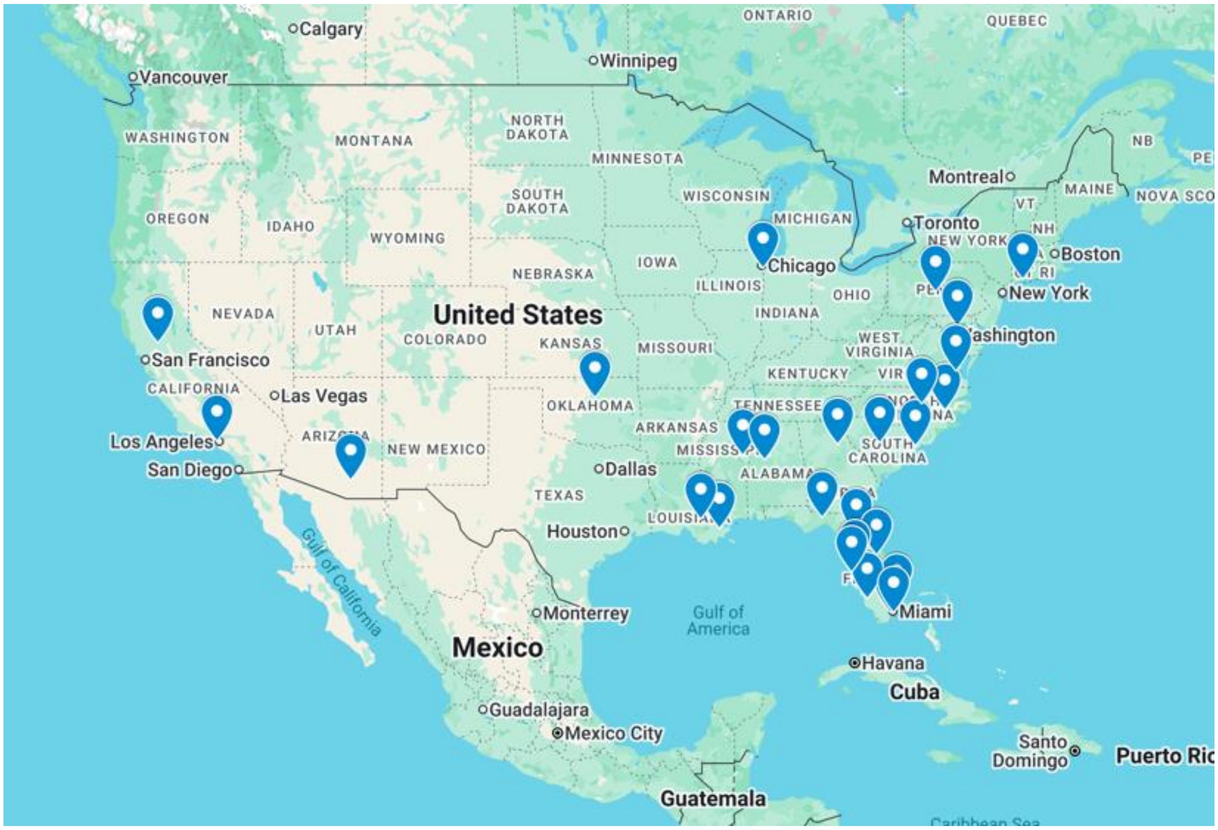

Figure 29. US distribution of FCE collaborators

Partner programs and our collaborators play an important role in recruiting external graduate and undergraduate students to work at FCE. The *Centers of Research Excellence in Science and Technology-Center for Aquatic Chemistry and Environment* (CREST- CAChE; NSF# 2111661) and *Coastal Ecosystems Research Experience for Undergraduates Site* (CE-REU; NSF# 2149700) assist with recruiting candidates through the *NSF Education & Training Application (ETAP)* system, other CREST and LTER sites, and their collaborators working at many U.S. Department of Energy's Established Program to Stimulate Competitive Research (EPSCoR) institutions, predominantly undergraduate institutions (PUIs), and two- year colleges. In addition to these efforts, the Everglades Foundation supports additional REUs to work at FCE each year through its John Marshall Fellowship which allocates a portion of those funds towards recruiting candidates from two-year colleges such as Miami Dade College, Broward College (BC), and College of the Florida Keys (CFK).

In addition to our broad geographic and institutional recruitment, many students are recruited directly through more than 250 course sections taught by FCE scientists at FIU. Over 70 of our researchers are actively teaching in classrooms at FIU where over 56,000 students are enrolled which includes more than 10,000 STEM majors (**Table 5**). Many of those students are First Generation (~20%) and/or economically disadvantaged

Pell eligible (~43%) and FIU is ranked No. 1 in Social Mobility by US News and World Report (U.S. News & World Report, 2026).

Graduate student in the Earth System Sciences doctoral program, Chloe Vorseth received her PhD degree and moved on to become an Environmental Policy Expert for a federal agency. A post-doctoral research associate advanced her understanding on ecosystem services valuation.

Impact on teaching and educational experiences

K-12 Schoolyard Activities, Informal Education & Participatory Science
Working in collaboration with and through shared funding, the FCE EO and Coastal BIORETS program provided logistical, training, and stipend support to 8 new teachers. This year *Understanding and Improving How Teachers Use Context in Science Instruction (NSF # 2509524)* was funded and will focus on understanding how teacher use field experiences to contextualize instruction in the classroom. This will include the utilization of *Data Nugget* lessons produced by previous RETs augmented by field experiences that includes visiting the research sites with PI Kominoski where he conducted the research described in those lessons.

Mahadev Bhat and Anna Fache have used the economic models and results developed under the study extensively in Methods in Sustainable Resource Management graduate course and Wetland Ecosystem Restoration class taught in the Earth and Environment Department to enrich graduate level courses. Students in this class gained expertise in conducting ecosystem services assessment, using the examples and insights from this research. Wakefield uses her research to provide empirical case studies in graduate and undergraduate courses at FAU on sustainable urban development, environmental policy and programs, and urban design theories.

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 Datasets

The FCE Information Management System (FCE IMS) contains 229 datasets, which are available through the FCE LTER Data Catalog on the FCE website (https://fcelter.fiu.edu/data/index.html) and in the EDI Data Repository. Fourteen datasets were added, and 38 long-term datasets were updated between 01/01/2025 and 12/31/2025. All datasets are publicly accessible. A table of titles and DOIs for FCE LTER datasets deposited in the EDI Data Repository is included the Appendix of this report.

Data Processing

FCE LTER finished 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 or update metadata for all new and existing 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 DOIs from the EDI Data Repository detected 15 papers published since 01/01/2025 that contain 17 citations of FCE LTER datasets, and a citation list from EDI yielded an additional published paper citing 1 FCE LTER dataset 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 66,837 non-robot downloads of FCE datasets between 01/01/2025 and 12/31/2025. Seven datasets had approximately 6,400 downloads apiece, most of which are checksum requests from DataONE. A better estimate of downloads from PASTA is thus approximately 21,403 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, and the EDI Data Repository. 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. 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 2025, G. Kamener contributed to the FCE Student Group's Data Management Series of presentations and workshops for the FCE community by presenting on "Introduction to Data Management and Publication." He presented to the broader research community at the Greater Everglades Ecosystem Restoration Conference on "A Unique History: Long-Term Ecological Data at the FCE LTER Program." He held weekly IM office hours for FCE members and regularly attended in-person FCE student Think Tank Thursday events to assist with IM-related questions as students worked with their data and metadata. He also provided informal training to FCE staff to increase use of reproducible, scripted workflows in R to prepare data for publication.

