FLORIDA COASTAL EVERGLADES LTER

FCE III YEAR SIX ANNUAL REPORT

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Principal Investigators

Evelyn Gaiser

Michael Heithaus

Rudolf Jaffé

John Kominoski

René Price

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Accomplishments

Major goals of the project

The goal of the Florida Coastal Everglades Long Term Ecological Research (FCE LTER) program is to conduct long-term studies to understand how climate change and resource management decisions interact with biological processes to modify coastal landscapes. Our focus is on the oligohaline ecotone of the Florida Everglades, integrating marine and freshwater influences. Long-term data show that the ecotone is highly sensitive to increasing marine pressures, driven over longer-time scales by sea level rise (SLR) and over shorter-time scales by storms and tidal exchanges. Freshwater flow, controlled by climate variation and upstream allocation decisions, interacts with marine pressures to affect water supplies to the ecotone. This is the end of the 6th year of the third phase of research (FCE III), focused on linking long-term dynamics in freshwater and marine water supplies to transformations in the ecotones of two major drainages, Shark River Slough (SRS) and the Taylor Slough/Panhandle (TS/Ph).

The overarching goals of this reporting year included: (1) continue to constrain the sources of variance in the short and long-term dynamics of water supply to the ecotone, and socioecological and hydrological politics of freshwater restoration in the face of SLR, (2) continue to collect long-term data across the five core areas and integration with results from mechanistic experiments and spatial scaling studies to address the causes and consequences of long-term dynamics of the oligohaline ecotone relative to changes in fresh and marine water supplies, (3) continue studies of the legacies of climate and disturbance as drivers of change through alterations in ecotone salinity, phosphorus (P) supplies and inundation, (4) complete modeling and synthesis efforts linking climate and disturbance legacies to future projections, (5) complete work with the publisher on finalizing FCE's synthesis book, (6) continue updates of FCE data to the Network Information System (PASTA), (7) integrate core findings across through LTER network-wide collaborations, (8) advance education (FCE Schoolyard) and outreach activities through expanded partnerships directed toward goals of the Strategic Implementation Plan for LTER.

FCE III research is conducted within the context of four major working groups (WG): *Biogeochemical Cycling*, *Primary Production*, *Organic Matter (OM) Dynamics*, and *Trophic Dynamics*. Integration is accomplished through four Cross-Cutting Themes (CCT): *Hydrology and Water Policy*, *Carbon (C) Dynamics*, *Climate and Disturbance Legacies*, and *Modeling and Scenarios*. Further synthesis was driven by our contributions to a holistic synthesis book that is with the publisher, and in several synthesis papers that have been published or accepted for publication. Here, we report progress integrating across each of these categories relative to the themes set in our proposal using data from long-term studies and experiments, while also addressing the feedback from our midterm review team. We began to conduct a series of planning meetings and implementing programmatic changes to address concerns of our recent proposal panel about integration of our food web research and generalizability of our research findings.

Major Activities

Hydrology and Water Policy: Activities in our hydrology and water policy theme address how climate change and sea level rise (SLR) interact with water management practices to control hydrologic conditions in the oligohaline ecotone through two hypotheses: (1) variable inflows from upstream sources, SLR, and storm surge interact to alter surface water residence time, salinity, and groundwater intrusion in the oligohaline ecotone, and (2) stakeholder uncertainties over SLR will increase conflicts over Everglades restoration implementation and will affect freshwater delivery to the oligohaline ecotone. Activities addressing the first hypothesis included hydrological monitoring using ground-based and satellite observations to detect hydrologic changes across the oligohaline ecotone throughout the year as well as flooding extent induced by Hurricane Irma (September 2017). We finalized a statistical analysis of the influence of sea level rise on water levels and water chemistry of the oligohaline ecotone over a 16-year period. Activities addressing the second hypothesis included the analysis of surveys and interviews with farming operations in the Everglades Agricultural Area (EAA) related to individual and collective contributions to water quality improvements in the upper FCE watershed. Furthermore, water quality data in the EAA was analyzed via in-depth spatiotemporal visualization at the sub-basin, operation scale as well as for long-term trends and management drivers.

Carbon Dynamics: Activities in our Carbon (C) Dynamics theme address how changing freshwater inflows, tidal and storm cycles, and climate patterns influence the magnitude, rates, and pathways of C sequestration, loss, storage and transport across the land-water continuum through two hypotheses: (1) temporal variability in C cycling reflects the presses and pulses of the balance of marine and freshwater supplies, and (2) landscape patterns of C reveal legacies of this balance. We continue to address the first by coupling long-term data with field and laboratory experiments to address mechanisms, and the second through scaling plot-based long-term measurements using remote imagery. Our carbon working group effort focused on factors that lead to accumulation or loss of soil C, the major C pool, from components of the FCE landscape. Five graduate students completed PhD dissertations and one student completed an MS thesis examining dynamics of C storage using a combination of field observations and experimental manipulations.

Long-term data collection and synthesis. Following the advice of our mid-term review team, we conducted a synthesis effort to test the hypothesis that carbon (C), nitrogen (N), and P dynamics, organic matter sources and fate, and plant and animal production along freshwater-ecotone-marine gradients in SRS and TS/Ph express the balance of freshwater and marine supplies (through surface and groundwater) in space and time. We: (1) published 21 manuscripts related to changes in water level, salinity, and P availability on periphyton, macrophyte, and soil C storage, OM quality, source and fate; (2) submitted 6 manuscripts synthesizing 17 years of surface water P and bacterial abundance and productivity data along freshwater-ecotone-marine gradients in SRS and TS/Ph to examine biogeochemical effects of decreasing freshwater and increasing marine connectivity; (3) completed a 10-year analysis of DOM fluorescence data from SRS and TS/Ph; and, (4) analyzed 27 years of water level and water chemistry data from Florida Bay.

In response to reviewer comments, we enhanced efforts to document linkages in food webs of the estuary and integrated our long-term studies of consumer dynamics through explicit linkages to FCE studies of food quality and habitat structure. To test the hypothesis that freshwater delivery influences the importance of detritus to freshwater marsh and mangrove estuary food webs, we continued analysis of food webs in the freshwater Everglades using fatty acid biomarkers and stoichiometry. We made progress in our efforts to update fresh-water Everglades food-web descriptions with a focus on detritial contributions. Two book chapters already provide graphical representation of structural food webs documenting trophic linkages (who eats who). Our use of new methods permitted a novel spatially referenced description of carbon assimilation with a level of resolution of basal resource sources not possible in the past. Spatio-temporal dynamics are a critical element to understand ecosystem function in the Everglades and make it an excellent ecosystem to reveal novel yet widely important ecological dynamics. We continued our long-term fishing and acoustic movements datasets. We performed juvenile bull shark fishing to obtain a minimum of 12 longline sets per yearly quarter. In addition, we tagged and measured 38 juvenile bull sharks and 15 alligators and sampled multiple tissues for stable isotope analysis. We deployed an additional 23 bull shark acoustic tags and 8 alligator tags since December 2017. These long-term datasets of movements and trophic interactions will give us insights into the ecological roles of consumers and determine the interplay of these roles with changing environmental conditions.

Experiments. We completed nearly 4 years of experimental work in field and outdoor mesocosms to test the effects of salinity and inundation and the subsidy-stress effect of salinity and phosphorus on freshwater and brackish marsh peat. This included completion of a 1.5-year mesocosm experiment manipulating freshwater restoration of *Cladium jamaicense* marshes previously exposed to salinity and P loading for 2 years and completion of analyses and a draft manuscript for a mesocosm experiment testing subsidy-stress gradients in salinity and P concentrations on freshwater and brackish water peat soil C loss.

Landscape scaling. We completed assessments of landscape-scale coastal ecotone vegetation to determine how plant composition and primary production vary with variation in marine water supplies. We also nearly completed an assessment of spatial representativeness of plant community composition in sites along our transects.

Climate and Disturbance Legacies: Studies of disturbance underpin much of the FCE research program, and this work was enhanced by an NSF RAPID grant to study the effects of Hurricane Irma. This project is helping FCE: (1) document the role of mangrove forests and elevation gradients in attenuating storm surge and assess associated elevation changes driven by sediment deposits or losses, (2) determine whether a storm surge erases or enhances a prior storm surge deposit, and influences the stability of mangrove-derived carbon in the coastal zone, and (3) assess the influence of coastal storms on hydrologic connectivity and the access to food supplies by mobile consumers.

Modeling and Scenarios: Our modeling and synthesis efforts continue to span both local and landscape spatial scales and instantaneous to multi-decadal temporal scales, while addressing both hydrodynamic, geochemical, and hydroecological dynamics. Our hydrodynamic and geochemical modeling continues to improve our fundamental understanding of pattern and

process and serves to inform our scenarios modeling; our scenarios modeling is underscoring the need for improved understanding of vegetation-peat responses to altered salinities and water depths. We made progress on geochemical and hydrodynamic modeling efforts to better understand the geochemistry, transport, and fate of dissolved constituents, with a focus on P and C, in the mangrove ecotone of the Everglades. Having developed a framework of climate scenarios for use in FCE modeling efforts, we simulated hydro-ecological responses to three of these climate scenarios for 2060 using the Everglades Landscape Model (ELM v2.8.6) with a focus on soil biogeochemistry of the Everglades Water Conservation Areas and the Everglades National Park.

Specific Objectives

Hydrology and Water Policy: Specific objectives of this past year were directly related to the Working Group's hypotheses and included: (1) understanding how climate change and sea level rise interact with water management practices to control hydrologic conditions in the oligohaline ecotone; (2) developing a new technique of observing hurricane induced flooding in the oligohaline ecotone; (3) understanding how institutional mechanisms as well as social capital interacted to shape agricultural and water management practices in the EAA; and (4) analyzing the impact of those dynamics on water quality trends across space (throughout the sub-basins of the entire EAA) and through time (1996-2016).

Carbon Dynamics: We had 4 specific objective over the last year: 1) to document the rate of accumulation of organic carbon in soils across the FC landscape, 2) to explore the factors that lead to accumulation or release of "refractory" carbon stored in soils, 3) to test how salinity and phosphorus availability change the stability and storage of soil organic carbon from the oligohaline reaches of the FCE, and to 4) to examine how production and accumulation of soil inorganic C could be influencing net carbon balance of the FCE. We planned continued long-term data collection, coupled with field experiments to address the patterns and causes for change, and analysis of our ability to detect change at different scales by combining interpretations from long term measurements and remote imagery.

Long-term data collection and synthesis. We continue to collect and synthesize over 17 years of FCE biogeochemical, primary production, organic matter and consumer data to determine how the balance of fresh and marine water supplies influence components of the C cycle. We completed several synthesis papers addressing biogeochemical changes along the coastal gradients relative to water flow changes and sea level rise, including an analysis of long-term surface water phosphorus and bacterial productivity patterns throughout the SRS and TS/Ph and a study of long-term water level and biogeochemical patterns in Florida Bay. We also continued measuring and analyzing DOC concentration and composition along transects of SRS and TS/Ph, and submitted a key paper characterizing long-term patterns in DOC fluorescence and composition throughout SRS and TS/Ph. We also performed a cross-LTER collaboration with the Georgia Coastal Ecosystems LTER (Dr. Medeiros), and with the Bonanza Creek LTER in Alaska (Dr. J. Jones) of origin, fate and transport of different forms of carbon in fluvial systems.

Our trophic dynamics research focused on the hypothesis that periphyton mat structure protects palatable algae and mat infaunal invertebrates, a phenomenon called associational resistance, and limits secondary production (Trexler et al. 2015) and that herbivory is sustained by heterotrophic

bacteria that provide essential fatty acids and lipid-rich autotrophs, especially diatoms and green algae (Sanchez and Trexler 2016). We also hypothesized that the movements and trophic interactions of consumers are driven by both seasonal and inter-annual variation in hydroclimatic conditions, as well as rare extreme climatic events. With their movements, consumers (American alligators, bull sharks, common bottlenose dolphins, common snook and Atlantic tarpon) create trophic linkages among freshwater, estuarine and marine food webs, and partition resources over both space and time (Matich et al. 2017). These trophic linkages can be severed by extreme events, such as drought, that alter both the magnitude and the quality of the marsh prey subsidy (Boucek et al. 2016), and we hypothesize the ecosystem is resilient and will recover from extreme events.

Experiments. Our objectives were to synthesize results from long-term saltwater intrusion manipulative studies, complete a freshwater restoration experiment that tested for legacy effects of long-term salinity and phosphorus additions in freshwater *Cladium jamaicense* marshes.

Landscape scaling. We completed a first-generation coastal ecotone vegetation map. We explicitly focused synoptic sampling to align with developing datasets that link variability in hydrology and salinity with vegetation structure and aboveground biomass.

Climate and Disturbance Legacies: Our explicit focus of this work was to continue documenting the impact of Hurricane Irma on long-term hydrological, ecological and geomorphological change in the coastal Everglades and to determine through modelling efforts how storm surge and ecosystem structure interact to determine impact and recovery.

Modeling and Scenarios: Our modeling and scenarios work focused on conducting new geochemical laboratory experiments of water-rock interactions accompanying saltwater intrusion and using these results to further develop our geochemical model in which we can investigate nutrient release under various climate and sea level rise scenarios. We also planned to complete our hydrodynamic model of coastal Shark River with a particle tracking component, and finalize and publish our Everglades Landscape Model (ELM) simulations of soil biogeochemistry responses in the Everglades Water Conservation Areas and the Everglades National Park to future climate scenarios.

Significant results

Hydrology and Water Policy: We found that the freshwater-to-marine head difference was the most important factor affecting marine-to-freshwater hydrologic connectivity and transport of salinity and P into the oligohaline ecotone from the Gulf of Mexico (Dessu et al. 2018). Institutional analysis of farm and water management practices revealed that the shared pollution cap through CERP worked to incentivize farmer cooperation and application of agricultural best management practices (Yoder and Roy Chowdhury 2018). Long-term (1996-2015) water quality trends analysis revealed greatly variability across time and space, as well as by land use, farm manager/operators, and by type of practice adopted (Figure 1). A cross-site comparative study showed that multiple sources of social-ecological knowledge, including that of indigenous people, transdisciplinarity, and a proactive focus on watershed sustainability are critical components of successful wetland restoration (Marazzi et al. 2018).

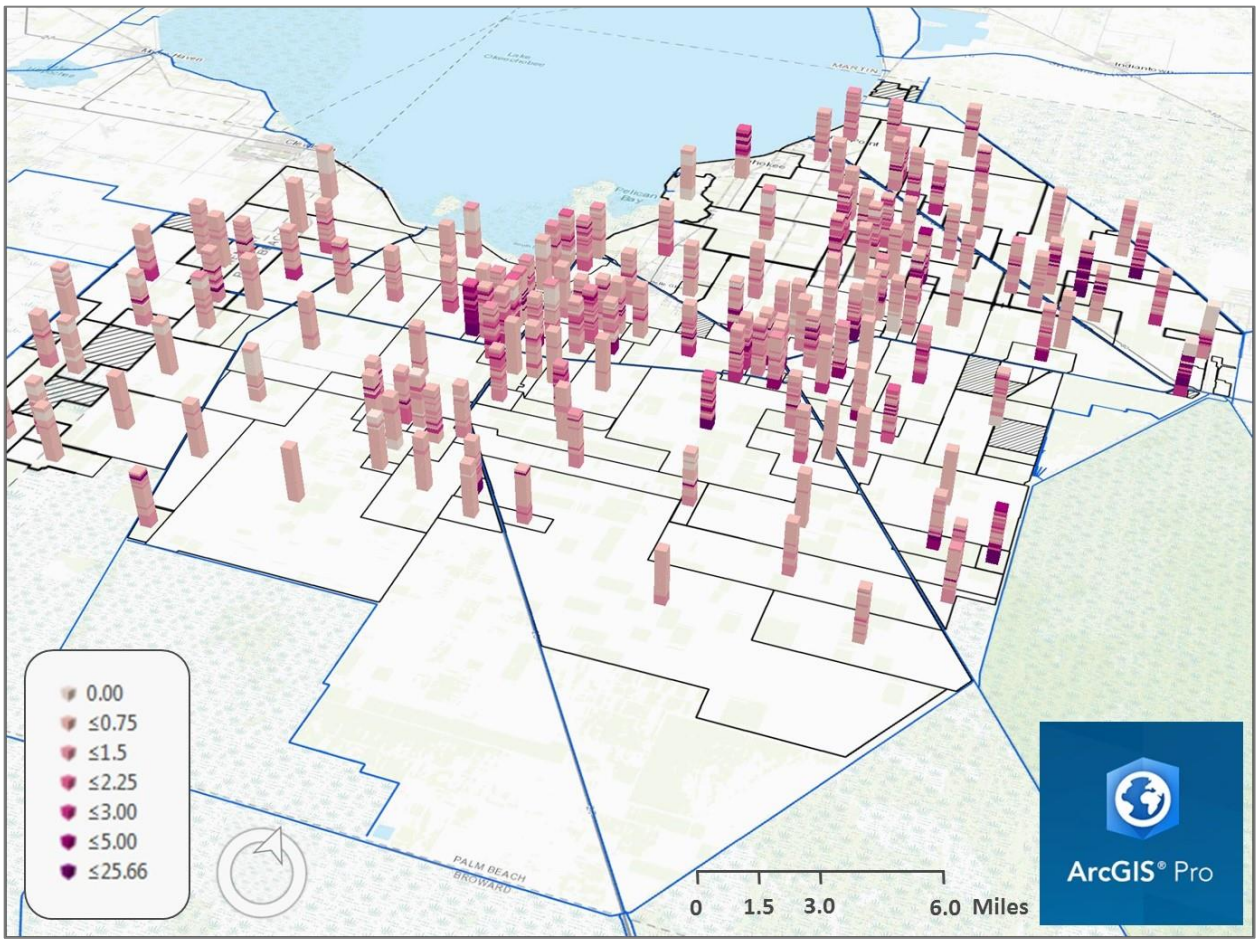

Figure 1. Total Phosphorus per unit area load (UAL) in successive wet seasons (Jun-Oct) over 1996-2016 in the Everglades Agricultural Area (EAA) located just south of Lake Okeechobee (blue area).