IT Infrastructure

The FCE IM team manages 7 virtual Linux servers, a Sharepoint platform, a GitHub organization, and 3 computer workstations. The virtual servers and Sharepoint platform are maintained by Florida International University's (FIU) Division of Information Technology, for which FCE LTER pays a yearly and monthly fee in the case of the virtual servers and no fee for Sharepoint. The virtual servers provide production, development, and disaster-recovery environments and host PostgreSQL database servers, web servers, and an FTP server. Multiple back-ups ensure the website stays operational and that FCE data are secure. The FCE website consists of static pages hosted on the Cascade CMS and dynamic pages hosted on the FCE virtual web server. Florida International University manages updates to the Cascade CMS, and the FCE IM and Project Manager have access to create and edit FCE web pages in Cascade. The dynamic pages on the FCE website use PHP to query the PostgreSQL database. Dynamic and static web pages share a common Foundation framework to maintain a common look and feel throughout the website.

FCE's PostgreSQL database, co-maintained and co-populated by the IM and the Project Manager, is used to manage FCE publications, presentations, research site information, personnel and project information for display on the FCE website. The IM also maintains a system for tracking dataset submission compliance in the PostgreSQL database. FCE's GitHub organization provides a centralized location to store and track project-related code and documentation.

Other contributions

The FCE IM serves as co-chair of the LTER Information Management Executive Committee, which meets monthly via Zoom to plan events and coordinate cross-site activities. The FCE IM also participated in monthly LTER Network IM Virtual Water

Cooler meetings and co-led the planning and execution of the Network's annual Information Managers Committee meeting.

The FCE IM began developing a prototype, automated-workflow in GitHub to check for and download updated FCE dataset from the EDI data repository, combine data from multiple datasets into cohesive outputs for analysis, and generate interactive plots that can be hosted on the FCE website.

Products

Publications

Book

Wakefield, S. 2025. Miami in the Anthropocene: Rising Seas and Urban Resilience. University of Minnesota Press: Minneapolis, Minnesota

Journal Articles

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Atkinson, C.C., N. Viadero, M. White, V. Goldner, J. Sturges, J. Rodemann, W.R. James, J.S. Lesser, R.O. Santos, and J.S. Rehage. 2025. Incorporating fish movement data into habitat suitability indices: A conceptual framework for coastal mesopredators. Florida Chapter of the American Fisheries Society Annual Meeting, St. Augustine, Florida, May 13, 2025 - May 15, 2025.

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Costa, S.V., J. Rodemann, W.R. James, R.O. Santos, and J.S. Rehage. 2025. Uncovering secrets of Spotted Seatrout: Fine-scale habitat use and foraging behavior through YAPS acoustic telemetry. International Conference on Fish Telemetry, Traverse City, Michigan, June 8, 2025 - June 13, 2025.

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Dorn, N.J. 2025. What could be lost if Lostmans Slough gets lost in the hydro shuffle? Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 22, 2025.

Eggenberger, C., R. Rezek, R.O. Santos, C.J. Madden, J.S. Rehage, and R.M. Price. 2025. Linking movement strategy selection to the trophic dynamics of an estuarine predator. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 24, 2025.

Fernandez, M., N.J. Dorn, and J.C. Trexler. 2025. Shifts in food web topology and biomass accrual of wetland consumers along an experimental discharge gradient. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 23, 2025.

Fernandez, M., N.J. Dorn, and J.C. Trexler. 2025. Shifts in food web topology and biomass accrual of wetland consumers along an experimental discharge gradient. Society for Freshwater Science Annual Meeting, San Juan, Puerto Rico, May 19, 2025.

Fernandez, M., N.J. Dorn, and J.C. Trexler. 2025. Shifts in food web typology and biomass accrual of wetland consumers along an experimental discharge gradient. Society for Freshwater Science Annual Meeting, San Juan, Puerto Rico, May 18, 2025 - May 22, 2025.

Gaiser, E.E. 2025. Restoring connectivity while maintaining oligotrophy: long-term signals of legacy nutrient spiraling in benthic microbial mats. Society for Freshwater Science Annual Meeting, San Juan, Puerto Rico, May 21, 2025.

Gann, D., and J.H. Richards. 2025. Spatial scaling of categorical data: Effects of class precision on detection accuracy from medium resolution multispectral data. 12th INTECOL Wetlands Conference, Tartu, Estonia, July 1, 2025.

Garcia, D., and D. Whitman. 2025. Multitemporal geophysical mapping of saltwater intrusion in the southern region of the Everglades National Park. 2025 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, April 30, 2025 - May 2, 2025.

Garcia, D., and D. Whitman. 2025. Multitemporal geophysical mapping of saltwater intrusion in the southern region of the Everglades National Park. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 23, 2025.

Goldner, V., M. White, C. Eggenberger, A.A. Jones, C.C. Atkinson, J. Rodemann, W.R. James, J. Massie, A.M. Kroetz, P. O'Donnell, R. Boucek, R.O. Santos, and J.S. Rehage. 2025. Gone but not forgotten: collaborative telemetry network provides insight into out-of-system movements of Common Snook (Centropomus undecimalis). International Conference on Fish Telemetry, Traverse City, Michigan, June 8, 2025 - June 13, 2025.

Goldner, V., M. White, C. Eggenberger, A.A. Jones, C.C. Atkinson, J. Rodemann, W.R. James, J. Massie, A.M. Kroetz, P. O'Donnell, R. Boucek, R.O. Santos, and J.S. Rehage. 2025. Gone but not forgotten: Collaborative telemetry network provides insight into out-of-system movements of Common Snook (Centropomus undecimalis). 2025 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, April 30, 2025 - May 2, 2025.

Guell, B., and N.J. Dorn. 2025. Hydrologic determinants of Everglades Crayfish presence and aboveground biomass in the Southwestern Everglades. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 22, 2025.

Herrera, A., M.I. Cook, and N.J. Dorn. 2025. Asian Swamp Eel prey use and selection in the Everglades. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 23, 2025.

Herrera, A., M.I. Cook, and N.J. Dorn. 2025. Prey use and selectivity of the invasive Asian swamp eel in a sub-tropical wetland. Society for Freshwater Science Annual Meeting, San Juan, Puerto Rico, May 19, 2025.

Herteux, C., J. Goeke, and N.J. Dorn. 2025. Impact of large fishes on SAV growth and establishment in the STAs. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 22, 2025.

Hormiga, S., E.E. Gaiser, M.S. Ross, J.W. Fourqurean, and R. Vidales. 2025. Carbonate sediment production in coastal wetlands: Periphyton contributions and diatom indicators. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 23, 2025.

Innocent, H., A. Wachnicka, and E.E. Gaiser. 2025. Contrasting responses of phytoplankton and periphyton to spatially variable TN:TP in a large, shallow hypereutrophic lake. Society for Freshwater Science Annual Meeting, San Juan, Puerto Rico, May 19, 2025.

James, W.R., G. Badlowski, M. Coppola, J. Rodemann, J.S. Lesser, R. Rezek, J.S. Rehage, and R.O. Santos. 2025. A system level assessment of spatiotemporal changes of trophic function using e-scapes across seagrass seascapes. Coastal and Estuarine Research Federation (CERF) 2025, Richmond, Virginia, November 10, 2025.

Jonas, A., and N.J. Dorn. 2025. Documenting the impacts of sawgrass encroachment in sloughs of the central Everglades. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 23, 2025.

Jonas, A., and N.J. Dorn. 2025. Vegetation encroachment produces fewer fish and more insects in a shallow subtropical wetland. Society for Freshwater Science Annual Meeting, San Juan, Puerto Rico, May 18, 2025 - May 22, 2025.

Jones, A.A., J.S. Rehage, R.O. Santos, J. Rodemann, J.S. Lesser, R. Boucek, J. LaBadie, and W.R. James. 2025. Potential role of regional diet and resource shifts in declining seagrass flat fishery quality. Coastal and Estuarine Research Federation (CERF) 2025, Richmond, Virginia, November 10, 2025.

Kamener, G. 2025. A unique history: Long-term ecological data at the FCE LTER Program. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 24, 2025.

Kleindl, P., C. Candelario, and E.E. Gaiser. 2025. Co-variation of macrophyte and microbial mat standing stocks along wetland resource gradients. 2025 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, April 30, 2025 - May 2, 2025.

Kleindl, P., C. Candelario, and E.E. Gaiser. 2025. Co-variation of macrophyte and microbial mat standing stocks along wetland resource gradients. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 23, 2025.

Kleindl, P., C. Candelario, and E.E. Gaiser. 2025. Co-variation of macrophyte and microbial mat standing stocks along wetland resource gradients. Society for Freshwater Science Annual Meeting, San Juan, Puerto Rico, May 22, 2025.

Kleindl, P., E.E. Gaiser, and N. Oehm. 2025. Inspiring art and connecting communities through Everglades science. Society for Freshwater Science Annual Meeting, San Juan, Puerto Rico, May 22, 2025.

Kominoski, J.S., K.J. Anderson, and M.A. Smith. 2025. Shifting freshwater hydrology and saltwater intrusion characterize changing dissolved organic matter along coastal wetland gradients. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 22, 2025.

Kominoski, J.S. 2025. Chasing coastal carbon: Organic and inorganic sources and sinks along shifting freshwater-marine gradients. ASLO 2025 Aquatic Sciences Meeting, Charlotte, North Carolina, March 28, 2025.

Kominoski, J.S. 2025. Lessons from 25 years of research in the Florida Everglades. Academy of Science, Engineering, and Medicine of Florida, Annual Meeting, Orlando, Florida, November 7, 2025 - November 8, 2025.

Kominoski, J.S. 2025. Shifting freshwater hydrology and saltwater intrusion characterize changing dissolved organic matter along coastal wetland gradients. Ocean Carbon Biogeochemistry Meeting, Virtual, June 2, 2025 - June 6, 2025.

Krause, J.R., C. Cameron, A. Arias-Ortiz, M. Cifuentes-Jara, S. Crooks, M. Dahl, D.A. Friess, H. Kennedy, K.E. Lim, C.E. Lovelock, N. Marba, K.J. McGlathery, M.P.J. Oreska, E. Pidgeon, O. Serrano, M.A. Vanderklift, L.-W. Wong, S.M. Yaakub, and J.W. Fourqurean. 2025. Global seagrass carbon stock variability and potential emissions from seagrass loss. ASLO 2025 Aquatic Sciences Meeting, Charlotte, North Carolina, March 31, 2025.

Kuntz, A., N.J. Dorn, E. Cline, and M.I. Cook. 2025. Negative correlations between Mayan Cichlid and Native Sunfish catch rates. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 21, 2025 - April 24, 2025.

Lamb-Wotton, L., T. Troxler, D. Gann, K. Ishtiaq, and S.E. Davis. 2025. Landscape-scale evaluation of vegetation cover and hydrologic conditions along the southwest coast of Everglades National Park. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 24, 2025.

Lara, M., R.M. Price, D.E. Ogurcak, M.S. Ross, A. Band, and B. Charkhian. 2025. Determining spatial and temporal sources of water in a coastal wetland system using geochemical tracers, Southeast Florida. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 23, 2025.

Lesser, J.S., J.S. Rehage, B.A. Strickland, M. Schrandt, J.L. Davis, and R.O. Santos. 2025. Using fisheries-independent monitoring data to assess nekton assemblage change across Everglades National Park in response to disturbance and restoration. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 22, 2025.

Lesser, J.S., J.S. Rehage, B.A. Strickland, M. Schrandt, J.L. Davis, W.R. James, and R.O. Santos. 2025. Stable, but for how long? Evaluating methods for measuring stability across timescales in coastal Florida. Coastal and Estuarine Research Federation (CERF) 2025, Richmond, Virginia, November 13, 2025.

Lesser, J.S., M. White, J. Sturges, and J.S. Rehage. 2025. Bass trophic ecology and shifting habitat connectivity patterns in the Everglades. American Fisheries Society Annual Conference, San Antonio, Texas, August 10, 2025 - August 14, 2025.

Lesser, J.S., M. White, J. Sturges, and J.S. Rehage. 2025. Invasion-mediated shifts in energy flow and connectivity in the Florida Coastal Everglades. Society for Freshwater Science Annual Meeting, San Juan, Puerto Rico, May 21, 2025.

Mesa, X., J.P. Sah, and D. Gann. 2025. Quantifying spatial patterns of woody vegetation embedded in Everglades freshwater wetland ecosystems. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 23, 2025.

Mock, A., and N.J. Dorn. 2025. Fish community shifts associated with freshwater management for Everglades coastal wetlands. Coastal and Estuarine Research Federation (CERF) 2025, Richmond, Virginia, November 13, 2025.

Mock, A., J.C. Trexler, P. Kleindl, M. Fernandez, E.E. Gaiser, and N.J. Dorn. 2025. Interactive effects of fish predators and nutrient enrichment on aquatic insect emergence. 2025 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, April 30, 2025 - May 2, 2025.

Mock, A., J.C. Trexler, P. Kleindl, M. Fernandez, E.E. Gaiser, and N.J. Dorn. 2025. Interactive effects of fish predators and nutrient enrichment on aquatic insect emergence. Society for Freshwater Science Annual Meeting, San Juan, Puerto Rico, May 19, 2025.

Montenegro, K., J.S. Kominoski, E. Castañeda-Moya, E. Solohin, M.C. Prats, and K.R.T. Whelan. 2025. Quantifying biomass carbon storage and soil elevation dynamics in mangrove forests of Biscayne National Park. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 23, 2025.

Montenegro, K., J.S. Kominoski, E. Castañeda-Moya, K.R.T. Whelan, M.C. Prats, E. Solohin, R. Bendana, and C. Reisa. 2025. Blue carbon storage facilitates soil elevation gains in coastal mangrove forests of Biscayne National Park . Coastal and Estuarine Research Federation (CERF) 2025, Richmond, Virginia, November 13, 2025.

Montenegro, K., J.S. Kominoski, E. Castañeda-Moya, K.R.T. Whelan, M.C. Prats, E. Solohin, R. Bendana, and C. Reisa. 2025. Quantifying biomass carbon storage and soil elevation dynamics in mangrove forests of Biscayne National Park. 2025 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, April 30, 2025 - May 2, 2025.

Montiel, K., J.S. Kominoski, and A. Simonsen. 2025. Microbial specialization in dauciform roots of Cladium jamaicense: Evidence of anaerobic and metabolic specialization. 2025 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, April 30, 2025 - May 2, 2025.

Morales, J., K. Montenegro, J.S. Kominoski, and N. Oehm. 2025. Comparing methods of above-ground biomass estimation in coastal mangrove forests of Biscayne National Park (Florida, USA). 2025 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, April 30, 2025 - May 2, 2025.

Olivera, R., and R. Burgman. 2025. Physical mechanisms of precipitation in Florida. 2025 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, April 30, 2025 - May 2, 2025.