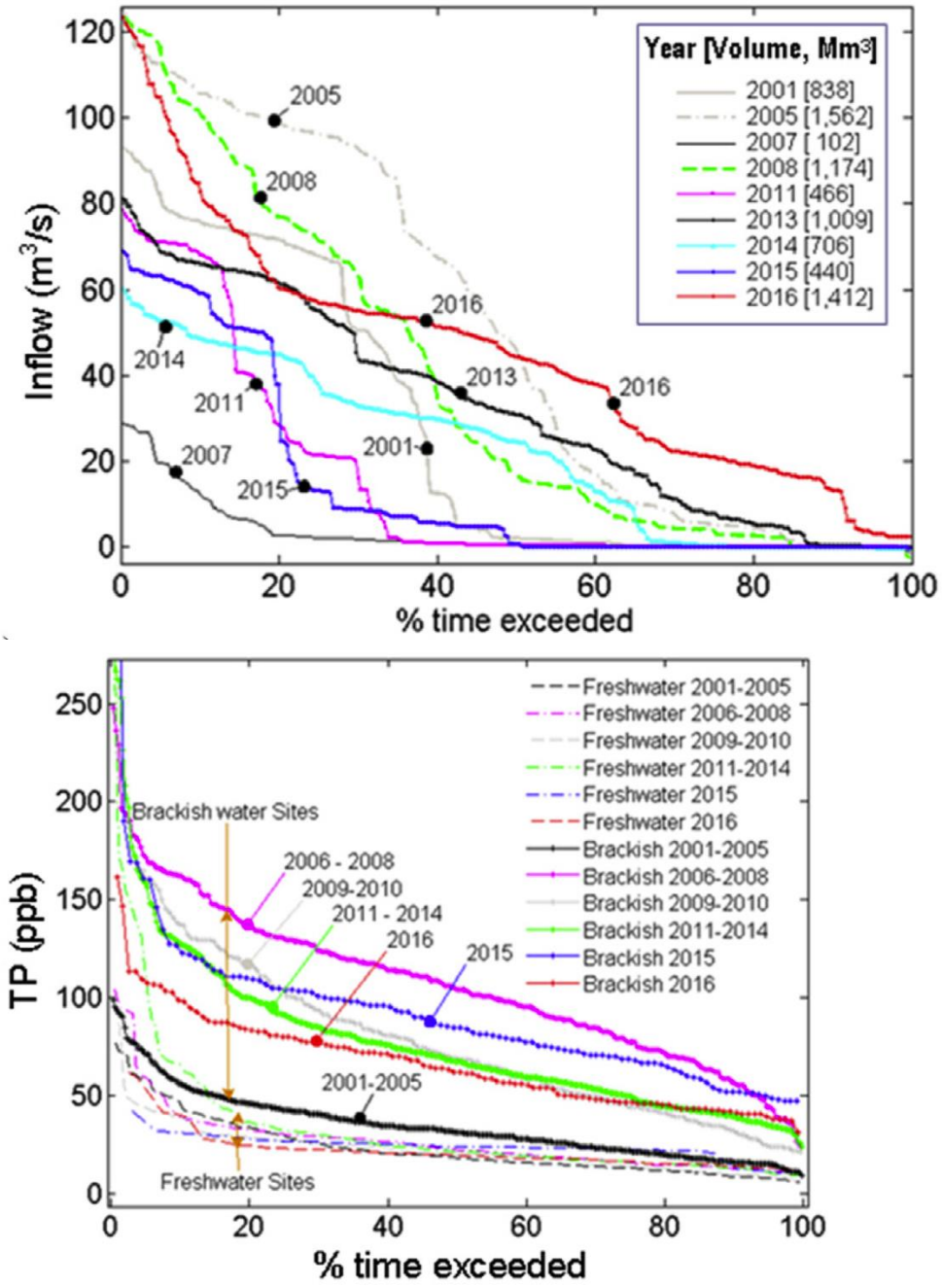

Figure 2. Exceedance curves for (a) freshwater inflow (m3/s) and (b) Total Phosphorus (TP) from freshwater and brackish water sites along SRS from 2001-2016.

Carbon Dynamics: *Long-term data collection and synthesis.* Our analysis of long-term trends in biogeochemistry show that SLR and freshwater inflow exceedances are interacting with inter-annual droughts and storms to drive increasingly higher total P (TP) concentrations and exceedances along SRS (Figure 2). Experimental manipulations of cycles of drying and rewetting helped define the uptake and release from periphyton mats that control marsh P concentrations (Sola et al. 2018; Figure 3). Drying causes domination by a few foundation

species capable of withstanding desiccation and simulates more TP retention than TN (Marazzi et al. 2018). At the same time, increasing presses and pulses of salinity and P from marine water are increasing water column TP concentrations and bacterial productivity in estuarine and ecotonal wetlands (Figures 4, 5). Dynamics of DOM fluorescence data are clearly linked to seasonal hydrology, with SRS being strongly influenced by upstream inputs and water management, which increases the relative abundance of terrestrial DOM (Figure 6).

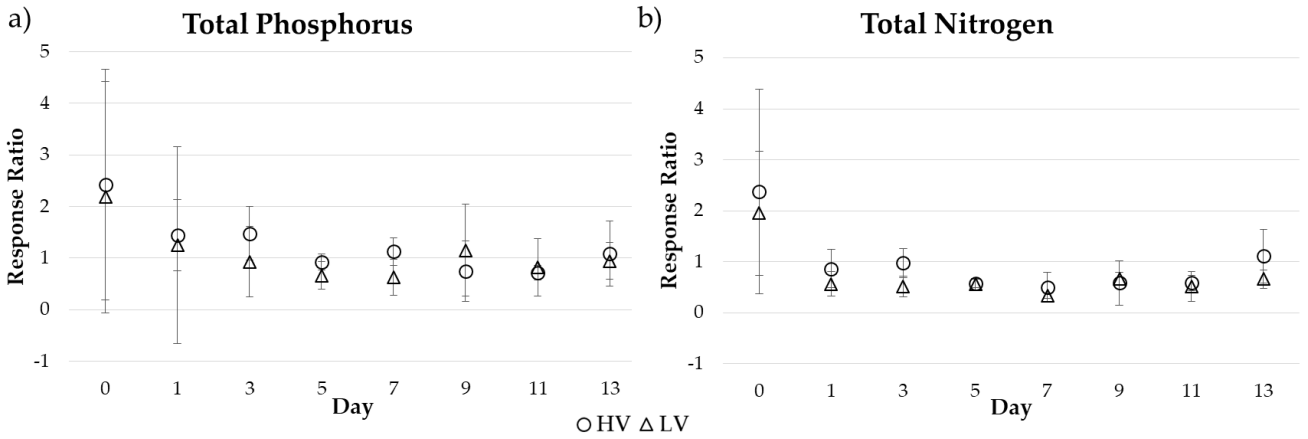

Figure 3. Response ratios for (a) TP and (b) TN of HV and LV treatments relative to Control mats, using the original nutrient concentrations from the field as a baseline. Ratios were calculated by subtracting concentrations by original field data (pre-treatment), then dividing by the relative daily average in the Control samples. Bars indicate standard deviations (SD). HV and LV did not differ significantly in TP or TN (Tukey HSD; $p < 0.05$). (Source: Figure 5 in Sola et al., 2018)

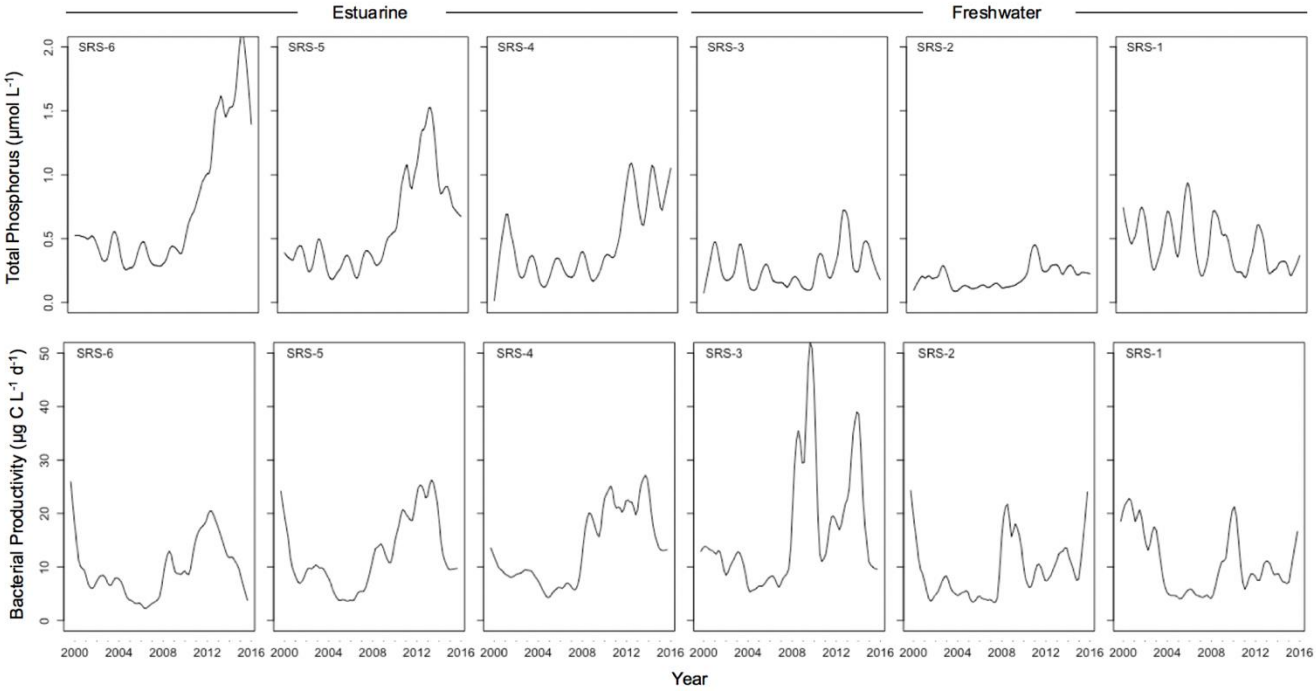

Figure 4. Long-term time series trends of surface water total phosphorus and bacterial productivity along estuarine to freshwater gradients in Shark River Slough (SRS) from 2000 to 2016.

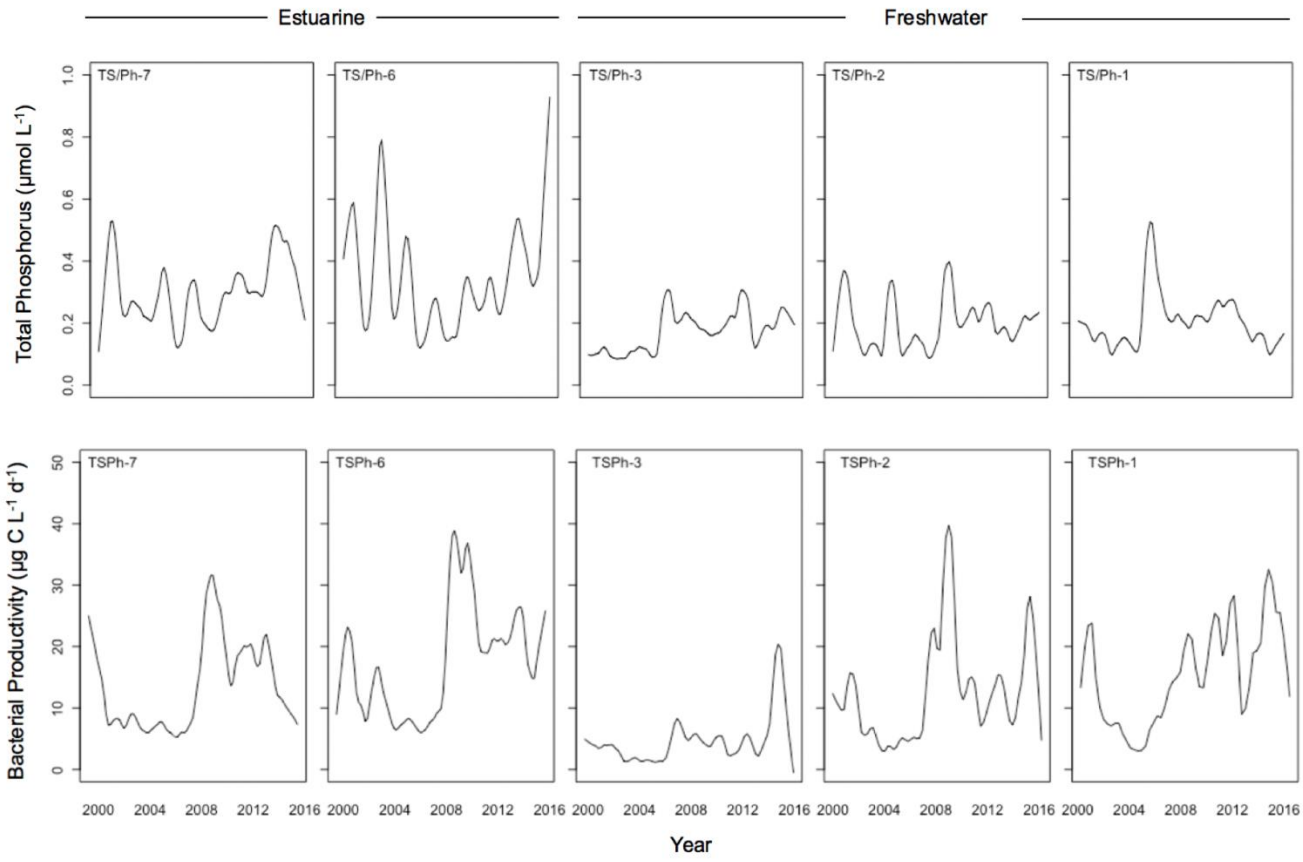

Figure 5. Long-term time series trends of surface water total phosphorus and bacterial productivity along estuarine to freshwater gradients in Taylor Slough Panhandle (TS/Ph) from 2000 to 2016.

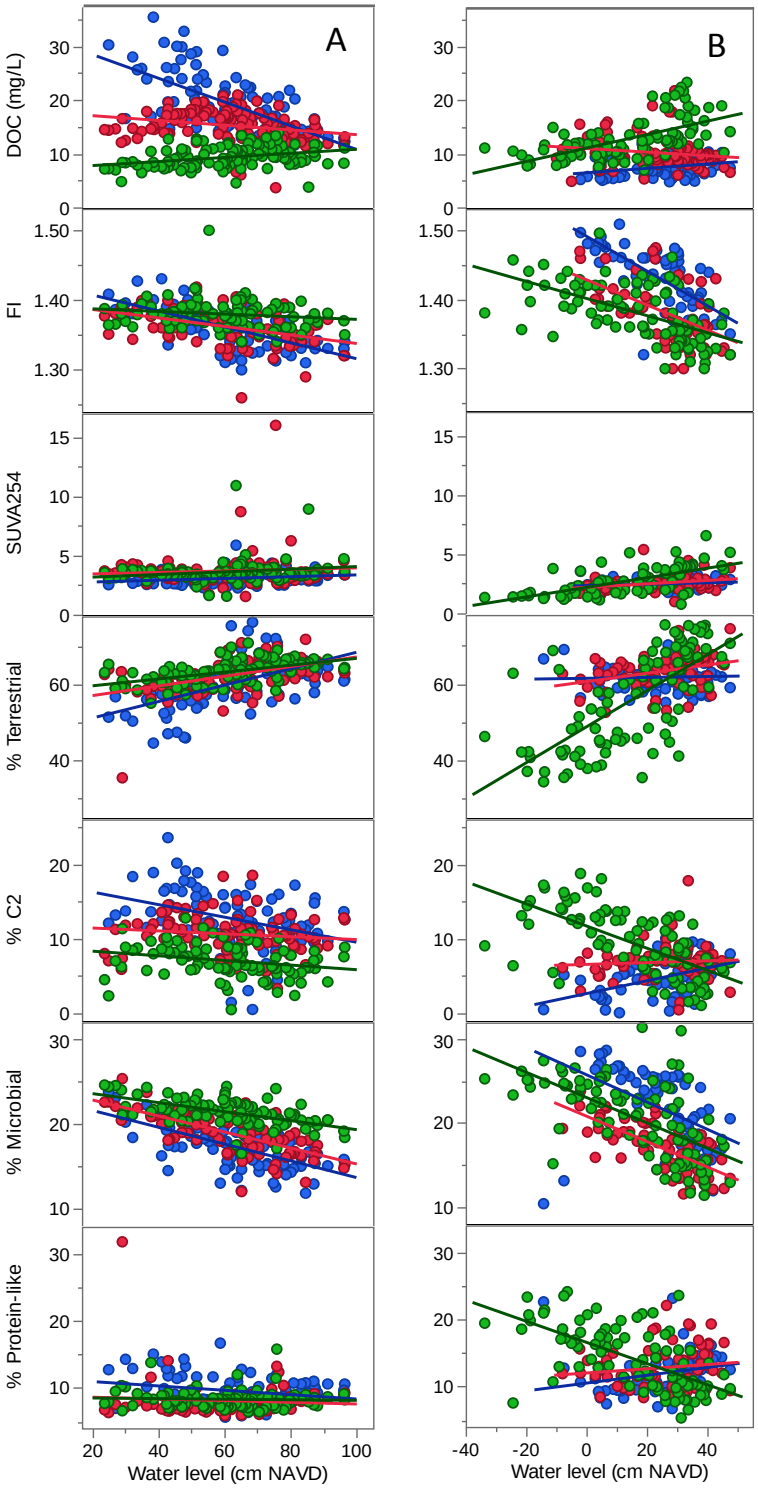

Figure 6. Linear regressions of DOC concentration and percentages of the four PARAFAC groupings against water level for (A) TS/Ph-2 and (B) SRS-2. Wet season values are blue, dry season values are red. Regression lines are only presented for significant ($p < 0.05$) regressions.