Ortiz Munoz, L., and J.S. Kominoski. 2025. Microbes drive seasonal transformations in dissolved organic matter composition and bioavailability in urban canals. Society for Freshwater Science Annual Meeting, San Juan, Puerto Rico, May 18, 2025 - May 22, 2025.

Patalinghug, J.M.R., and N.I. Wisnoski. 2025. Microbial ecology of mangroves: A metacommunity perspective. 2025 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, April 30, 2025 - May 2, 2025.

Poulin, B. 2025. Consequences of sulfur applications on DOM chemistry across the Greater Everglades Ecosystem. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 22, 2025.

Pulido, C., J.P. Sah, and K. Beltran. 2025. From roots to leaves: Understanding multi-scale trait variation in freshwater wetlands. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 23, 2025.

Rehage, J.S., M. White, V. Goldner, J. Sturges, C.C. Atkinson, W.R. James, J.S. Lesser, and R.O. Santos. 2025. Linking the movement and trophic ecology of consumers to enhance our understanding of how fisheries respond to hydroclimatic variation. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 23, 2025.

Rehage, J.S., R.O. Santos, J. Rodemann, M. White, J. Sturges, C.C. Atkinson, M.R. Heithaus, W. Sample, S. Hemsi, K.R. Gastrich, T.A. Frankovich, Z.F. Fratto, B.A. Strickland, V.A. Paz, C.J. Madden, P. Matich, and A.J. Adams. 2025. Coastal Fisheries Research Lab: Florida International University acoustic telemetry updates. Florida Atlantic Collaborative Telemetry Annual Meeting, Jensen Beach, Florida, February 2025.

Rehage, J.S., R.O. Santos, M. White, W.R. James, N. Viadero, J. Massie, and R. Boucek. 2025. Cause and consequences of Common Snook (Centropomus undecimalis) space use specialization in a subtropical riverscape. Florida Chapter of the American Fisheries Society Annual Meeting, St. Augustine, Florida, May 13, 2025 - May 15, 2025.

Rehage, J.S., R.O. Santos, M. White, W.R. James, N. Viadero, J. Massie, and R. Boucek. 2025. Cause and consequences of Common Snook (Centropomus undecimalis) space use specialization in a subtropical riverscape. International Conference on Fish Telemetry, Traverse City, Michigan, June 8, 2025 - June 13, 2025.

Restrepo, V., J.S. Kominoski, and J.P. Sah. 2025. Quantifying marsh aboveground net primary productivity along shifting freshwater-to-saltwater gradients. 2025 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, April 30, 2025 - May 2, 2025.

Restrepo, V., J.S. Kominoski, and J.P. Sah. 2025. Quantifying marsh aboveground net primary productivity along shifting freshwater-to-saltwater gradients. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 23, 2025.

Reyes, J., C. Cocca, and D. Gann. 2025. Spatiotemporal patterns of tidal creek expansion and riparian mangroves in the Southern Everglades. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 23, 2025.

Rodemann, J., R.O. Santos, T. Strazisar, Z.F. Fratto, C.J. Madden, T.A. Frankovich, and J.S. Rehage. 2025. Identifying nutrient sources driving algal blooms in Florida Bay: A causal modelling and stable isotope analysis approach. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 24, 2025.

Rodemann, J., R.O. Santos, W.R. James, S.V. Costa, H. Baktoft, S.J. Pittman, and J.S. Rehage. 2025. Dining or dashing: Behavior and fine-scale movement of spotted seatrout (Cynoscion nebulosus) in Florida Bay. Coastal and Estuarine Research Federation (CERF) 2025, Richmond, Virginia, November 12, 2025.

Ross, M.S., J.F. Meeder, S. Stoffella, R. Vidales, and P.L. Ruiz. 2025. Mangrove transgression into Everglades marshes: A process to be accepted, resisted, or directed? Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 22, 2025.

Santos, R.O., C. Eggenberger, J.S. Lesser, W.R. James, J. Rodemann, T.A. Frankovich, C.J. Madden, and J.S. Rehage. 2025. Assessment of nektonic communities' spatiotemporal patterns in the Everglades Coastal Lakes using a fisheries-independent monitoring approach. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 23, 2025.

Shannon, T., and E.E. Gaiser. 2025. Resilience of a coastal benthic algal metacommunity to experimental seawater intrusion. 2025 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, April 30, 2025 - May 2, 2025.

Shannon, T., and E.E. Gaiser. 2025. Understanding and managing local-to-landscape resilience for Everglades periphyton. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 23, 2025.

Sturges, J., J.S. Rehage, J.S. Lesser, M. White, R.O. Santos, W.R. James, C.C. Atkinson, R. Rezek, and J. Nelson. 2025. Spatiotemporal variability of food web energy dynamics in the Florida coastal Everglades . Coastal and Estuarine Research Federation (CERF) 2025, Richmond, Virginia, November 10, 2025.

Sturges, J., W.R. James, J.S. Lesser, M. White, and J.S. Rehage. 2025. Paths of change: community trajectory analysis of Everglades fish assemblages. American Fisheries Society Annual Conference, San Antonio, Texas, August 10, 2025 - August 14, 2025.

Sturges, J., W.R. James, S.V. Costa, A. Distrubell, M. White, R.O. Santos, and J.S. Rehage. 2025. Paths of change: Community trajectory analysis of Everglades fish communities. 2025 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, April 30, 2025 - May 2, 2025.

Tilley, C.M., and N.J. Dorn. 2025. Evaluating population dynamics of the Everglades Crayfish within the marl prairies of Big Cypress National Preserve. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 23, 2025.

Tilley, C.M., and N.J. Dorn. 2025. Population dynamics of a resilient burrowing crayfish (Procambarus alleni) in seasonal wetlands. Society for Freshwater Science Annual Meeting, San Juan, Puerto Rico, May 18, 2025 - May 22, 2025.

Troxler, T. 2025. Collaborative, Community-Centered Research for Transformative Change, Plenary Presentation and Panel. Coastal and Estuarine Research Federation (CERF) 2025, Richmond, Virginia, November 10, 2025.

Troxler, T. 2025. Investigating adaptive capacity to climate-related shocks and stressors in Southeast Florida. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 22, 2025.

Vidales, R. 2025. Pre-restoration mangrove cover change in the Cutler Wetlands and functional trait response. 2025 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, April 30, 2025 - May 2, 2025.

Vidales, R. 2025. Pre-restoration mangrove cover change in the Cutler Wetlands and functional trait response. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 23, 2025.

Vorseth, C., M. Bhat, and G.A. Stainback. 2025. Drops for dollars: Estimating the economic value of recreational fishing and water management in Lake Okeechobee, Florida. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 24, 2025.

Wdowinski, S., and S. Palomino-Angel. 2025. A Multi-sensor Approach for Hydrological Monitoring of Wetlands: Altimetry-InSAR (ICESat-2/Sentinel-1) Integration Method Development over the South Florida Everglades. EGU General Assembly 2025, Vienna, Austria, April 27, 2025 - May 2, 2025.

White, M., W.R. James, J.S. Lesser, R. Rezek, J. Rodemann, R. Boucek, R.O. Santos, and J.S. Rehage. 2025. Balancing the budget: Metabolic drivers modulate the foraging and activity of a coastal mesopredator. Florida Chapter of the American Fisheries Society Annual Meeting, St. Augustine, Florida, May 13, 2025 - May 15, 2025.

White, M., W.R. James, J.S. Lesser, R. Rezek, J. Rodemann, R. Boucek, R.O. Santos, and J.S. Rehage. 2025. Balancing the budget: Metabolic drivers modulate the foraging and activity patterns of a coastal mesopredator. 2025 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, April 30, 2025 - May 2, 2025.