Experiments. We found that P alleviated salinity stress on sawgrass productivity and adding salinity and P increased aboveground productivity (Figures 7, 8). Surface litter breakdown was enhanced by elevated P regardless of salinity (Figure 9). Freshwater marsh peat soils collapsed (lost elevation) within 180 days of continuous exposure to elevated salinity (7 ppt), and declines in elevation began to saturate at a cumulative load of ~22,000 g m-2 y-1 (Figure 9). Legacies of elevated salinity maintained increased porewater salinity and DOC more than 1 year following freshwater restoration the mesocosms (Figure 10). In a separate experiment, P loading was increased by elevating water flow velocity causing changes in periphyton species and biochemical composition which was transferred to an herbivorous fish (both tissue fatty acid composition and stoichiometry) (Bornhoeft 2016; Mercado-Molina and Trexler in prep). By experimentally manipulating biofilms, we showed that the most abundant Everglades herbivorous fish benefitted by elevated levels of heterotrophic bacteria (Sanchez and Trexler 2018) and displayed multi-channel C assimilation.

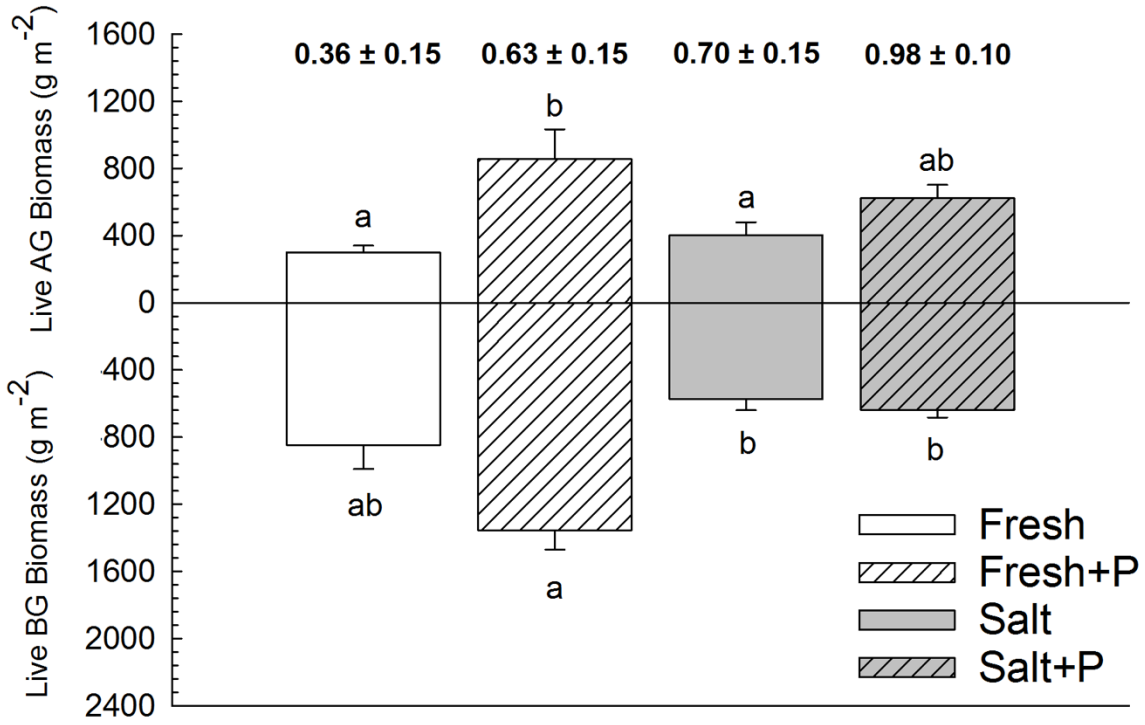

Figure 7. Live aboveground (AG) and belowground (BG) biomass after two years. Aboveground biomass was calculated allometrically, whereas belowground biomass was measured through soil coring down to 30-cm depth. Subscripted letters represent differences among treatments from a Tukey's HSD post-hoc test. Bars represent the mean (*n* = 6 replicates per treatment) ± 1 SE in grams dry weight of material per meter squared. The number at the top of each treatment represents the ratio of aboveground to belowground biomass.

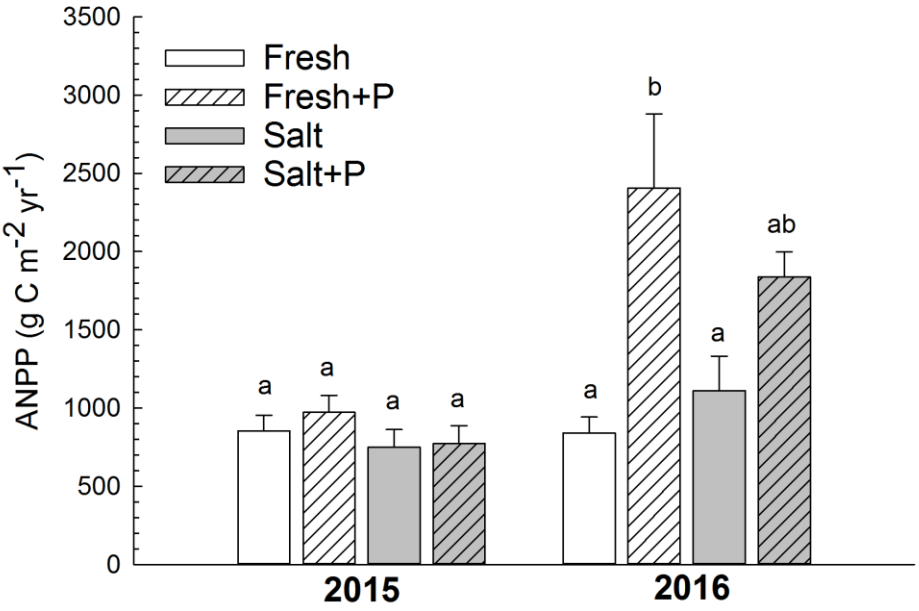

Figure 8. Measured aboveground net primary productivity (ANPP) separated by treatment and year. Letters represent the results of a Tukey's post-hoc analysis performed separately for each year. Points represent the annual mean (n = 6 replicates per treatment) ± 1 SE.

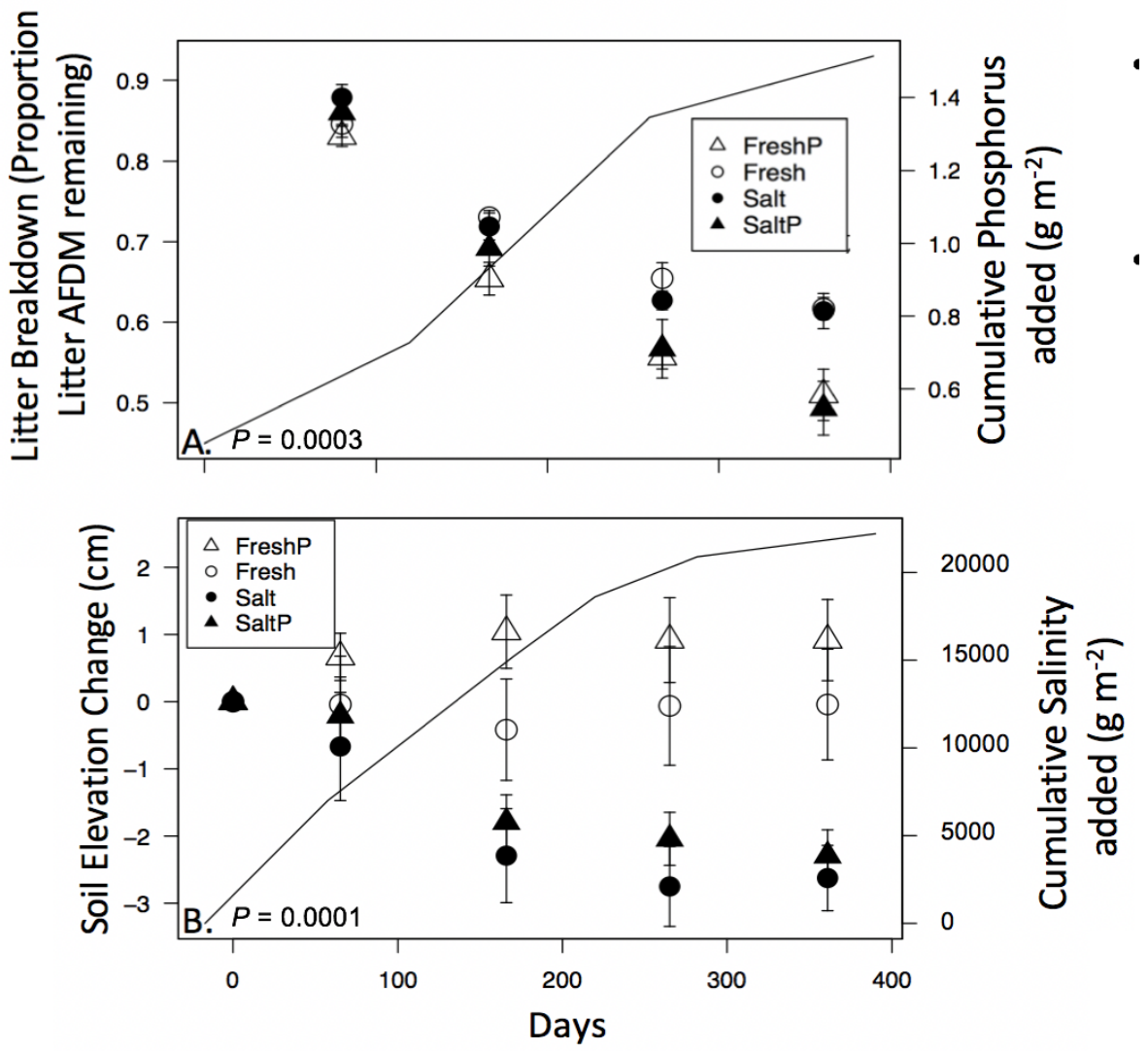

Figure 9. Effects of cumulative salinity and phosphorus loading on *Cladium jamaicense* litter breakdown and elevation loss from freshwater peat soils during continuous experimental exposures in artificial wetland mesocosms. Treatments are added freshwater (Fresh), freshwater + phosphorus (FreshP), 7 ppt salinity (Salt), 7 ppt salinity + phosphorus (SaltP). Significant differences among treatments determined using two-way ANOVA with an alpha = 0.05.

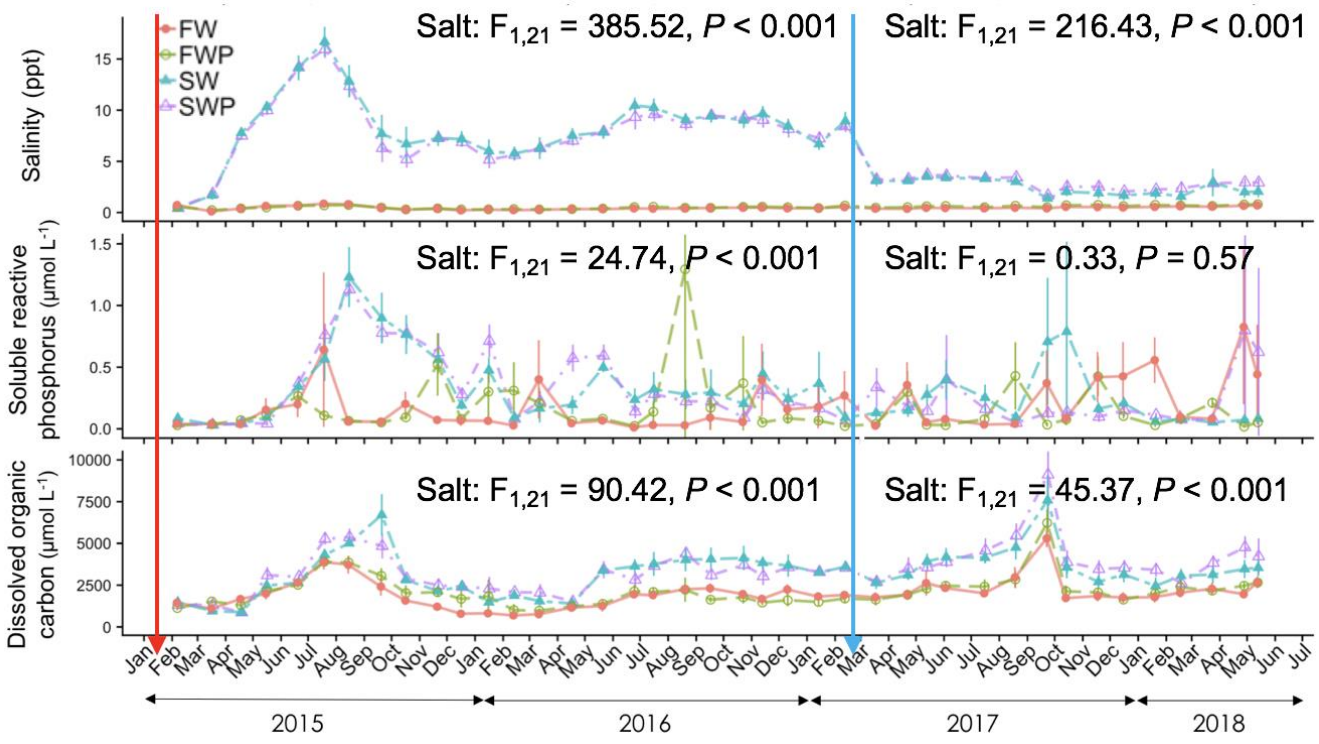

Figure 10. Effects of experimental elevated salinity and phosphorus (red arrow) and freshwater restoration (blue arrow) on porewater salinity, soluble reactive phosphorus, and dissolved organic carbon concentrations in artificial wetland mesocosms.

Landscape scaling. We are developing plant community composition maps for 0.25 km areas for each LTER site and sites in the southeast saline Everglades (with leveraged funding from SFWMD) to determine the "representativeness" of our LTER macrophyte sites in the local landscape. We are working to link longterm macrophyte dynamics (Figure 11) to changes in hydrology (Figure 12) and salinity to project landscape-level changes in marsh vegetation composition, biomass and productivity.