White, M., W.R. James, J.S. Lesser, R. Rezek, J. Rodemann, R. Boucek, R.O. Santos, and J.S. Rehage. 2025. Linking hydrology, temperature, and energetics: global change implications for the diet of a generalist predator. 2025 Ecological Society of America Annual Meeting, Baltimore, Maryland, August 13, 2025.

Yannick, D., S. Oberbauer, C.L. Staudhammer, and G. Starr. 2025. Restoration and climate impacts on carbon fluxes in freshwater Everglades marshes. 2025 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, April 30, 2025 - May 2, 2025.

Yoham, G.A., C. Heath, N. Oehm, and N.S. Quinete. 2025. Assessment of PFAS contamination and coliform bacteria presence in Biscayne Bay canals. 2025 FCE LTER All Scientists Meeting, Fairchild Tropical Garden, Coral Gables, Florida, April 30, 2025 - May 2, 2025.

Zapata, H.M., J.S. Rehage, J. Rodemann, W.R. James, and R.O. Santos. 2025. Evaluating fishery and habitat responses to trawling pressure and no-trawl zone implementation. Coastal and Estuarine Research Federation (CERF) 2025, Richmond, Virginia, November 12, 2025.

Zhao, H., L. Yuncong, D.D. Surratt, D. Shinde, and J.S. Kominoski. 2025. Marsh and canal flow connectivity approximations to explore influence of marsh on constituent transport. Greater Everglades Ecosystem Restoration (GEER) Meeting, Coral Springs, Florida, April 22, 2025.

Dissertations and Theses

Master's Theses

Distrubell, Andy. 2025. Understanding the extent of PFAS contamination in Red Drum (*Sciaenops ocellatus*) across 9 Florida estuaries. Master's thesis, Florida International University.

Herrera, Alyssa. 2025. Non-random prey use and optimal foraging by an invasive eel using diets and prey community data. Master's thesis, Florida International University.

Ph.D. Dissertations

Alwakeel, Julian. 2025. Hydrogeochemical processes of freshwater and coastal wetlands, Everglades, FL, USA. Ph.D. dissertation, Florida International University.

Biswas, Himadri. 2025. Multi-scale expansion patterns of Rhizophora mangle in response to environmental drivers in the Southeastern Everglades. Ph.D. dissertation, Florida International University.

Ortiz Munoz, Liz Domary. 2025. Quantifying hydrologic and anthropogenic drivers of spatiotemporal variability of dissolved organic matter in urban coastal ecosystems. Ph.D. dissertation, Florida International University.

Shannon, Thomas. 2025. Drivers of benthic algal metacommunities and their functional resilience. Ph.D. dissertation, Florida International University.

Vidales, Rosario. 2025. Characterization of red mangrove and the coastal marshes it inhabits in changing south Florida environments. Ph.D. dissertation, Florida International University.

White, Mack. 2025. Functional consequences and drivers of fish behavior in coastal ecosystems. Ph.D. dissertation, Florida International University.

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.

Other Products

Databases

The FCE Information Management System (FCE IMS) contains 229 datasets which are available on the FCE LTER's website (https://fcelter.fiu.edu/data/) and in the EDI Data Repository. Datasets include climate, consumer, primaryproduction, 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 in the Appendix of this report.

Software or Netware

landscapeScaling R package Dr. Dan Gann updated an R package for categorical data scaling(https://github.com/gannd/landscapeScaling)

Participants & Other Collaborating Organizations

Participants

Name	Most Senior Project Role
Kominoski, John	PD/PI
Gann, Daniel	Co PD/PI
Rehage, Jennifer	Co PD/PI
Santos, Rolando	Co PD/PI
Troxler, Tiffany	Co PD/PI
Arroyo, Alexander	Faculty
Basic, Grga	Faculty
Bhat, Mahadev	Faculty
Burgman, Robert	Faculty
Caple, Zachary	Faculty
Clement, Amy	Faculty
Dorn, Nathan	Faculty
Gaiser, Evelyn	Faculty
Grove, Kevin	Faculty
Heithaus, Michael	Faculty
James, Ryan	Faculty
Kim, Sol	Faculty
Kirtman, Ben	Faculty
Krause, Johannes	Faculty
Malone, Sparkle	Faculty
Martens-Habben, Willm	Faculty
Nelson, James	Faculty
Oberbauer, Steven	Faculty
Obeysekera, Jayantha	Faculty
Oehm, Nicholas	Faculty
Osburn, Christopher	Faculty
Price, Rene	Faculty

Name	Most Senior Project Role
Redwine, Jed	Faculty
Sah, Jay	Faculty
Simonsen, Anna	Faculty
Solomon, Kelsey	Faculty
Wakefield, Stephanie	Faculty
Wdowinski, Shimon	Faculty
Garcia, Sofia	Technical School Faculty
Arce, Irvin	K-12 Teacher
Bravo, Katheen	K-12 Teacher
De La Rua, Zachary	K-12 Teacher
Dominguez, Richard	K-12 Teacher
Duran, Keren	K-12 Teacher
Pavon, Jose	K-12 Teacher
Bogen, Sarah	Postdoctoral
Chavez, Selena	Postdoctoral
Choi, Change Jae	Postdoctoral
Fache, Anne	Postdoctoral
Hewavithana, Dishane	Postdoctoral
Lamb-Wotton, Luke	Postdoctoral
Lesser, Justin	Postdoctoral
Mao, Lishen	Postdoctoral
Rodemann, Jonathan	Postdoctoral
Shannon, Thomas	Postdoctoral
White, Mackenzie	Postdoctoral
Zhao, Jun	Postdoctoral
Castaneda, Edward	Other Professional
Gastrich, Kirk	Other Professional
Innocent, Hanna	Other Professional
Kamener, Gabriel	Other Professional
Rugge, Michael	Other Professional

Name	Most Senior Project Role
Smith, Matthew	Other Professional
Standen, Emily	Other Professional
Tobias, Franco	Other Professional
Travieso, Rafael	Other Professional
Bendana, Roger	Technician
Christine, Nation Garcia	Technician
Diaz Cedeno, Laura	Technician
Dominguez, Gustavo	Technician
Foster, Emilie	Technician
Garcilazo, Johan	Technician
Goldner, Victoria	Technician
Heidbreder, Brian	Technician
Jonas, Ariana	Technician
Marquez, Miguel	Technician
Rizzie, Chris	Technician
Servin, Marco	Technician
Stumpf, Sandro	Technician
Tilley, Christina	Technician
Fitz, H.	Staff Scientist (doctoral level)
Julian, Paul	Staff Scientist (doctoral level)
Soledade Lemos, Leila	Staff Scientist (doctoral level)
Atkinson, Cameron	Graduate Student (research assistant)
Bierhaus, Lucas	Graduate Student (research assistant)
Biswas, Himadri	Graduate Student (research assistant)
De Vito, Lauren	Graduate Student (research assistant)
Fernandez, Marco	Graduate Student (research assistant)
Garriga, Marbelys	Graduate Student (research assistant)
Hemsi, Sophia	Graduate Student (research assistant)
Johnson, Katie	Graduate Student (research assistant)
Kerigan III, John	Graduate Student (research assistant)

Name	Most Senior Project Role
Kirejevas, Kyle	Graduate Student (research assistant)
Kleindl, Paige	Graduate Student (research assistant)
Mock, Alan	Graduate Student (research assistant)
Montiel, Kevin	Graduate Student (research assistant)
Moore, Ella	Graduate Student (research assistant)
Olivera, Rigoberto	Graduate Student (research assistant)
Restrepo, Veronica	Graduate Student (research assistant)
Reyes, Jessika	Graduate Student (research assistant)
Richardson, Stephen	Graduate Student (research assistant)
Sample, Will	Graduate Student (research assistant)
Spurgeon, Emily	Graduate Student (research assistant)
Strickland, Davon	Graduate Student (research assistant)
Sturges, James	Graduate Student (research assistant)
Tanchin, Syra	Graduate Student (research assistant)
Vorseth, Chloe	Graduate Student (research assistant)
Zuccolo, Veronica	Graduate Student (research assistant)
Diaz, Sophia	Undergraduate Student
Lam, Sue-Lin	Undergraduate Student
Marro-Ambrosini,Lorenzo	Undergraduate Student
Meckstroth, Jordan	Undergraduate Student
Mell, Aedan	Undergraduate Student
Moreno, Angelo	Undergraduate Student
Murray, Lorie-Ann	Undergraduate Student
Schaffhauser, Chase	Undergraduate Student
Vidales, Alondra	Undergraduate Student
Yi, Michelle	Undergraduate Student
Gabb, Mia	Other

Collaborating Organizations

Aarhus University
Aarhus, Denmark

American Saltwater Guide Association
Islamorada, Florida

Bonefish and Tarpon Trust
Miami, Florida

Coastal Carolina University
Conway, South Carolina

College of William & Mary
Williamsburg, Virginia

East Carolina University
Greenville, North Carolina

Eckerd College
St. Petersburg, Florida

EcoLandMod, Inc
Fort Pierce, Florida

Everglades Foundation
Palmetto Bay, Florida

Everglades National Park
Homestead, Florida

Florida Atlantic University
Boca Raton, Florida

Florida Gulf Coast University
Fort Meyers, Florida

Florida Keys Fishing Guide Association
Islamorada, Florida

Florida State University
Tallahassee, Florida

Georgia Southern University
Statesboro, Georgia

Louisiana State University
Baton Rouge, Louisiana

Lower Keys Guide Association
Sugarloaf, Florida

Miami-Dade County Dept of Environmental Resources Management (DERM)
Miami, Florida

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

Miccosukee Tribe of Indians of Florida
Ochopee, Florida

Mississippi State University
Mississippi State, Mississippi

Mote Marine Laboratory
Sarasota, Florida

NASA Goddard Space Flight Center
Greenbelt, Maryland

National Park Service - South Florida/Caribbean Network
Palmetto Bay, Florida

National Tropical Botanical Gardens
Coconut Grove, Florida

North Carolina State University
Raleigh, North Carolina

Oak Ridge National Laboratory
Oak Ridge, Tennessee

Ocean First Foundation
Key Largo, Florida

Oklahoma State University
Stillwater, Oklahoma

Seminole Tribe of Florida
Hollywood, Florida

Smithsonian Environmental Research Center
Edgewater, Maryland

South Florida Water Management District
West Palm Beach, Florida

The Deering Estate
Miami, Florida

The Ohio State University
Columbus, Ohio

The Pennsylvania State University
University Park, Pennsylvania

The University of Chicago
Chicago, Illinois

U.S. Army Corps of Engineers
Washington, District of Columbia

University of Alabama
Tuscaloosa, Alabama

University of California, Davis
Davis, California

University of Central Florida
Orlando, Florida

University of Georgia
Athens, Georgia

University of South Carolina
Columbia, South Carolina

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

Yale University
New Haven, Connecticut

U.S. Geological Survey
Reston, Virginia

University of Alberta
Edmonton, Alberta, Canada

University of California, Los Angeles
Los Angeles, California

University of Florida
Gainesville, Florida

University of Hawaii at Manoa
Honolulu, Hawaii

University of South Florida
Tampa, Florida

Utah State University
Logan, Utah

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/385b86e7962f2a93283fdba80e72792f		NOAA Daily Surface Meteorologic Data at NCDC Flamingo Ranger Station (ID-083020) (FCE), South Florida, USA, January 1951 - January 2021
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/bb52d5ca3ff6dcd6e2a645fe72f24120	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/f863c55b367e398227abaa361a2527a7	Briceno, Henry	Microbial Sampling from Shark River Slough and Taylor Slough, Everglades National Park, South Florida, USA (FCE LTER), January 2001 - December 2023
https://doi.org/10.6073/pasta/2da9a91134920ddb03203830b0046f53	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/4b02c258fcbe1ec17d0504e286a79911		NOAA Monthly Mean Sea Level Summary Data for the Key West Water Level Station (NOAA/NOS Co-OPS ID 8724580), Florida, USA, January 1913 - ongoing
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/3bb6080db763aec9b384fc60e4560164	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/4c37ce2ccf034594fc82e442ed2140b5	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/70a4d130987112acf292976750fd80db	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/fdf3751cccd1b614b59c3c5e75c9b765	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/4a741b21867d76eed699a8ce51d95c6f	Price, René M	Rainfall Stable Isotopes collected at Florida International University-MMC (FCE LTER), Miami, Florida, USA, October 2007 - ongoing
https://doi.org/10.6073/pasta/fd9a6b684d449e16296b2fecb8a8789d	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/ec0a5918d361bcc1ed398b0d1b0a9221	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/332e0639eda374cb620fb46220c7a97a	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/8ddb405a5bdd8677fab72f3c5b2795b7	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/7a3a1ffffe79481cdb459bf102693d08	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/833deb8efc4e6ecefba516212e37175c	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/7e22e70203ccf86c55e760ac46a64812	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/0a31b1b2fa42d5e6bf223e88b670d222	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/4a7ada57b8f17e5d929f5db80573d7a1	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/d9b472df54cce37bd847773e61c0e5b5	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/f70e6f4febd1f53b0d2b22e925b2efd0	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/d9e8079406c40922379dec0a9929e831	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/f378144d8752481934bfc6610bd2bfc6	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/63c0ce1fa1d09c10ff306b459cff7822	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/4a843752bc61867c4039a4d4bdf269b7	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/6b5dcd67d90e65397642eefd68a2eb43	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/194799886af365609e377489f983d5d1	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/710beeb6a8fba12658403af8e6cb5e17	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/662e92dd7780ddb2600751d9bba411b4	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/452c9a409a63a9a3c6ea5c1b01d7ace8	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/6ae7ebc290f5549b990e3dc6d009418c	Kominoski, John; Price, Rene; Childers, Daniel; Travieso, Rafael	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/dab19e4ac027f0ec9072adcfd6ce826d	Kominoski, John; Price, Rene; 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/ec6ef96cbfa63057c193e266906c5adb	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/736727833f549abd08361275522d0a66	Troxler, Tiffany; Childers, Daniel	Water Depths and Water Temperatures near Soil Surface from Taylor Slough, Everglades National Park (FCE LTER), Florida, USA, August 1999 - ongoing
https://doi.org/10.6073/pasta/b244a3eb610cdfb419088f2ebab00d34	Jaffe, Rudolf	Monthly monitoring of Fluorescence, UV, Humic and non-Humic Carbon, Carbohydrates, and DOC for Shark River Slough, Taylor Slough, and Florida Bay, Everglades National Park (FCE LTER) for January 2002 to August 2004
https://doi.org/10.6073/pasta/e043bac2f37ee341e9524d880a25c28b	Jaffe, Rudolf	Examination of protein-like fluorophores in chromophoric dissolved organic matter (CDOM) in a wetland and coastal environment for the wet and dry seasons of the years 2002 and 2003 (FCE)
https://doi.org/10.6073/pasta/3dd491d35a795e2deb1354cdb113edb2	Jaffe, Rudolf	Monthly monitoring fluorescence data for Florida Bay, Ten Thousand Islands, and Whitewater Bay, in southwest coast of Everglades National Park (FCE) for February 2001 to December 2002
https://doi.org/10.6073/pasta/b3d7a2405f44164506ecf8d06940fac1	Jaffe, Rudolf	Quantitative and qualitative aspects of dissolved organic carbon leached from plant biomass in Taylor Slough, Shark River and Florida Bay (FCE) for samples collected in July 2004