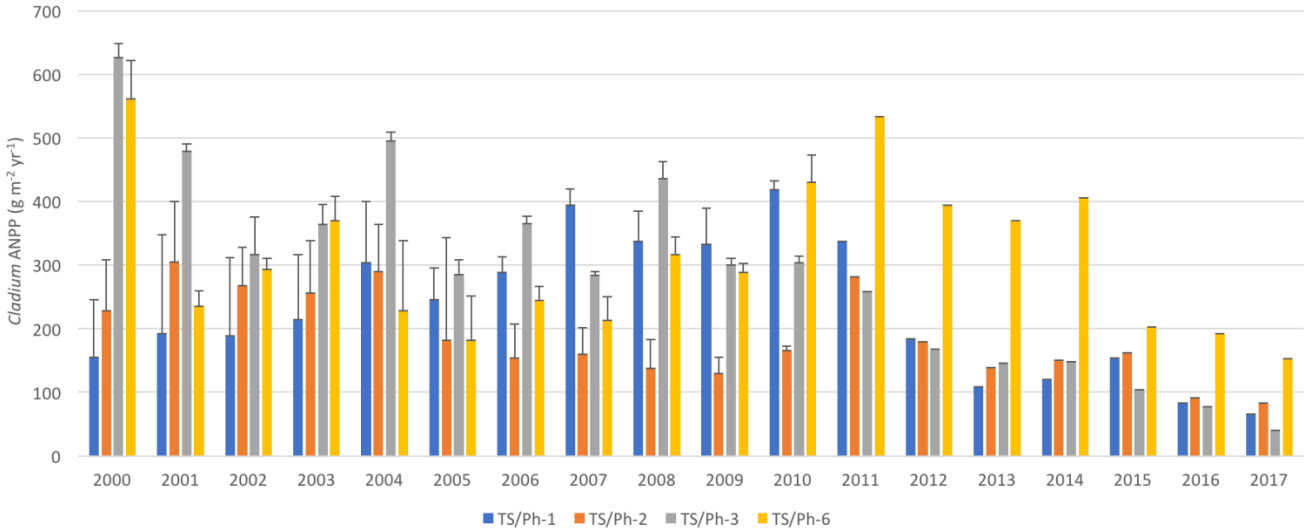

Figure 11. Long-term *Cladium* aboveground net primary productivity for Taylor Slough

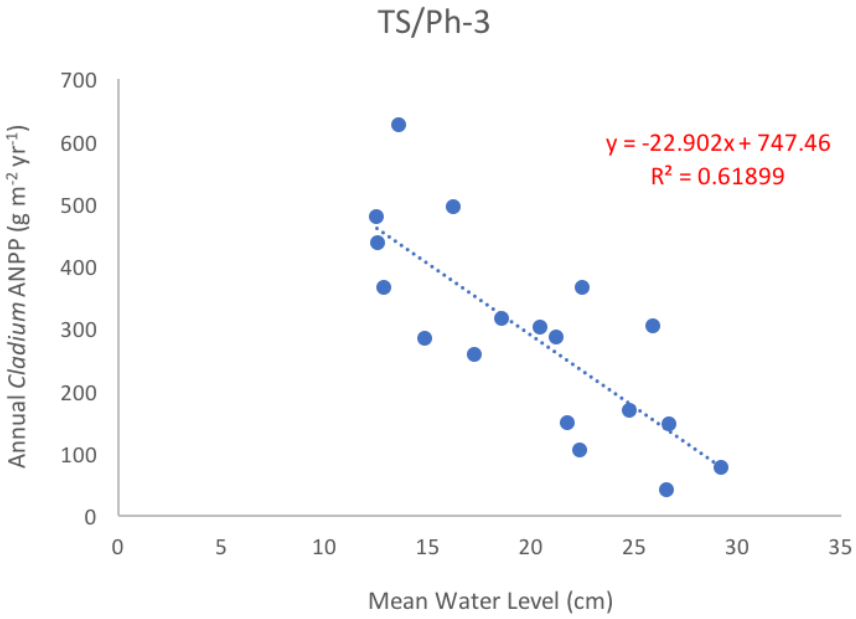

Figure 12. Long term *Cladium* aboveground net primary productivity and mean water level at TS/Ph 3 (2000-2018).

Climate and Disturbance Legacies: The analysis of multi-temporal SAR images acquired before, during, and after the passage of Hurricane Irma revealed that most of south Florida was subjected to flooding due to heavy rain induced by the hurricane (Figure 13; Zhang et al. 2018). Net primary productivity was reduced to < 50 % of the cumulative monthly production in previous years (2015-2016, Figure 14), similar to observations following Hurricane Wilma in the same forest stands (Danielson et al 2017). We quantified storm sediment deposition rates and examined the potential for the storm layer to enhance regional C sequestration via reduced soil respiration (Figures 15, 16, 17). We estimated that these disturbances trigger a C flux ranging

3.6-4.7 Mg C ha-1 in 2005 (Figure 19A) and from 2.5 – 3.2 Mg C ha-1 in 2017 (Figure 19B). Microbial biomass C in the pre-Irma soil was 9.86 ± 2.21 mg g soil-1, roughly 5 times higher than the average of all other storm and prestorm layers (1.86 ± 0.18). The flux of CO2 was approximately 30% lower in the cores with a storm layer compared to those without a storm layer (Figure 17). This supports the hypothesis that the storm layer was capable of reducing soil respiration, but only in locations where the underlying soil is highly organic. Our paleoecological data are showing that over the last 100 years, the mangrove forests in the FCE bury organic C at an average rate of 134 gm-2y-1, and they also bury allochthonous inorganic C at an average rate of 33 gm-2y-1 (Breithaupt et al. 2018). Sites with higher burial rate of inorganic C also buried P, the limiting nutrient, and organic C at higher rates (Figure 18, Breithaupt et al. 2018). Our work has shown that common global models underestimate stocks of soil organic C in mangrove forests in carbonate terrains such as the FCE by up to 50% (Rovai et al. 2018). Seagrass ecosystems in the FCE bury roughly 3x more inorganic C than organic C, suggesting that these ecosystems could bet a net source of C to the atmosphere over the Holocene (Howard 2018).

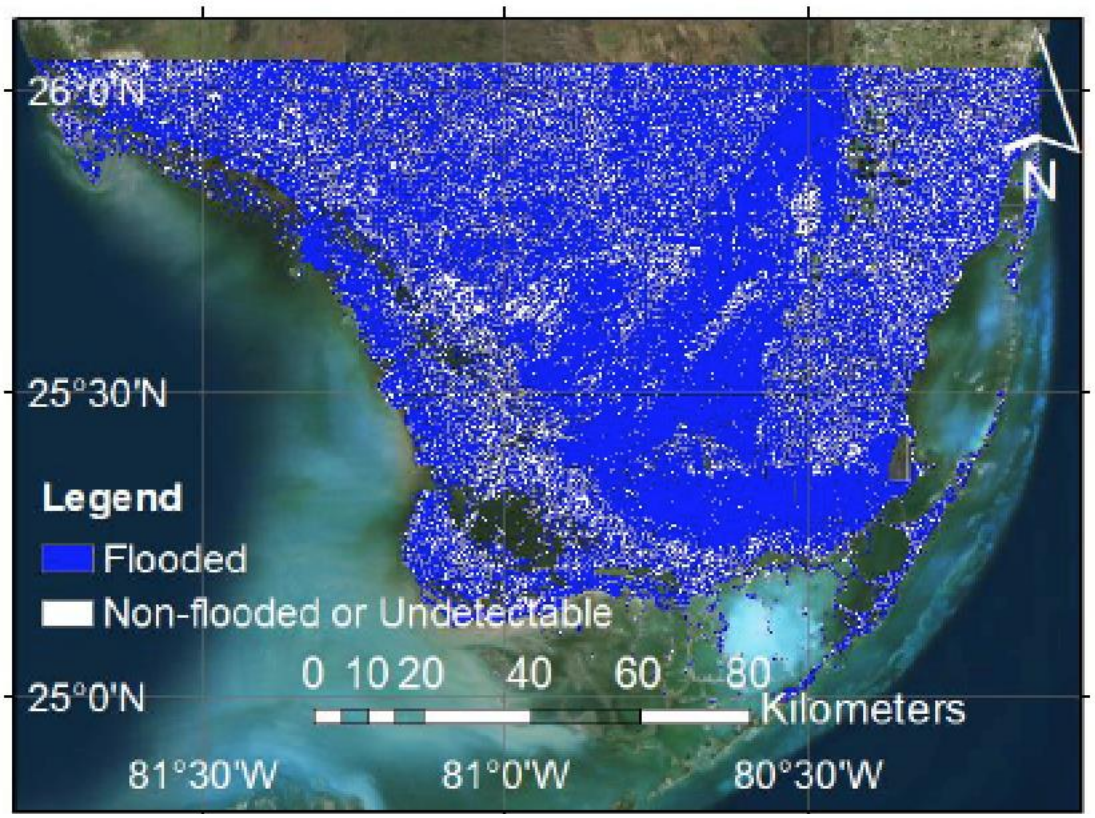

Figure 13. A binary map showing the extent of flooding induced by Hurricane Irma (Sept. 2017). Blue indicates flooded areas while white indicates non-flooded or undetectable.

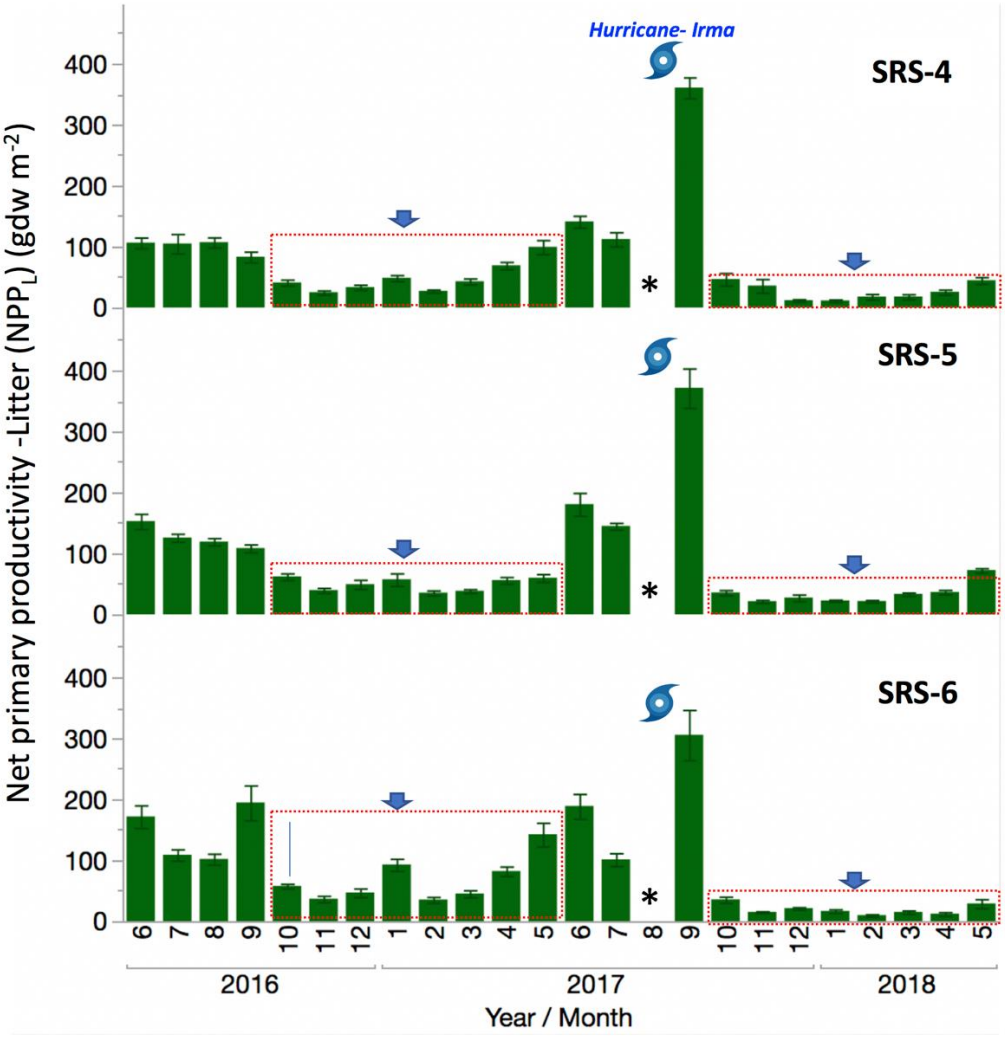

Figure 14. NPP-Litter in study sites before and after Hurricane Irma impact (September 9 2017). * data is accounted in values for the month of September; Doted line and arrows encompass the period and relative impact before and after the storm.

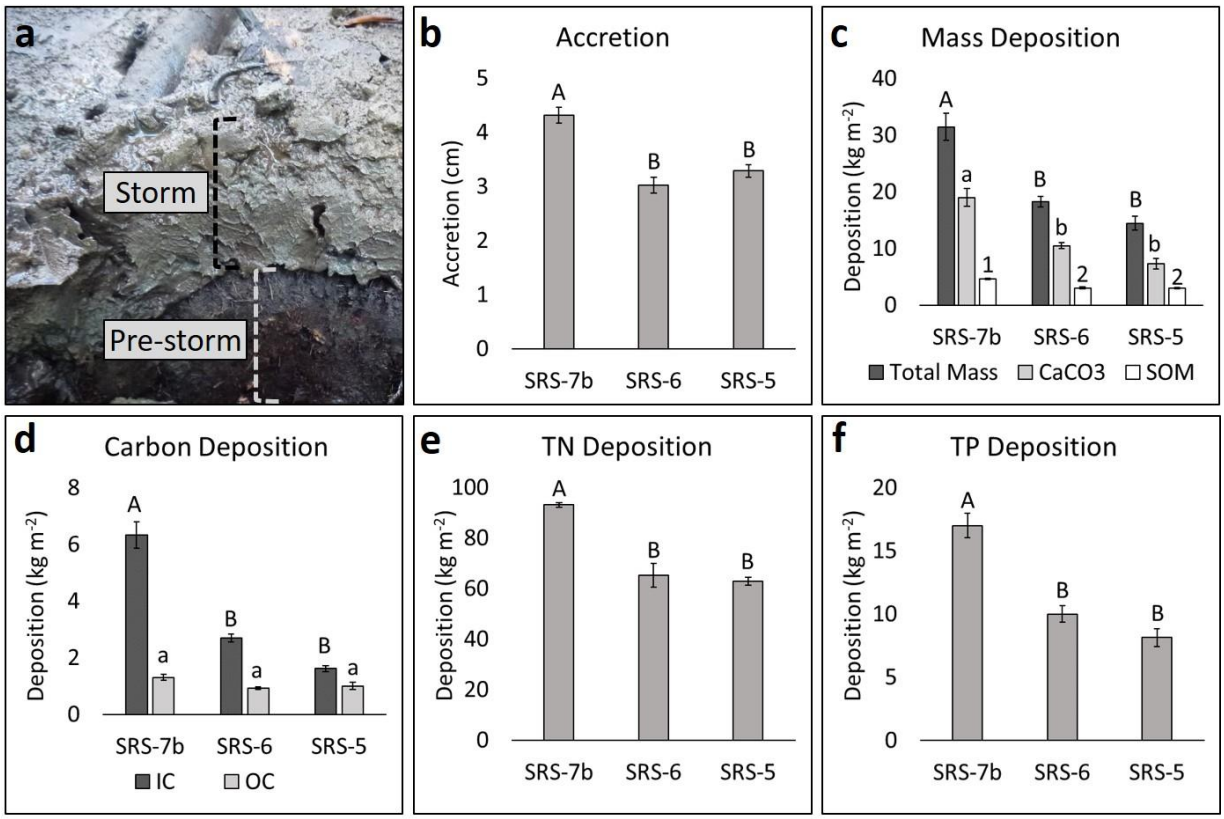

Figure 15. a) Photograph of Irma storm layer sediment atop pre-storm soil at site SRS-5, as well as mean (± 1 SE) site values for **b)** accretion, **c)** mass deposition (including $CaCO_3$, and soil organic matter [SOM]), **d)** carbon deposition (including inorganic and organic carbon [IC and OC]), **e)** total nitrogen (TN) deposition, and **f)** total phosphorous (TP) deposition. Different capital and lowercase letters and numbers within panels indicate significant differences between sites for individual deposition parameters.

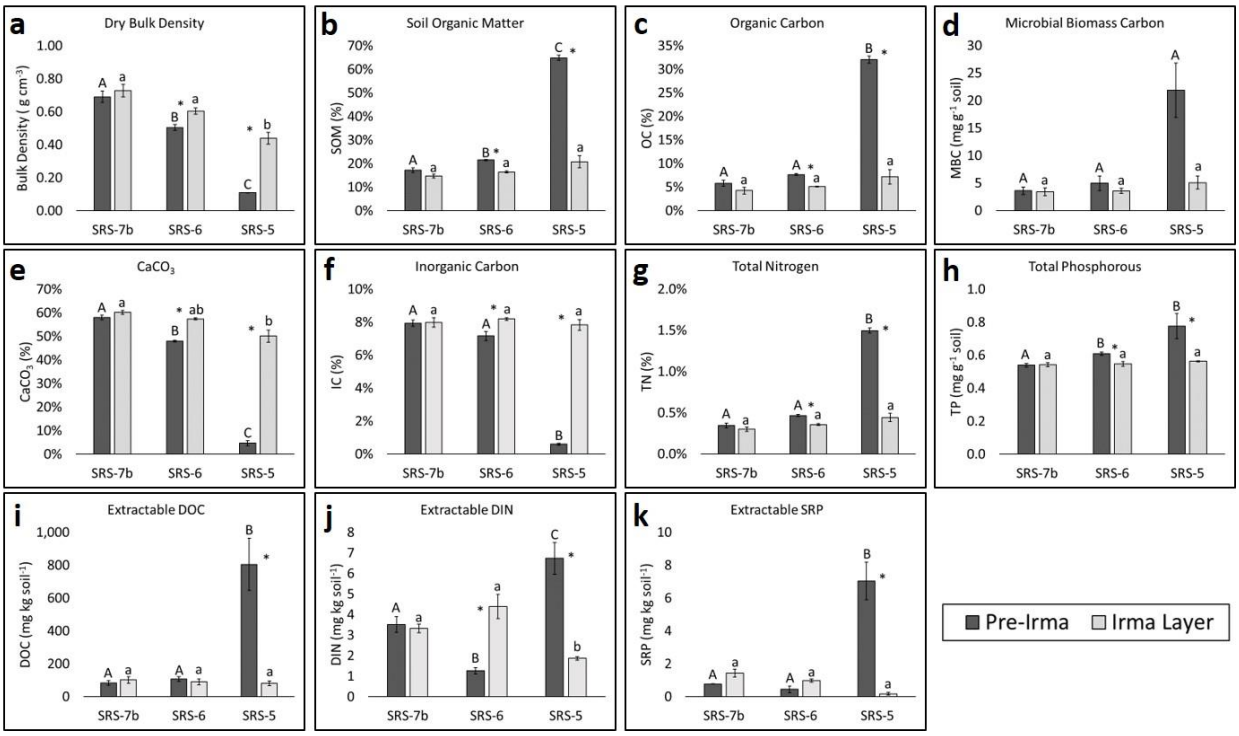

Figure 16. Mean (± 1 SE) values of pre-Irma and Irma layer soils by site for **a)** dry bulk density, **b)** soil organic matter, **c)** organic carbon, **d)** microbial biomass carbon, **e)** $CaCO_3$, **f)** inorganic carbon, **g)** total nitrogen, **h)** total phosphorous, **i)** extractable dissolved organic carbon (DOC), **j)** extractable dissolved inorganic nitrogen (DIN), and **k)** extractable soluble reactive phosphorous (SRP). Different capital letters indicate significant difference for pre-Irma soils by site; different lowercase letters indicate significant difference for Irma layer soils by site, and asterisks indicate significant difference between pre-Irma and Irma soils within a site.