DOI	Authors	Title
https://doi.org/10.6073/pasta/fa704066a4e46675033f1ed13cc40268	Jaffe, Rudolf	Chemical characteristics of dissolved organic matter in an oligotrophic subtropical wetland/estuary ecosystem, Everglades National Park (FCE), South Florida from December 2001 to January 2002
https://doi.org/10.6073/pasta/91c112c13f01076c04ee5f2a8d90d7d9	Jaffe, Rudolf	Physical and microbial processing of dissolved organic nitrogen (DON) (Salinity Experiment) along an oligotrophic marsh/mangrove/estuary ecotone (Taylor Slough and Florida Bay) for August 2003 in Everglades National Park (FCE), South Florida, USA
https://doi.org/10.6073/pasta/782f00ed86a8027d081af4ad7d8f45c4	Jaffe, Rudolf	Physical and microbial processing of dissolved organic nitrogen (DON) (Photodegradation Experiment) along an oligotrophic marsh/mangrove/estuary ecotone (Taylor Slough and Florida Bay) for August 2003 in Everglades National Park (FCE), South Florida, USA
https://doi.org/10.6073/pasta/4f0ac68c77c19035b95209158c24e3f8	Jaffe, Rudolf	Characterization of dissloved organic nitrogen in an oligotrophic subtropical coastal ecosystem (Taylor Slough and Shark River Slough) for December 2001 in Everglades National Park (FCE), South Florida, USA
https://doi.org/10.6073/pasta/4950343b897e59305376be65fc2edb40	Gaiser, Evelyn; Tobias, Franco	Periphyton Productivity from the Shark River Slough and Taylor Slough, Everglades National Park (FCE LTER), South Florida, USA, October 2001 - October 2024
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
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/209bd55e2d34186a2609554767926e58	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

DOI	Authors	Title
https://doi.org/10.6073/pasta/f0426edc392ec6108f8de14386ef4df3	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/45b440211d5756a157e72b1ee3a7a0ec	Castañeda-Moya, 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/8beb8cf1862007946c407c705580328d	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/76ea456794531417e341becda42d28c7	Castaneda, Edward; Rivera-Monroy, Victor; Twilley, Robert	Mangrove Soil Chemistry Shark River Slough and Taylor Slough, Everglades National Park (FCE), from December 2000 to May 23, 2002
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/bd556eaf31ba7b68543b282ef7565b39	Gaiser, Evelyn	Environmental data from FCE LTER Caribbean Karstic Region (CKR) study in Yucatan, Belize and Jamaica during Years 2006, 2007 and 2008
https://doi.org/10.6073/pasta/df72676a02ae7f5e88f4e1b054168dff	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/945595a38ab20a0f1676d39cb2ee3494	Blochel, Alexander; Lorenz, Jerry	Physical Hydrologic Data for the National Audubon Society's 16 Research Sites in coastal mangrove transition zone of southern Florida, March 1986 - ongoing

DOI	Authors	Title
https://doi.org/10.6073/pasta/53350eb1bf9619139ffef40ca4d36f8e	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/fee18c44f64a252aaad07921dcf15b10	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/0a012d9bffa94911109aad7b8447145c	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/6de109fde0abe3dbd693d8dbd5343f5d	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/626834ac6448d924a03581246b301a20	Saunders, Colin	Isotopic Variation of Soil Macrofossils from Shark River Slough, Everglades National Park (FCE) in December 2004
https://doi.org/10.6073/pasta/0c8de830f90983f2994948425b6476df	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/6ec40ba174eed58293a9ed7984291b67	Fourqurean, James	Florida Bay Nutrient Data, Everglades National Park (FCE LTER), Florida, USA, September 2000 - ongoing
https://doi.org/10.6073/pasta/a66ce929f124ab499a501d12d9267914	Fourqurean, James	Florida Bay Braun Blanquet, Everglades National Park (FCE LTER), South Florida, USA, September 2000 - ongoing
https://doi.org/10.6073/pasta/2c81270c947caa6257ca0112874aa263	Fourqurean, James	Florida Bay Productivity Data, Everglades National Park (FCE LTER), Florida, USA, September 2000 - May 2024

DOI	Authors	Title
https://doi.org/10.6073/pasta/cb5734d20d8be6a8060b6bd62f179b2a	Fourqurean, James	Florida Bay Stable Isotope Data Everglades National Park (FCE LTER), Florida, USA, September 2000 - ongoing
https://doi.org/10.6073/pasta/c45f10b9d1a54d5e94e5ffa4f1168c1d	Fourqurean, James	Florida Bay Physical Data, Everglades National Park (FCE LTER), Florida, USA, September 2000 - ongoing
https://doi.org/10.6073/pasta/80ca188bd67ae078b5c7ea5f84efed4e	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, Rene	Water flow velocity data, Shark River Slough (SRS) near Black Hammock island, Everglades National Park (FCE LTER), South Florida from October 2003 to August 2005
https://doi.org/10.6073/pasta/dfbecceaa573243fb9bb58f9413f1608	Price, Rene	Water flow velocity data, Shark River Slough (SRS) near Chekika tree island, Everglades National Park (FCE LTER) from January 2006 to March 2021
https://doi.org/10.6073/pasta/18c744af8da6cbfb986ff2a2fb20eded	Price, Rene	Water flow velocity data, Shark River Slough (SRS) near Frog City, south of US 41, Everglades National Park (FCE LTER) from October 2006 to July 2009
https://doi.org/10.6073/pasta/8a09e87a1f8ef3b9319c72a4640c41de	Price, Rene	Water flow velocity data, Shark River Slough (SRS) near Gumbo Limbo Island, Everglades National Park (FCE) from October 2003 - December 2018
https://doi.org/10.6073/pasta/fbb12ce7f9595d2b9c6ec6011b9236e1	Price, Rene	Water flow velocity data, Shark River Slough (SRS) near Satinleaf Island, Everglades National Park (FCE LTER) from July 2003 to December 2005

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https://doi.org/10.6073/pasta/06938136601cdd81eb37837b7ea4b5fb	Price, Rene	Non-continuous TS/Ph7b Weather Tower Data, Everglades National Park (FCE LTER), South Florida from May 2008 to 2017
https://doi.org/10.6073/pasta/d5a224eed0f1bec5b69ce963493d9af1	Price, Rene	Non-continous meteorological data from Butternut Key Weather Tower, Florida Bay, Everglades National Park (FCE LTER), April 2001 through August 2013
https://doi.org/10.6073/pasta/2b42a17496155b8a7ce2191ae90e193b	Price, Rene	Groundwater and surface water phosphorus concentrations, Everglades National Park (FCE), South Florida for June, July, August and November 2003
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/7441ec29670ebc94116b628b852686f1	Barr, Jordan; Fuentes, Jose; Zieman, Joseph	Radiation measurements at Key Largo Ranger Station, South Florida (FCE) for July 2001
https://doi.org/10.6073/pasta/3a3f8c4f4e87dcf4607fccb1b695e91a	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/82f6becbd659b3ef4656fc0cd1d7d73c	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