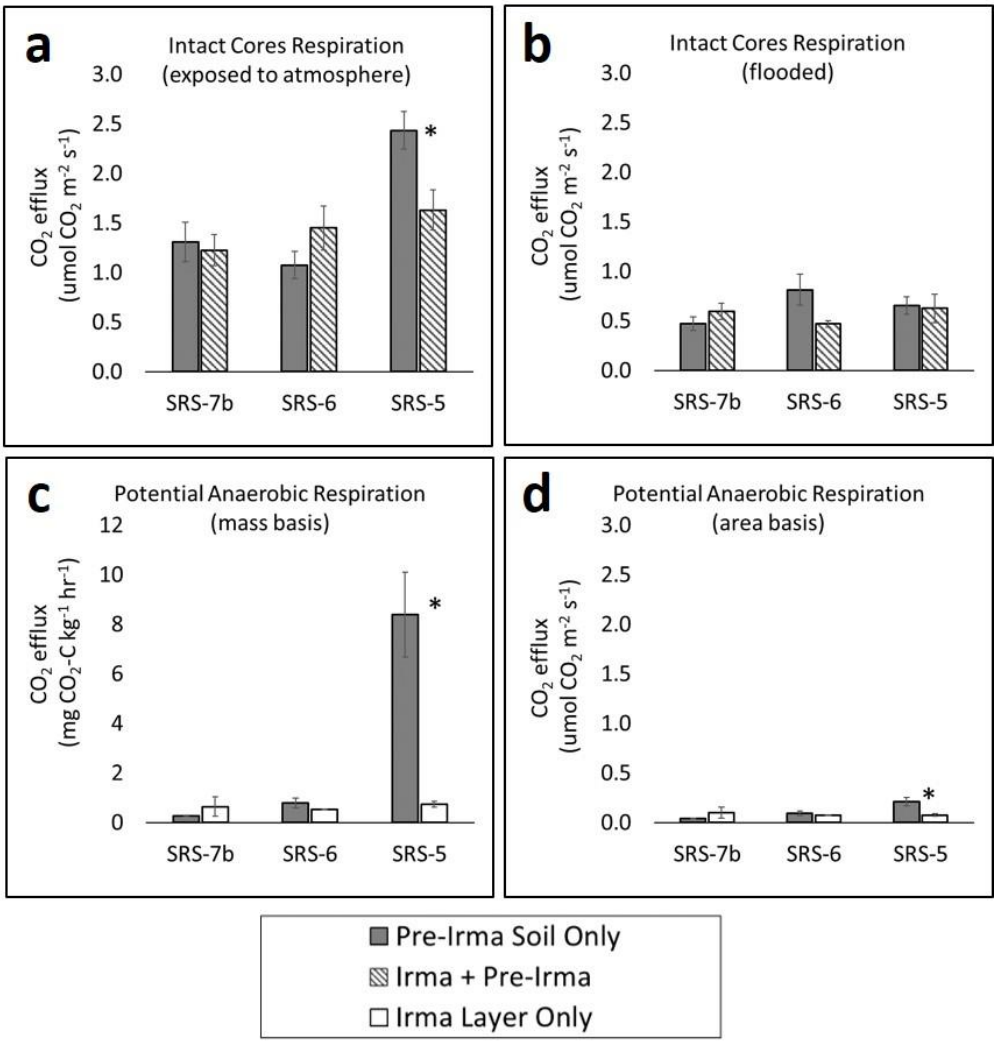

Figure 17: Mean (± 1 SE) CO_2 fluxes from **a)** intact cores exposed to the atmosphere, **b)** flooded intact cores, and anaerobic bottle incubations reported on a **c)** per mass basis and **d)** per area basis. Note that the intact cores are either composed exclusively of pre-Irma soil or of a combination of pre-Irma soil capped by an Irma layer. The bottle incubations are composed exclusively of pre-Irma or Irma soil only. Asterisks indicate a significant difference ($p<0.05$) between treatments within a site.

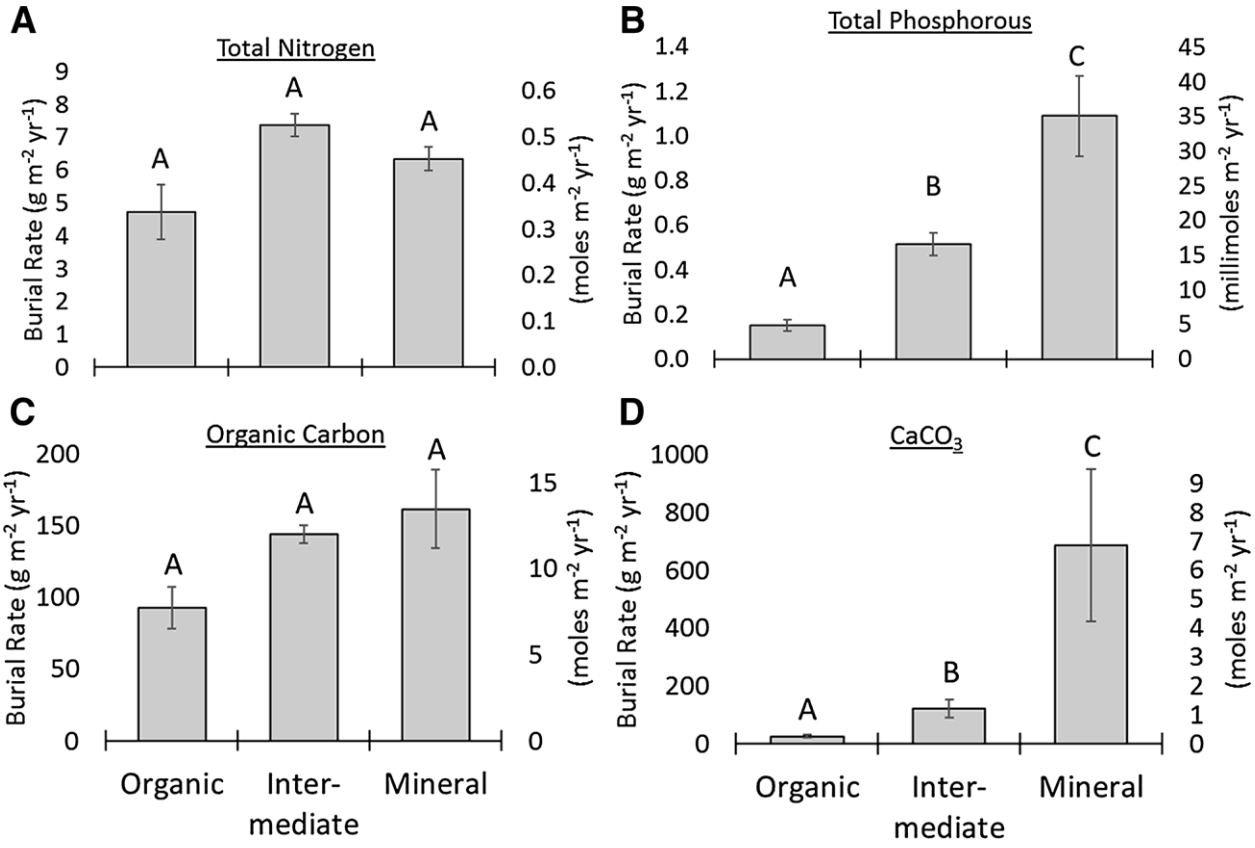

Figure 18. Mean (± 1 SE) burial rates by site classification. Different capital letters above error bars indicate significant difference ($P < 0.05$). Rates are provided in mass units on the primary axis, and molar units on the secondary axis. (Source: Figure 3 in Breithaupt et al., 2018)

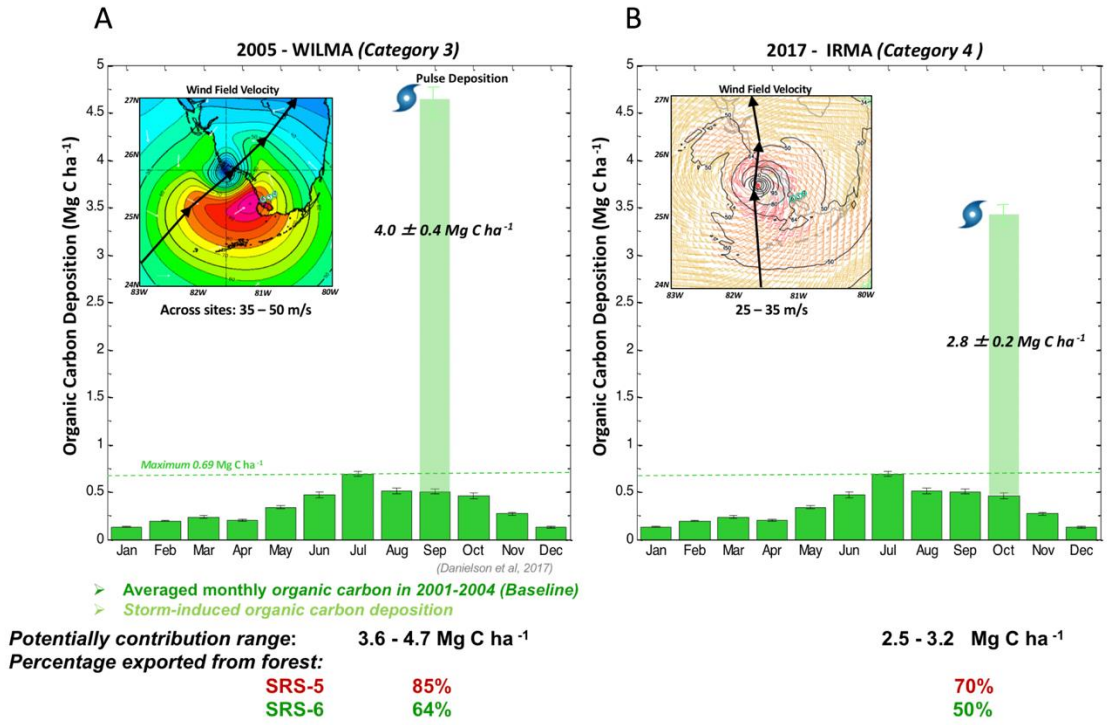

Figure 19. Organic carbon deposition in two study sites (SRS-5, SRS-6) before and after Hurricane Wilma (A) and Irma impact (B) and comparison with baseline maximum monthly deposition baseline value (2011-2004). Upper left panels show hurricane trajectories and wind fields.

We continue to follow the dynamics of predators across the estuary as they recover from the 2010 cold snap and Hurricane Irma. The juvenile bull shark population in Tarpon Bay has showed signs of recovery almost reaching numbers seen before the cold snap. Abundance of Common Snook (*Centropomis undecimalis*), Florida Largemouth Bass (*Micropterus salmoides floridae*) and Sunfishes (genus *Lepomis*) is highly seasonal, with a quadrupling of the Snook and Bass abundance between the wet and dry seasons, and a 12- fold increase in the abundance of Sunfish prey in the dry season (Figures 20, 21). We hypothesize that these lower abundances post-drought are the consequence of high mortality of the Bass and Sunfishes in the marshes, and to low movements of Snook to the upstream reaches of the Shark River in response to low prey numbers.

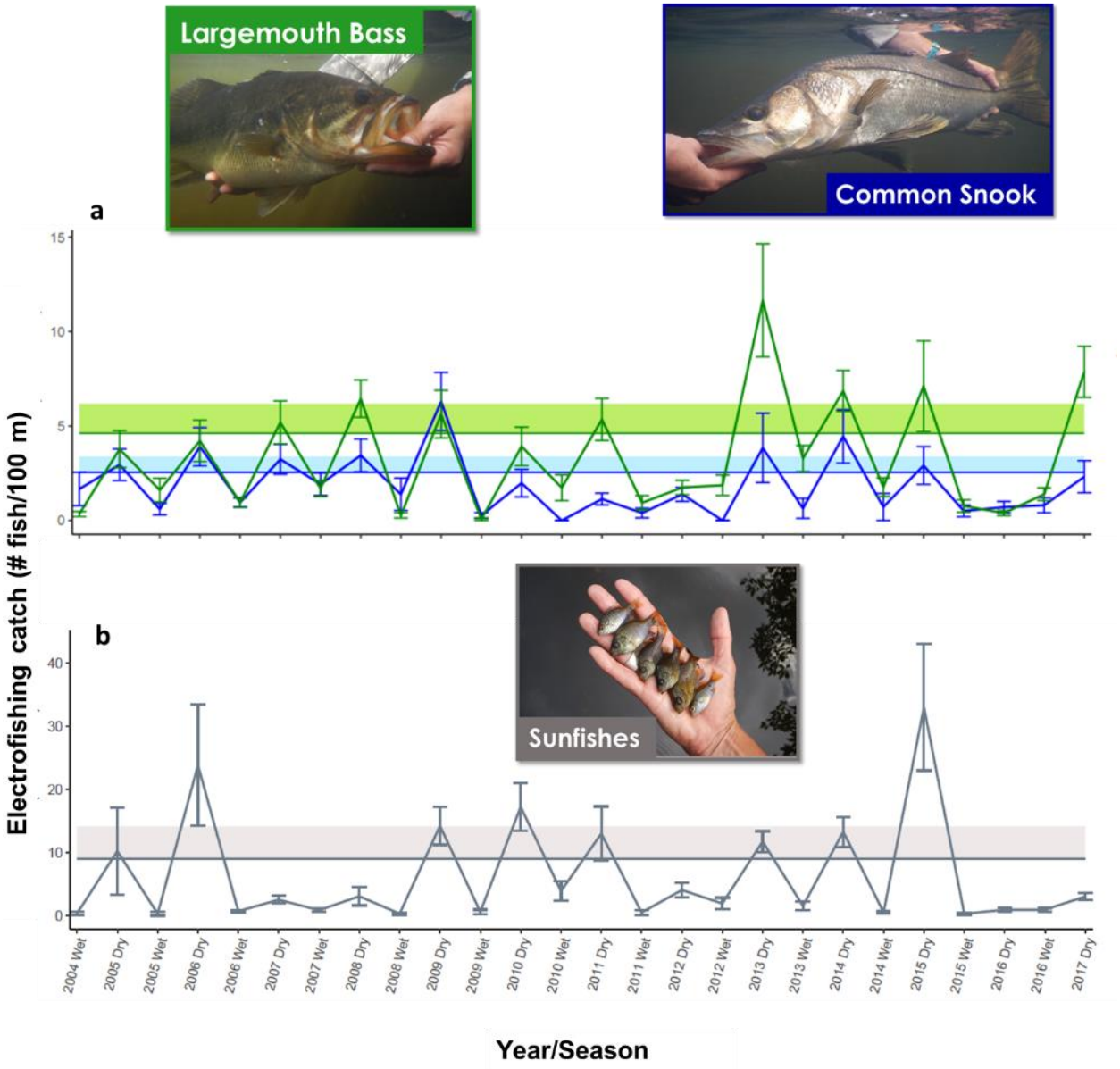

Figure 20. Time series of the a) largemouth bass, common snook and b) sunfish (prey) catch in the wet and dry seasons between 2004-2017. Shaded area indicates +/- 1 SE (standard error) around the mean dry catch (color-coded). Line at bottom of shading indicates the lower bound (-1SE) used in assessment of deviations from a desired long-term average condition.