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https://doi.org/10.6073/pasta/2dc4fab65b1400d777fdfcde3197ceeb	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/2e48fc35d6c547a96a6ae7dd44208886	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/8b904f5a90dc060eed3969fbc33df702	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/2ce31d46b58323fdd3eefe1567478873	Frankovich, Thomas	Seagrass Epiphyte Accumulation for Florida Bay, South Florida (FCE) from December 2000 to September 2001
https://doi.org/10.6073/pasta/75cf3eaed510acd1199892062ade0180	Frankovich, Thomas	Mean Seagrass Epiphyte Accumulation for Florida Bay, South Florida (FCE) from December 2000 to September 2001
https://doi.org/10.6073/pasta/0319ec83dc385ff970f3cd6946b4bee6	Frankovich, Thomas	Seagrass Epiphyte Accumulation: Epiphyte Loads on Thalassia testudinum in Rabbit Key Basin, Florida Bay (FCE) from March 2000 to April 2001
https://doi.org/10.6073/pasta/9bbce782de8f8a3d35b3598d0838c114	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/40949c44f9b6db5a3b9dc11f9db0380f	Frankovich, Thomas	Florida Bay, South Florida (FCE) Seagrass Epiphyte Light Transmission from December 2000 to February 2002

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https://doi.org/10.6073/pasta/9e8b52d13c165e47e41a422501082abe	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/a16c1c4824b9ac915e2d4a8573f88239	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/59add23bf18df839a352a7f71e411309	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/7f0a7bf9e1425d9f7ae6a75f0b986233	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/c41d43a430d2a7489749569df7328be6	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/f1265ccc240aae0955de83cf1ccd09b3	Rehage, Jennifer; Massie, Jordan; Viadero, Natasha; Sturges, James; White, Mack; Atkinson, Cameron	Seasonal Electrofishing Data from Rookery Branch and Tarpon Bay, Everglades National Park (FCE LTER), Florida, USA, November 2004 - ongoing
https://doi.org/10.6073/pasta/075fbfe89bd4ab194c92a6d1c9f7e162	Rehage, Jennifer	Minnowtrap Data from Rookery Branch and the North, Watson, and Roberts Rivers National Park (FCE) from November 2004 to April 2008

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https://doi.org/10.6073/pasta/5630c50470016dfc44d1ab27ec4d6a68	Gaiser, Evelyn; Trexler, Joel C.	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/c0400de612fb5cbdb2b8af0b1206c625	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/9fd1d290fbe0753e76be1f748c4e9dab	Castañeda-Moya, Edward; Kominoski, John; Rivera-Monroy, Victor; Rizzie, Chris; Reisa, Caitlin	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/b767069ee137d3487bb9d7680766c77e	Castañeda-Moya, Edward; Kominoski, John; Rivera-Monroy, Victor; Rizzie, Chris B; Reisa, Caitlin	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/0ed4b60c76672dada07f781f7bb1e558	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/cd38181a01297bc25a086d71635a1a26	Castañeda-Moya, Edward; Kominoski, John; Rivera-Monroy, Victor; Twilley, Robert; Rizzie, Chris B; Reisa, Caitlin	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/99f170ae05bb1203d999f23855aa94ba	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

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https://doi.org/10.6073/pasta/4d7a31e8990d6ccf8f2b58e63059193b	Rains, Mark	Subsurface Water Temperatures taken in Shark River Slough and Taylor Slough, Everglades National Park (FCE LTER), Florida, USA, May 2010 - December 2015
https://doi.org/10.6073/pasta/5c512d14cc80c8e0bf2e9ef64fd8552f	Jaffe, 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
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https://doi.org/10.6073/pasta/cbd2c90bf1eafc11ab220ab45a7d4c03	Onsted, Jeff	FCE Redlands 1994 Land Use, Miami-Dade County, South Florida
https://doi.org/10.6073/pasta/4690107ef7cf3eb83232dbaa96a587b1	Onsted, Jeff	FCE Redlands 1998 Land Use, Miami-Dade County, South Florida
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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.

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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/744eb99039cf734ef0087ebea8fd7627	Castañeda-Moya, Edward; Kominoski, John; Rivera-Monroy, Victor; Twilley, Robert; Bendana, Roger; Rizzie, Chris; Reisa, Caitlin	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/a3ba2abf24e645e6205d737bab0d7d74	Anderson, William	DIC and DOC 13C tracer data from Shark River Slough and Harney River (FCE), Everglades, South Florida in November 2011

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https://doi.org/10.6073/pasta/83ac54a606433cf54ad7c4aa38300c64	Rehage, Jennifer; Heithaus, Michael; Boucek, Ross; Massie, Jordan; Viadero, Natasha; White, Mack; Sturges, James; Atkinson, Cameron	Movements of aquatic predators within the Shark River estuary (FCE LTER), Everglades National Park, South Florida, USA, June 2007 - 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
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/751b8b699d8dd40541c16d747cbd961a	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

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https://doi.org/10.6073/pasta/756edd5f40dbf69ca478d8c48f6ee6ba	Price, Rene	Monthly water balance data for southern Taylor Slough Watershed (FCE LTER) from January 2001 to December 2011
https://doi.org/10.6073/pasta/92a97f3ef2f409c987fb9c80f7714171	Jaffe, Rudolf; Pisani, Oliva	Biomarker assessment of spatial and temporal changes in the composition of flocculent material (floc) in the subtropical wetland of the Florida Coastal Everglades (FCE) from May 2007 to December 2009
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
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/6a162dae81e2a586a2c3dae7011fc7f2	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/892b837dbd6c8bc459c1e45b3755d75e	Gaiser, Evelyn	Relative Abundance of Soft Algae From the Comprehensive Everglades Restoration Plan (CERP) Study (FCE), Florida, USA, September 2005 to November 2011
https://doi.org/10.6073/pasta/5231f2aef72c3f9d9793e0ad2ca4f780	Coronado, Carlos A; Sklar, Fred	Sediment Elevation Change (Feldspar Marker Horizon Method) from Northeastern Florida Bay (FCE) from 1996 to Present

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https://doi.org/10.6073/pasta/2f10cfbbe5352f81ffde6ef59201ea93	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/0e06cc37e77d4bf881dc4d1ae093a413	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
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/4791bb7a25e0a69d27e8436fb9ae893f	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
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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
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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	Castaneda, Edward; Rivera-Monroy, Victor	Sediment and nutrient deposition and plant-soil phosphorus interactions associated with Hurricane Irma (2017) in mangroves of the Florida Coastal Everglades (FCE LTER), Florida
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

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https://doi.org/10.6073/pasta/27f6332609eb1ef6d398c7855855f2e3	Hogan, James A; Castaneda, Edward; Lamb-Wotton, Lukas	FCE LTER Taylor Slough/Panhandle-7 Site Scrub Red Mangrove (Rhizophora mangle) Leaf Gas Exchange Data, Florida, USA from January-December 2019
https://doi.org/10.6073/pasta/27afcea3bab0adc058457705506248f8	Kominoski, John	Saltwater Coastal Carbon Flux Synthesis
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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/627112b3481c2aeed4f60523cc8466b6	Kominoski, John Stephen	Monthly monitoring fluorescence data for Shark River Slough and Taylor Slough, Everglades National Park, Florida, USA (FCE LTER) for 2012 - 2020
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
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https://doi.org/10.6073/pasta/02b67b374c052132c0f80a3934d7b1a6	Mock, Alan J; Virzi, Thomas	Cape Sable Seaside Sparrow (Ammospiza maritima mirabilis) breast feather total mercury concentrations from the Florida Everglades, Florida, USA: breeding seasons 2016 - 2018
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