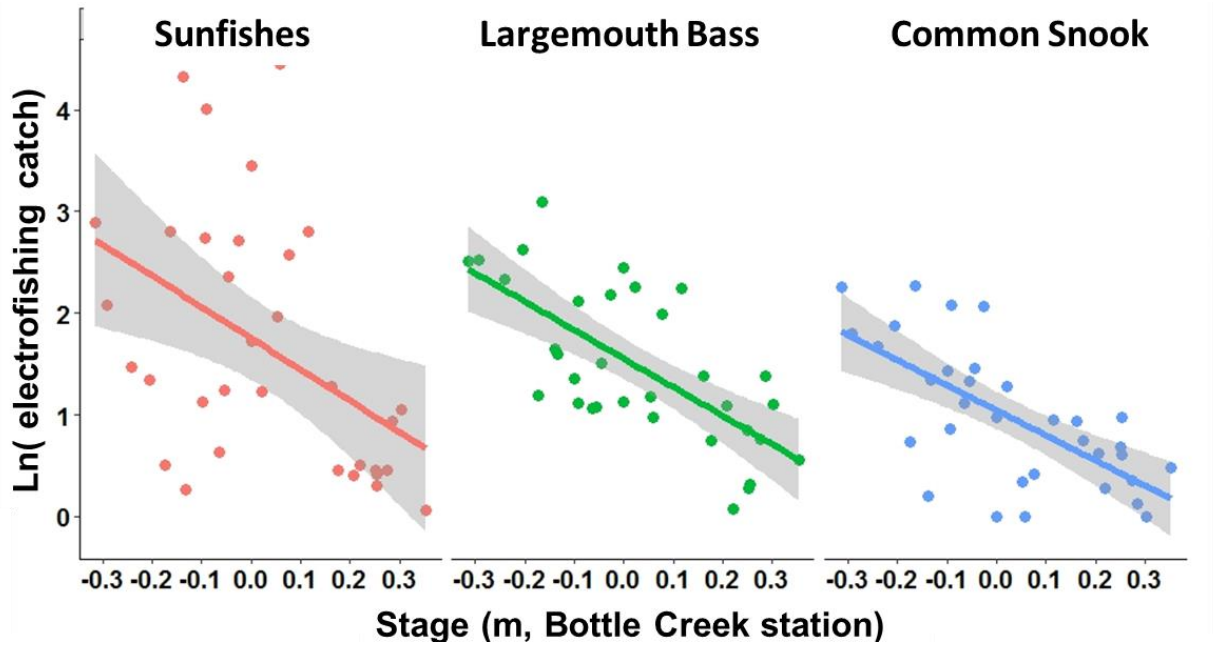

Figure 21. Relationships between electrofishing catch for the 3 key groups: Sunfishes (prey), Largemouth Bass, and Common Snook, as a function of stage (Bottle Creek Station, headwaters of Shark River). Adjusted R squared values are 0.18 (sunfishes), 0.45 (Bass), and 0.47 (Snook).

Modeling and Scenarios: We developed a calcite-focused geochemical model that simulates seawater-induced desorption of P accompanying seawater intrusion (Figure 22), and a reach-scale particle-tracking hydrodynamic model of an 8 km portion of SRS (Figure 23). Our ELM simulations provide soil biogeochemistry sensitivity to increases or decreases in rainfall by 10% in the face of 1.5 ºC warming and 7% increase in evapotranspiration for 2060. Muck fire risk was more than twice as high as the Baseline scenario in the two locations WCA-3A North, reaching 31% and 49% (Figure 24). Our modeling results clearly demonstrated that oxygen availability in soils determines the lability of different types of organic matter (Lovelock et al. 2017), and that climate change, by destabilizing vegetated coastal plant communities, can lead to substantial releases of CO2 to the atmosphere when conditions change the lability of soil organic C (Arias-Ortiz et al. 2018).

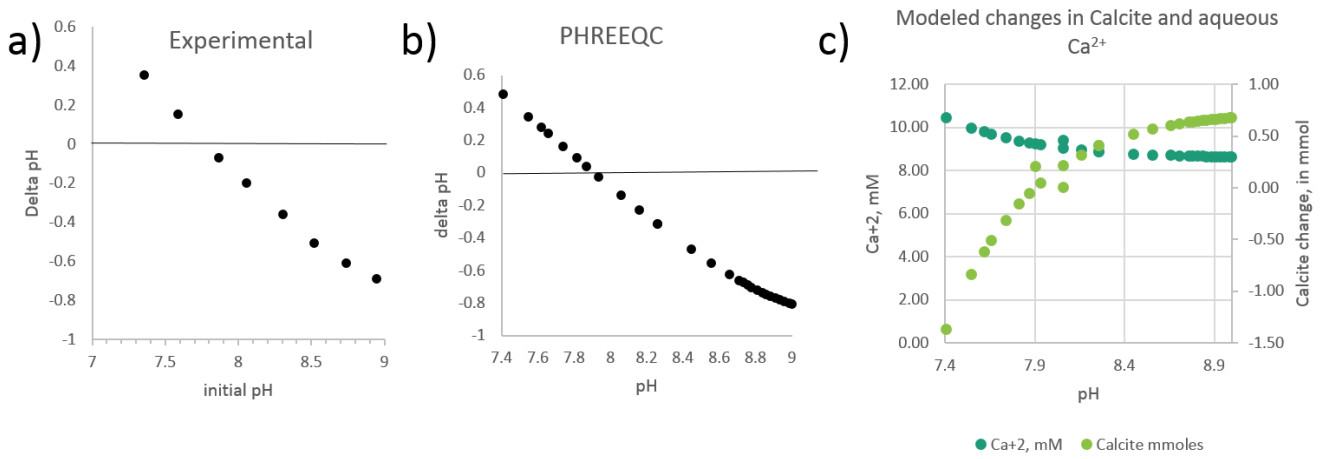

Figure 22. Geochemical modeling results: a) Experimental results for change in pH (Delta pH) during phosphorus adsorption to calcite for pH-adjusted seawater; (b) geochemical simulation of the same experiment; (c) simulated changes in aqueous Ca2+ concentration and calcite reflecting the dissolution and precipitation occurring simultaneous to the P adsorption.

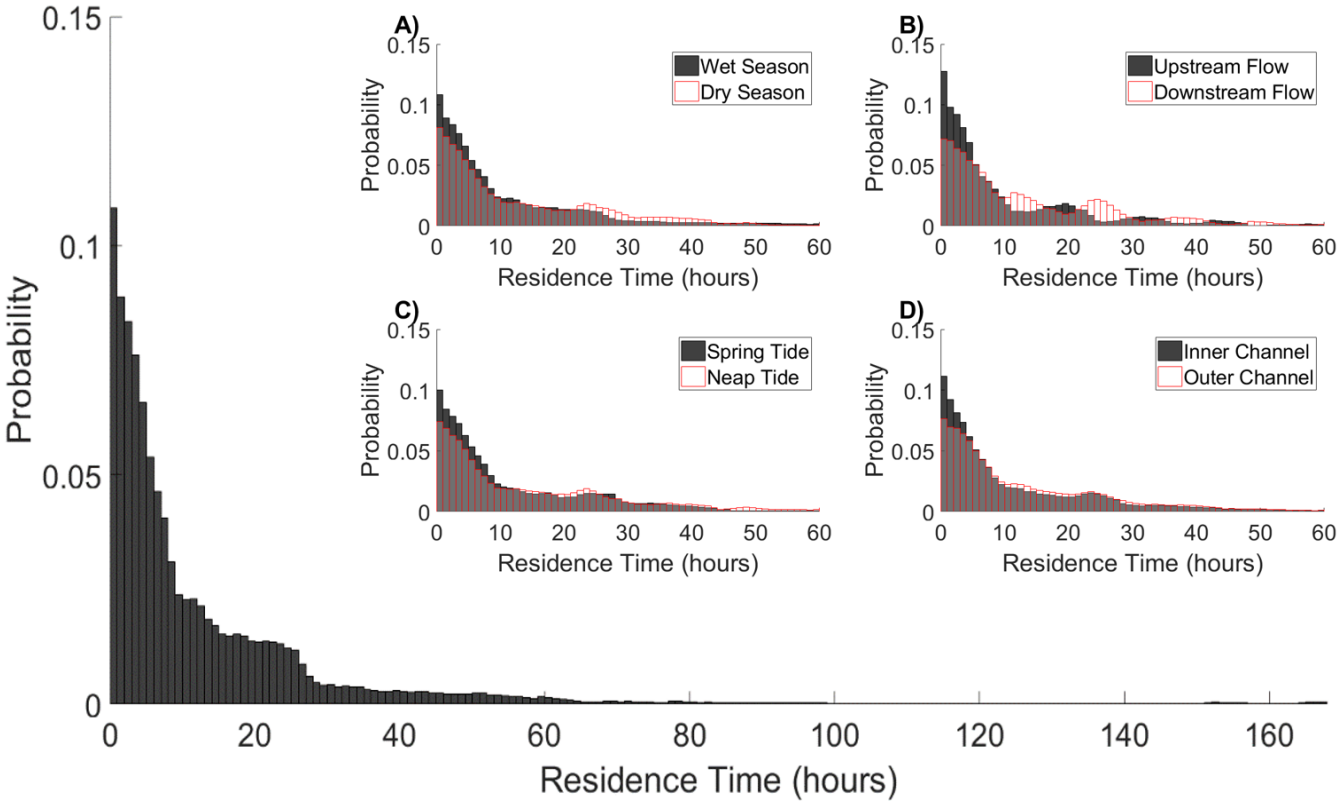

Figure 23. Histograms showing the distribution of particle residence time (hours). Top: residence time for all simulations (1.03 million particles) Skew = 3; Kurt = 15. Bottom: overlapping histograms of residence time distributions for different particle release conditions: A) during wet/dry season; B) during upstream/downstream flows; C), during spring/neap tides; D) within the inner/outer areas of the main channel. The light gray bars occur where the histograms overlap.

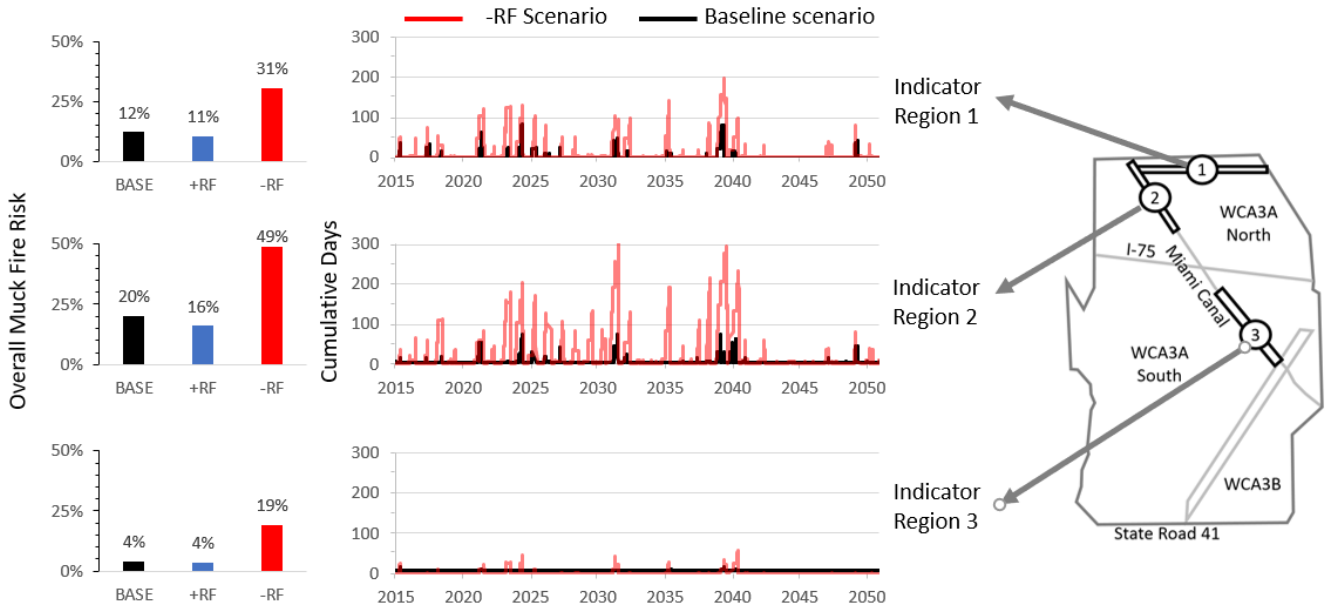

Figure 24. For three Indicator Regions in Everglades Water Conservation Area-3A, with locations specified in the map insert, Muck Fire Risk is shown in the bar graphs as percent of days with elevated Muck Fire Risk for the period of simulation, for the Baseline scenario (black), +RF scenario (blue), and –RF scenario (red); and as a time series exhibiting the cumulative number of consecutive days of Muck Fire Risk for -RF scenario (red) and the Baseline scenario (black).

Key outcomes or Other achievements

Here we provide a bulleted list of major outcomes and achievements organized across our cross-cutting themes:

Hydrology and Water Policy:

- The delivery of salinity and nutrients to the FCE from the Gulf of Mexico is regulated by the balance between upstream freshwater levels and downstream sea level.
- Farmers in the EAA, located in the upper watershed of the FCE, worked together to reduce the release of nutrients from their farms to adjacent surface water bodies.

Carbon Dynamics:

- Net allochthonous carbonate production in the seagrass regions of the FCE leads to these autotrophic communities being net sources of CO2 to the atmosphere (Howard et al, 2018).
- Lability of soil organic carbon stored in FCE wetlands is dependent on oxygen availability and salinity (Lovelock et al. 2017, Wilson et al. 2018).
- Established burial rates for organic and inorganic C, P and N, along a transect of marine influence for FCE mangrove swamps.
- Experimentally simulated impacts of climate change, sea level rise and water management on the lability of soil organic C in fresh and brackish marshes in the FCE,

showing that the combined effects of sea level rise and water management lead to peat collapse and large fluxes of formerly recalcitrant organic C out of the system.

- We continued the development of our use of fatty acids as markers of food quality in the Everglades. We used nutrient additions, shading, and flow velocity to manipulate stoichiometry of biofilms and expected responses were tracked in fatty acid biomarkers. We also completed a laboratory experiment that demonstrated expected transfer of fatty acid markers from food to three common Everglades consumers, including one herbivore and two omnivores. One paper from this work was published, a second is in review, and two more are nearing submission.
- We ran new experiments with manipulations of water flow velocity to change biofilm composition, stoichiometry, and fatty acid profile indicative of nutrient loading. This experiment was run for six weeks and involved higher trophic position species than our first experiment reported last year; we have added analysis of mercury as a new food-web tracker with potential implications for ecosystem health. All of the primary producer samples have been processed and consumer samples are being processed now.
- In the freshwater Everglades, we documented the bioaccumulation factor of mercury for 'green' and 'brown' consumers and found no evidence of difference tied to carbon source.
- Trophic linkages and resource partitioning in a community of consumers are both temporally and spatially variable. In addition, consumer populations exhibit degrees of plasticity in response to environmental change, as well as individual-level variability in movements and foraging behavior.
- Long Term passive acoustic monitoring for bottlenose dolphins' vocalizations using CPODs started in May 2017 and array was not affected by Hurricane Irma. Dolphins showed variations in their habitat use following Hurricane Irma.

Climate and Disturbance Legacies:

- Hurricane Irma (Sept. 2017) caused significant flooding across the FCE and surrounding areas of south Florida mainly due to heavy rain.
- Hurricane Irma legacies are likely to be longstanding primarily due to the loss of organic carbon from the ecosystem at rates not seen before.
- Hurricane Irma forced mass exits from our array and resulted in mortality for both juvenile bull sharks and snook. Alligators and largemouth bass appeared to remain in marsh habitats as expected.

Modeling and Scenarios:

- Models suggest peat loss will continue in the absence of restoration as a result of oxidation from extended drying, exposure to marine supplies of salt and P and increased risk of muck fires. By destabilizing vegetated coastal plant communities, climate change can lead to substantial releases of CO2 to the atmosphere when conditions change the lability of soil organic C (Arias-Ortiz et al. 2018).

Opportunities for training and professional development

- In October 2018, Co-PIs Evelyn Gaiser and John Kominoski, and the Education & Outreach Coordinator, Nicholas Oehm, participated in a one-day workshop with the Alan Alda Center for Communicating Science.
- PI Evelyn Gaiser attended an Executive Leadership Training Workshop by FIU's Center for Leadership in Fall 2018.
- Luca Marazzi participated in the two-day course "Introduction to stable isotopes in aquatic systems" at the AQUATROP Congress in Quito (Ecuador) and in various seminars organized by the Office for Research and Economic Development at FIU for postdoctoral associates.
- Victor Rivera-Monroy trained three undergraduate students (College of the Coast and Environment): Imani Mayberry, Nadia Romero, and Cameron Seitz. These students are involved in the analysis of soil and water nutrients and carbon.
- Rinku Roy Chowdhury's graduate students were trained in social science methods, GIS analysis, professional development through conference and meeting presentations.
- For the 14th consecutive year, Mark Rains used FCE LTER as a central focus of the Hydrology Section of USF Geology Summer Field School, a required course for the completion of the BS in Geology, taught annually to 25 students.
- Mark Rains trained 9 undergraduate students from chemical engineering to participate in laboratory experiments and geochemical modeling for 8 weeks as an independent study. He also trained a new graduate student with a scholarship from the Turkish government to conduct laboratory experiments and geochemical modeling.
- In collaboration with Kaelin Cawley from NEON-Battelle, we offered a fluorescence dissolved organic matter (fDOM) workshop at FIU-BBC in May 2018. Approximately 20 participants attended the 2-day workshop that included an orientation to DOM and its ubiquity in aquatic ecosystems, a suite of tools to measure and analyze fDOM, and how to use parallel factor analysis (PARAFAC). This workshop assisted in the training of John Kominoski and his lab, who are now running fDOM samples for the FCE LTER.
- FCE doctoral students Peter Flood and Nicole Strickland and technician Somers Smott attended a workshop on Structural Equation Models offered by Jim Grace and James Cronin at the USGS Wetland and Aquatic Research Center in Gainesville, Florida on August 22-23, 2018.
- In November 2017, FCE partnered with AIRIE (Artists in Residence in Everglades) for the AIRIE-FCE STEAM professional development. Designed for Miami Dade County Public School (MDCPS) teachers, the PD focused on the elementary and middle school curriculum to provide additional support for improving student instruction in low-performing benchmarks.

  The AIRIE-FCE STEAM series consisted of three, day-long workshops, each focusing on a different topic: Water; Habitat; and Man & Community. Each of the three days was divided into two sessions with the morning sessions focusing on science and led by an FCE graduate student, RET, and an FIUteach pre-service teacher and the afternoon sessions focused on art and was conducted by an AIRIE Artist Fellow. A total of 27 teachers from 21 MDCPS schools participated and each were instructed on how to use the information and the skills they acquired to communicate the story of the Everglades. On the following day, participants were led on an airboat tour of Conservation Area 3A

with *Love the Everglades Movement (LTEM)* and representatives from the Miccosukee Tribe. As a follow up, participants received a stipend and continuing education credit for implementing the material with their students and submitting their best artistic pieces for exhibit at the AIRIE Nest Gallery at the Ernest Coe Visitor Center at Everglades National Park.

Communicating results to communities of interest

FCE LTER actively disseminates the results of our research to communities of interest though our collaboration with scientists from 41 different organizations and include decision makers, NGOs, formal and informal science educators, community groups, media, citizen science, and collaborating in the arts and humanities.

Decision Makers & NGOs

Throughout FCE's long history of working with decision makers and NGOs as our collaborators, these partnerships have improved our communication with policy makers and enabled us to report our results directly to governmental agencies such as the US Environmental Protection Agency, US Geological Survey, NASA Goddard Space Flight Center, National Park Service (NPS) Everglades National Park, NPS South Florida/Caribbean Network Inventory and Monitoring Program, and the South Florida Water Management District.

Informal Science Education Venues & Community Groups

FCE also partners with Informal Science Education (ISE) venues and community groups to increase public awareness, generate an interest in learning, and to promote careers in science, technology, and the humanities. These ISE partnerships increase our ability to engage with the members of our community that are not typically aware of our research and allow us to maintain an active and consistent presence throughout the community. Since our last report, 37 of our researchers have participated in 134 events and have engaged with 85 different organizations. These events have covered nearly 21% of the calendar (n=75 d) and have included: panels; presentations; art exhibitions, and tabling events.

The FCE ISE partners serve an important role by providing us with an opportunity to share our work with a broad audience of local, national and international visitors. Last year, more than 779,400 guests visited The Phillip and Patricia Frost Museum of Science where Dr. Jim Fourqueran's work is presented in their *Seagrass Communities: Marine Meadows* exhibit. An additional 400,000 guests visited the Ft. Lauderdale Museum of Discovery and Science (FTL-MODS) which features Drs. Jennifer Rehage and Mike Heithaus' work on the movement of alligators, snook, and bull sharks in the Living in the Everglades exhibit.

FCE also participates in other high-traffic, special events hosted by our ISE partners. In 2018, over 18,000 visitors attended the *Deering Seafood Festival* and the *ZooMiami Party for the Planet*, where FCE staff presented educational activities such as the *Marine Macroalgae Mobile Lab* and the *Coastal Angler Science Team (CAST) Fishing Tournament*. Our graduate students also participated in the *2018 USA Science and Engineering Festival* (>3,300 visitors) and the Ft. Lauderdale Boat Show (>105,000).

Citizen Science

The FCE Citizen Science program provides four opportunities to engage with scientists: *Predator Tracker*; *CAST: Project Bay Bones*; *CAST: Mark-Recapture*; and the *LTeaER*. Predator Tracker (http://tracking.fiu.edu) is a stand alone, web-based application based on the FTL-MODS exhibit and highlights the work of Drs. Jennifer Rehage and Mike Heithaus. At the museum, visitors are introduced to the tracking experiment, answer questions about the movement of individual animals, and are encouraged to use the web application to continue tracking their favorite animal. The web application is available for free, and tracking data are updated monthly for the FTL-MODS exhibit and web-based app. Additional details can be seen at https://www.youtube.com/watch?feature=player_embedded&v=klgIaR27ziI#.
The CAST: Coastal Angler Science Team (http://cast.fiu.edu) is a collaborative effort between anglers and researchers in Dr. Jennifer Rehage's lab. Dedicated to conservation of recreational fisheries and investigating how changes in the Coastal Everglades impact coastal fisheries, CAST consists of two main projects: *Project Bay Bones* and *Mark-Recapture*.

The *CAST: Project Bay Bones* is partnership between FCE researchers and *The Bonefish and Tarpon Trust*. Working side by side, anglers and researchers collect and share information to better understand how bonefish populations and distribution have changed over time and how changes in South Florida waters may be affecting the quality of bonefishing. These results are being used to support bonefish conservation to better ensure high quality fishing in the future. The *CAST: Mark-Recapture* project focuses on the backcountry area of Everglades National Park. *CAST: MR* works with local fishermen, visitors, fishing guides, and families that agree to target this region as part of their regular fishing routine. Each participant is outfitted with an IR scanner for use in identifying recaptures and agrees to record and report morphometric data and release any re-captured fish.

In August 2018, the FCE Citizen Science program launched the *FCE LTeaER* decomposition project. Based on the *TeaBag Index* (http://www.teatime4science.org), *LTeaERbags* have been deployed at 11 FCE research sites along the Taylor and Shark River Slough transects and will be collected quarterly, dried, weighed, and used to calculate soil decomposition rates. In collaboration with the *Everglades Foundation* and *FIUteach*, the data will be used to discuss Everglades ecology, generate science fair projects, and shared internationally through the *TeaBag Index*.

Traditional and Social Media

FCE research has continued to receive widespread and regular coverage in both traditional news and social media. Over the last year, our research has been discussed in 78 media events, on 80 calendar days, and has highlighted 32 of our researchers. This news media has been distributed across 48 national, and local media outlets including: *NPR*; *PBS, The New York Times; The New Yorker; Miami Herald; Tampa Bay Times; Science Magazine; and Bloomberg News.* Our graduate students maintain an active presence for FCE on social media with regular contributions to Facebook, Twitter, and our *Wading Through Research* blog. Over the last year, they have made 79 new posts to the FCE Facebook page. These posts were displayed 10,626 times and

with 6,762 unique users and produced 122 new "Likes" (418 total) by 522 unique users that engaged with page. Under the direction of Grad Student Group President Luke Lamb-Wotton, our Twitter account has become more active with weekly tweets and 434 followers. *Wading Through the Research* added 10 new posts since our last report and the FCE newsletter, *News from the Sloughs*, has been updated to a new biweekly format.

Arts & The Humanities

Engaging with the arts and humanities remains an important priority for FCE. Our collaborations with the Tropical Botanic Artists, Eco Artist Xavier Cortada, and Artists in Residence in Everglades (AIRIE), have given us the opportunity to broaden the spectrum of our outreach to include new and different segments of the community.

The Tropical Botanic Artists (TBA) have long served as the cornerstone to FCE STEAM initiatives. Since our last report, the *The Trail: In the Beginning...Tamiami Trail 100th Anniversary* exhibit has been on display at The Gato Building, Key West, FL. The *Trail* exhibition features 31 portraits of native plants found in the various vegetation zones, across the breadth of South Florida, from Miami-Dade to Collier County, at the time the Tamiami Trail documentation was signed on May 15, 1915. The group artistically depicted a variety of plants, many of which are still there today, but now bordering on the rare or endangered, or their predominant locations have shifted due to a change in water flow and man's intervention.

Eco Artist Xavier Cortada continued his collaboration with Dr. Evelyn Gaiser as *Artist-In-Residence* for FIU's School of Environment, Arts, and Society and FCE. Over the last year, Cortada has presented artwork related to South Florida ecology, the Everglades, and climate change in more than 30 exhibits and has begun work to expand his Reclamation Project to include a new installation at FIU's Biscayne Bay Campus.

Plans to accomplish goals during the next reporting period

PLANS FOR NO COST EXTENSION

In September 2017, hurricane Irma caused large scale consumer research operation delays due to storm preparations, extended ENP closures due to damage and safety issues, and post storm equipment recovery/redeployments. A longer than normal dry down period also limited access to some of the Shark River and Taylor River slough sites, and thus delayed research in those sites. Additionally, changes in ENP permitting personnel have caused substantial delays in renewing/amending some park permits. On the positive side, the storm offered up a natural experiment to look at how these types of disturbances can affect large predators in complex estuary systems.

Additionally, we need to:

- Continue laboratory analysis of samples collected during fall 2018.
- Complete model fitting for vertical accretion of the mangrove surface for one site.

- Complete subcontracts for socio-ecological work at Clark University, the University of Florida, and UCLA.
- Provide support for meeting travel for summer 2018 REUs and RETs.
- Complete of graduate research assistantship contracts for fall 2018.
- Transfer the remaining organic matter quality analysis from the Jaffe to Kominoski laboratories.
- Pay final invoices for virtual servers used for the database and website.
- Complete the remote sensing analysis of InSAR data. During the NCE period, we will continue the analysis of Sentinel-1 data in order to identify seasonal changes in the patterns govern by fresh water supply.
- Publish a paper on the mechanism governing seawater-induced P desorption, first in a series of papers that will investigate how future climate and SLR scenarios may affect phosphorus availability.
- Publish results from our reach-scale particle-tracking hydrodynamic model of an 8 km portion of coastal SLR; develop model to include P and ecologically significant particles such as mangrove propagules and fish eggs under climate scenarios
- Publish our ELM simulations of soil biogeochemistry results for future climate change in the greater Everglades (Water Conservation Areas and Everglades National Park).
- Continue developing a "soft linkage" between the ELM and the Seagrass and Submerged Vegetation Community Model (SEACOM) so as to simulate hydro-ecological responses in Florida Bay to scenarios of climate change and sea level rise
- Continue to work with the South Florida Water Management District to improve the downscaling of precipitation data for future scenario development.

RESPONSE TO RECENT PROPOSAL REVIEW

- We are conducting a series of planning meetings and implementing programmatic changes to address concerns of our recent proposal panel about integration of our food web research and generalizability of our research findings.
- We will continue to integrate our food web dynamics research into the FCE program through analysis of stable isotopes and fatty acids and all components of freshwater and estuary food webs.
- We will be working with our hydrology and modeling groups to quantify the hydrologic press pulse dynamics for all of the FCE sites for the last 18 years and into the future under contrasting water management and sea level rise scenarios.

Products

Publications

Book Chapters

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Journal Articles

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freshwater-to-estuary gradients in a subtropical wetland. Ecosphere 9: e02296. DOI: 10.1002/ecs2.2296

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Prieto Estrada, A.E., R.M. Price, L.J. Scinto, F.J-M.R. Maurrasse, T.W. Dreschel, F.H. Sklar and E. Cline. 2018. Lithologic controls on hydrologic and geochemical processes in constructed Everglades tree islands. Chemical Geology. DOI: 10.1016/j.chemgeo.2018.04.001

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Yao, Q. and K.B. Liu. 2018. Changes in Modern Pollen Assemblages and Soil Geochemistry along Coastal Environmental Gradients in the Everglades of South Florida. Frontiers in Ecology and Evolution. DOI: 10.3389/fevo.2017.00178

Yoder, L. and R. Roy Chowdhury. 2018. Tracing social capital: How stakeholder group interactions shape agricultural water quality restoration in the Florida Everglades. Land Use Policy 77: 354-361. DOI: 10.1016/j.landusepol.2018.05.038

Conference Papers and Presentations

Banisakher, D., M.E. Presa Reyes, J.D. Eisengberg, J.M. Allen, M.A. Finlayson, R.M. Price, S-C. Chen. 2018. Ontology-Based Supervised Concept Learning for the Biogeochemical Literature. 2018 IEEE International Conference on Information Reuse and Integration. Salt Lake City, Utah.

Born, C.L. 2018. Investigation of groundwater-surface water interaction in a south Florida estuary: Shark River Slough. Geological Society of America Annual Meeting. Indianapolis, Indiana.

Breithaupt, J.L. 2018. Are Carbon Burial Rates in the Coastal Everglades Higher Now Than They Were a Century Ago? 12th International Symposium on Biogeochemistry of Wetlands. Coral Springs, Florida.

Chambers, L.G., N. Hurst, E. Duga, J.M. Smoak, J. Kominoski. 2018. Assessing the biogeochemical impact of storm layer sediments in mangroves affected by Hurricane Irma. Society of Wetland Scientists Annual Meeting. Denver, Colorado.

Chambers, L.G. 2018. Short-Term Response of Freshwater Wetland Soils to Saltwater Intrusion. 12th International Symposium on Biogeochemistry of Wetlands. Coral Springs, Florida.

Charles, S., J. Kominoski, M. Ross, S. Servais, T. Troxler and B. Wilson. 2018. Saltwater intrusion and vegetation shifts alter organic carbon storage across the coastal Everglades. 2018 LTER All Scientists Meeting. Pacific Grove, California.

Cordoba, N. 2018. Analyzing Hurricane Irma's storm surge impact in coastal Everglades using hydrological data. Geological Society of America Annual Meeting. Indianapolis, Indiana.

Dessu, S.B., R.M. Price. 2018. Effects of topography and peat/marl layers on groundwater discharge and salt water intrusion in Taylor Slough, the Florida Coastal Everglades. Geological Society of America Annual Meeting. Indianapolis, Indiana.

Eggenberger, C., R.O. Santos, T.A. Frankovich, C.J. Madden, J. Nelson, J.S. Rehage. 2018. Influence of freshwater induced habitat changes on the movement and trophic dynamics of common snook (*Centropomus undecimalis*). Ecological Society of America Annual Meeting 2018. New Orleans, Louisiana.

Eggenberger, C., R. Santos, T. Frankovich, J. Nelson, C. Madden, and J. Rehage. 2018. Coupling telemetry and stable isotope techniques to unravel movement: Common Snook habitat use across variable nutrient environments. 2018 LTER All Scientists Meeting. Pacific Grove, California.

Fernandez, M., J. Kominoski, B.B. Rothermel. 2018. Testing the relative above- and below-ground responses to fire-induced phosphorus release in intermittent wetlands. Ecological Society of America Annual Meeting 2018. New Orleans, Louisiana.

Flood, P.J., W.F. Loftus, J.C. Trexler. 2018. Estimating basal energy sources in an aquatic food web. Ecological Society of America Annual Meeting 2018. New Orleans, Louisiana.

Flower, H. 2018. Shifting ground: Landscape-scale modeling of soil biogeochemistry under climate change in the Florida Everglades. 12th International Symposium on Biogeochemistry of Wetlands. Coral Springs, Florida.

Gaiser, E.E. 2018. Surface tensions: Harnessing the connecting power of water for a sustainable future. Association for the Sciences of Limnology & Oceanography Aquatic Sciences Meeting. Victoria, British Columbia, Canada.

Gaiser, E.E., T.A. Crowl, R. Teutonico, J. Kominoski, B. Schonhoff, D.E. Ogurcak, N. Oehm. 2018. Experiential learning in subtropical ecology at the urban-wildland interface. Ecological Society of America Annual Meeting 2018. New Orleans, Louisiana.

Gatto, J., J.C. Trexler. 2018. Evaluating the impact of hydrological variation on stock-recruitment relationships. American Fisheries Society. Atlantic City, New Jersey.

Gatto, J., J.C. Trexler. 2018. Using agent-based modeling to predict recolonization patterns following disturbance. Ecological Society of America Annual Meeting 2018. New Orleans, Louisiana.

Gervasi, C.L. and J.S. Rehage. 2018. Impacts of Coastal Marine Reserves on Sport Fish Traits: A Case Study in Florida Bay. 2018 LTER All Scientists Meeting. Pacific Grove, California.

Gervasi, C.L., J.S. Rehage. 2018. Impacts of coastal marine protected area on Grey Snapper Lutjanus griseus biology, behavior, and movement in Florida Bay. Florida Chapter of the American Fisheries Society Annual Meeting. Haines City, Florida.

Hurst, N. 2018. Hurricane Irma: Biogeochemical Responses in a Mangrove Encroached Florida Salt Marsh . 12th International Symposium on Biogeochemistry of Wetlands. Coral Springs, Florida.

James, W.R. and J. Nelson. 2018. Consumer specific energetic landscapes derived from stable isotope analysis and habitat cover. 2018 LTER All Scientists Meeting. Pacific Grove, California.

Jo, M.J., B. Osmanoglu, B. Zhang, S. Wdowinski. 2018. Flood extent mapping using Dual-Polarimetric Sentinel-1 Synthetic Aperture Radar Imagery. International Society for Photogrammetry and Remote Sensing (ISPRS) Technical Commission III. Beijing, China.

Julian, P. 2018. One of these things is not like the other. Evaluation of wetland nutrient ntoichiometry and homeostasis in a subtropical treatment wetland. 12th International Symposium on Biogeochemistry of Wetlands. Coral Springs, Florida.

Julian, P. 2018. River runs through it. Evaluation of groundwater and surface water connectivity and its implication on riparian biogeochemistry and ecology. 12th International Symposium on Biogeochemistry of Wetlands. Coral Springs, Florida.

Kiflai, M. 2017. Geophysical characterization of groundwater in the mangrove lakes region of Everglades National Park. American Geophysical Union Fall Meeting. New Orleans, Louisiana.

Kominoski, J., E.E. Gaiser, E. Castañeda-Moya, S.E. Davis, S.B. Dessu, D.Y. Lee, L. Marazzi, V.H. Rivera-Monroy, A. Sola, D.D. Surratt, R. Travieso, T. Troxler. 2018. Enhanced marine and freshwater connectivity increase spatiotemporal synchrony of phosphorus and aquatic heterotrophy in coastal wetlands. Association for the Sciences of Limnology & Oceanography Aquatic Sciences Meeting. Victoria, British Columbia, Canada.

Kominoski, J., A.R. Armitage, S.P. Charles, A. Kuhn, S.C. Pennings, C.A. Weaver. 2018. Plant species identity affects ecosystem connectivity (retention and erosion) in coastal wetlands during a major hurricane. Ecological Society of America Annual Meeting 2018. New Orleans, Louisiana.

Lagomasino, D., B. Cook, T.E. Fatoyinbo, D.C. Morton, P. Montesano, C.S.R. Neigh, M. Wooten, E.E. Gaiser, T. Troxler. 2017. Using high-resolution imagery to characterize disturbance from Hurricane Irma in south Florida wetlands. American Geophysical Union Fall Meeting. New Orleans, Louisiana.

Lass, P., K. Ugarelli, R. Travieso, S. Stumpf, H.O. Briceno, E.E. Gaiser, J. Kominoski and U. Stingl. 2018. Microbial communities in waters of the Florida Coastal Everglades were impacted by Hurricane Irma. 2018 LTER All Scientists Meeting. Pacific Grove, California.

Lee, D.Y., B.J. Wilson, S. Servais, S.P. Charles, V. Mazzei, S.E. Davis, T. Troxler, E.E. Gaiser, M. Kline, M. Robinson, J. Kominoski. 2018. Saltwater intrusion legacies alter ecosystem carbon cycling in experimental wetlands: Insights into freshwater restoration and recovery. Association for the Sciences of Limnology & Oceanography Aquatic Sciences Meeting. Victoria, British Columbia, Canada.

Lee, D.Y., B. Wilson, S. Servais, S. Charles, V. Mazzei, S. Davis, T. Troxler, E. Gaiser,and J. Kominoski. 2018. Will freshwater restoration offset peat collapse in the Florida Everglades wetlands with salt and phosphorus legacies? 2018 LTER All Scientists Meeting. Pacific Grove, California.

Malone, S.L., S. Oberbauer, P.C. Olivas, J. Zhao, G. Starr, C.L. Staudhammer. 2018. Extreme events alter C dynamics across the Florida Everglades. Ecological Society of America Annual Meeting 2018. New Orleans, Louisiana.

Malone, S.L., S. Oberbauer, P.C. Olivas, J. Zhao, G. Starr, C.L. Staudhammer. 2018. Patterns in ecosystem C dynamics in Everglades freshwater marsh. Ecological Society of America Annual Meeting 2018. New Orleans, Louisiana.

Marazzi, L., C.M. Finlayson, P.A. Gell, P. Julian, J. Kominoski, E.E. Gaiser. 2018. Successful wetland restoration must balance benefits to human societies and ecosystems. Society of Wetland Scientists Annual Meeting. Denver, Colorado.

Marazzi, L., E.E. Gaiser. 2018. Drivers of temporal stability of core diatom species abundance in wetland benthic mats. AQUATROP. Quito, Ecuador.

Massie, J., N. Viadero, J.S. Rehage. 2018. Hurricane driven movements of Common Snook *Centropomus undecimalis* in the Florida coastal Everglades. Florida Chapter of the American Fisheries Society Annual Meeting. Haines City, Florida.

Massie, J.A., R. Santos, B .Strickland, J. Hernandez, N. Viadero, H. Willoughby, M. Heithaus, and J.S. Rehage. 2018. Environmental drivers of large-scale fish movements in the Florida Everglades during Hurricane Irma. 2018 LTER All Scientists Meeting. Pacific Grove, California.

Onwuka, I. and L.J. Scinto. 2018. Modelling phosphorus dynamics in Everglades Ecosystem Canals. 2018 LTER All Scientists Meeting. Pacific Grove, California.

Paz, V.A. 2018. Using stable isotopes to investigate trophic interactions of bottlenose dolphins (*Tursiops truncatus*) in subtropical estuary. Stable Isotope workshop -Universitat Konstanz. Konstanz, Germany.

Paz, V.A. 2018. Investigating abiotic factors influencing habitat use of a marine mammal using passive acoustic monitoring. FILAMO animal movement workshop- University of Cape Town. Cape town, South Africa.

Puig-Santana, A., J.S. Kominoski, M. Smith, S.M. Servais and B.J. Wilson. 2018. Testing biotic and abiotic mechanisms of root breakdown along salinity gradients in coastal wetlands. 2018 LTER All Scientists Meeting. Pacific Grove, California.

Regier, P., T. Harms, J. Jones, A. Mutschlecner, R. Jaffe. 2018. Temporal dynamics of carbon and nitrogen in permafrost catchments. Association for the Sciences of Limnology & Oceanography Aquatic Sciences Meeting. Victoria, British Columbia, Canada.

Regier, P., T. Harms, J. Jones, A. Mutschlecner, R. Jaffe. 2018. Temporal patterns of dissolved organic carbon and nitrate in discontinuous permafrost catchments. CUAHSI 2018 Biennial Colloquium. Shepherdstown, West Virginia.

Regier, P., K.M. Cawley, W. Huang, R. Jaffe. 2018. Linking hydrology and long-term dissolved organic matter compositional dynamics in a sub-tropical wetland system. 2018 Ocean Sciences Meeting. Portland, Oregon.

Rehage, J.S., K.E. Flaherty-Walia, C.L. Gervasi, R.O. Santos, D. Stormer, J.A. Ley, R.E. Matheson, P.W. Stevens, Jerome J. Lorenz, P. Frezza, B. Fitzgerald, R. Boucek. 2018. Effects of a 36-year fishing closure and opening of a coastal embayment in the crocodile sanctuary of northeastern Florida Bay on fishes and recreational fisheries. Florida Chapter of the American Fisheries Society Annual Meeting. Haines City, Florida.

Roebling, S., J.S. Kominoski, D.Y. Lee, M. Kline, C. Patriarca and M. Robinson. 2018. Testing effects of freshwater restoration following long-term simulated saltwater intrusion on litter breakdown in coastal wetlands. 2018 LTER All Scientists Meeting. Pacific Grove, California.

Roebuck, J.A., M. Seidel, T. Dittmar, R. Jaffe. 2018. Characterization of dissolved organic matter among a river continuum: living land use to the river continuum concept. Association for the Sciences of Limnology & Oceanography Aquatic Sciences Meeting. Victoria, British Columbia, Canada.

Roebuck, A., P.M. Medeiros, M.L. Letourneau, R. Jaffe. 2018. Hydrological controls on the date and transport is dissolved and particulate black carbon in the Altamaha River, GA. 2018 Ocean Sciences Meeting. Portland, Oregon.

Rugge, M., E. Gaiser, J. Kominoski, J. Rehage, K. Grove and J. Fourqurean. 2018. Drivers of Abrupt Change in the Florida Coastal Everglades. 2018 LTER All Scientists Meeting. Pacific Grove, California.

Santos, R. 2018. Incorporating animal movement into long-term ecological monitoring: Snook movement in the FCE LTER. 2018 LTER All Scientists Meeting. Pacific Grove, California.

Servais, S. 2018. Effects of Increased Salinity on Microbial Processing of Carbon and Nutrients in Brackish and Freshwater Wetland Soils . 12th International Symposium on Biogeochemistry of Wetlands. Coral Springs, Florida.

Servais, S., J. Kominoski, C. Coronado-Molina, S.E. Davis, E.E. Gaiser, S.P. Kelly, V. Mazzei, D.T. Rudnick, F. Santamaria, F.H. Sklar, T. Troxler, B.J. Wilson. 2018. Effects of increased salinity on microbial processing of carbon and nutrients in brackish and freshwater wetland soils. National Conference on Ecosystem Restoration. New Orleans, Louisiana.

Smoak, J.M., B.E. Rosenheim, R.P. Moyer, K. Radabaugh, L.G. Chambers, D. Lagomasino, J. Lynch, D.R. Cahoon. 2017. Controls on soil organic matter in blue carbon ecosystems along the south Florida coast. American Geophysical Union Fall Meeting. New Orleans, Louisiana.

Smoak, J.M. 2018. Coupled Soil Carbon Measurements and Remote Sensing to Quantify Above and Belowground Carbon Stocks in Mangrove Forest of the Ten Thousand Islands Region of Southwest Florida, USA. 12th International Symposium on Biogeochemistry of Wetlands. Coral Springs, Florida.

Trexler, J.C., J.J. Parkos III. 2018. Intra-community diversity of invasive species impacts in space and time: Scaling up to ecosystem function. Ecological Society of America Annual Meeting 2018. New Orleans, Louisiana.

Vanderbilt, K., C. Gries, M. Servilla, D. Costa, S. Grossman-Clarke, P. Hanson, M. O'Brien, C.A. Smith, R. Waide. 2018. Environmental Data Initiative (EDI): Enabling reproducible ecology and environmental science. Ecological Society of America Annual Meeting 2018. New Orleans, Louisiana.

Viadero, N.M., J.S. Rehage, and J.A. Massie. 2018. Seasonal habitat use of Largemouth Bass in the Shark River of the Florida Coastal Everglades LTER. 2018 LTER All Scientists Meeting. Pacific Grove, California.

Wilson, B.J., T. Troxler. 2017. Saltwater intrusion coupled with drought accelerates carbon loss from a brackish coastal wetland. American Geophysical Union Fall Meeting. New Orleans, Louisiana.

Wilson, B.J., S. Servais, S.P. Charles, V. Mazzei, C. Coronado-Molina, S.E. Davis, E.E. Gaiser, J. Kominoski, J.H. Richards, D.T. Rudnick, F.H. Sklar, T. Troxler. 2018. Saltwater intrusion and drought drive peat collapse in a brackish coastal peatland. National Conference on Ecosystem Restoration. New Orleans, Louisiana.

Wilson, B.J., T. Troxler. 2018. Drivers and mechanisms of peat collapse in coastal wetlands. National Conference on Ecosystem Restoration. New Orleans, Louisiana.

Wilson, B.J. 2018. Drivers and mechanisms of peat collapse in coastal wetlands. 12th International Symposium on Biogeochemistry of Wetlands. Coral Springs, Florida.

Wilson, B.J., S. Servais, T. Troxler. 2018. Drivers and mechanisms of peat collapse in coastal wetlands. Ecological Society of America Annual Meeting 2018. New Orleans, Louisiana.

Zhang, B., R. Koirala, T. Oliver-Cabrera, S. Wdowinski, B. Osmanoglu. 2017. Mapping the extent and magnitude of severe flooding Induced by Hurricanes Harvey, Irma, and Maria with Sentinel-1 SAR and InSAR observations. American Geophysical Union Fall Meeting. New Orleans, Louisiana.

Zhang, B., S. Wdowinski, T. Oliver-Cabrera, R. Koirala, M.J. Jo, B. Osmanoglu. 2018. Mapping the extent and magnitude of severe flooding induced by Hurricane Irma with Multi-temporal Sentinel-1 SAR and InSAR observations. International Society for Photogrammetry and Remote Sensing (ISPRS) Technical Commission III. Beijing, China.

Zhao, J. 2018. Extreme Events Alter C Dynamics across the Florida Everglades. 12th International Symposium on Biogeochemistry of Wetlands. Coral Springs, Florida.

Zhao, J., S.L. Malone, S. Oberbauer, G. Starr, C.L. Staudhammer. 2018. Prolonged inundation turns a short-hydroperiod freshwater marsh from a CO2 sink to a source. Ecological Society of America Annual Meeting 2018. New Orleans, Louisiana.

Dissertations and Theses

Ph.D. Dissertations

Blanchard, Jesse. 2018. A confluence of invasion, behavioral, and theoretical ecology: What drives ephemeral metacommunity re-assembly? Ph.D. dissertation, Florida International University.

Charles, Sean. 2018. Saltwater Intrusion and Vegetation Change Drive Changes in Carbon Storage in Coastal Wetlands. Ph.D. dissertation, Florida International University.

Clasen, Hunter. 2018. Flow and Transport in Low-Gradient Rivers and Estuaries. Ph.D. dissertation, University of South Florida.

Howard, Jason. 2018. Patterns of Carbon Metabolism, Storage, and Remineralization in Seagrass Ecosystems. Ph.D. dissertation, Florida International University.

Mazzei, Viviana. 2018. Diatoms as Tools for Tracking Changing Environmental Gradients in Coastal Freshwater Wetlands Threatened by Saltwater Intrusion. Ph.D. dissertation, Florida International University.

Roebuck, Alan. 2018. Environmental Dynamics of Dissolved Organic Matter and Dissolved Black Carbon in Fluvial Systems: Linking Biogeochemistry to Land Use. Ph.D. dissertation, Florida International University.

Sanchez, Jessica. 2018. The adaptive evolution of herbivory in freshwater systems. Ph.D. dissertation, Florida International University.

Servais, Shelby. 2018. Changes in Soil Microbial Functioning in Coastal Wetlands Exposed to Environmental Subsidies and Stressors. Ph.D. dissertation, Florida International University.

Wilson, Benjamin. 2018. Drivers and Mechanisms of Peat Collapse in Coastal Wetlands. Ph.D. dissertation, Florida International University.

Master's Theses

Comparetto, Kailey. 2018. Carbon Burial in a Freshwater Marsh to Mangrove Transitional Area in Everglades National Park. Master's thesis, University of South Florida.

Sarker, Shishir K. 2018. Spatial and Temporal Distribution of Total Phosphorus Concentration in Soil and Surface Water in the Everglades Protection Area. Master's thesis, Florida International University.

Websites

Florida Coastal Everglades LTER Program Website

http://fcelter.fiu.edu/

The Florida Coastal Everglades LTER Program Website provides information about FCE research, data, publications, personnel, education & outreach activities, and the FCE Student Organization.

Coastal Angler Science Team (CAST) Website

http://cast.fiu.edu/

The Coastal Angler Science Team (CAST) Website, created by FCE graduate student Jessica Lee, provides information about how researchers and anglers are working together to collect data on important recreational fish species in Rookery Branch and Tarpon Bay in the Everglades and invites anglers to participate in this project.

Predator Tracker

http://tracking.fiu.edu/

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

Wading Through Research

http://floridacoastaleverglades.blogspot.com/

A blog created by FCE graduate students which focuses on the experiences of graduate students conducting research in the Everglades.

Other products

Databases

The FCE Information Management System contains 172 datasets which are publicly available on FCE LTER's website (http://fcelter.fiu.edu/data/core/) and in the EDI Data Repository (https://portal.edirepository.org). Datasets include climate, consumer, primary production, water quality, soils, and microbial data as well as other types of data. A table of FCE LTER datasets in the EDI Data Repository with dataset titles and DOI is included in the Appendix.

Other publications

Wilson, B.J. 2018. Peat Collapse in Coastal Wetlands: An Easy to Understand Dissertation. Self-published magazine. 38 p. http://students.fiu.edu/~bwils034/Zine/.

Wilson, B.J. 2018. Transitioning Out of Academia. CERF's Up! Newsletter. Coastal and Estuarine Research Federation. Vol. 44(3): 8.

Participants & Other Collaborating Organizations

Group photo from the 2018 FCE LTER All Scientists Meeting

Participants*

*People who worked at least 1 person month on the project

Name	Most Senior Project Role
Gaiser, Evelyn	PD/PI
Heithaus, Michael	Co PD/PI
Jaffe, Rudolf	Co PD/PI
Kominoski, John	Co PD/PI
Price, Rene	Co PD/PI
Boyer, Joseph	Faculty
Briceno, Henry	Faculty

Name	Most Senior Project Role
Childers, Daniel	Faculty
Fourqurean, Jim	Faculty
Lagomasino, David	Faculty
Malone, Sparkle	Faculty
Martens-Habbena, Willm	Faculty
Oberbauer, Steven	Faculty
Oehm, Nick	Faculty
Rains, Mark	Faculty
Rehage, Jennifer	Faculty
Richards, Jennifer	Faculty
Rivera-Monroy, Victor	Faculty
Roy Chowdhury, Rinku	Faculty
Smoak, Joseph	Faculty
Starr, Gregory	Faculty
Staudhammer, Christina	Faculty
Stingl, Ulrich	Faculty
Trexler, Joel	Faculty

Name	Most Senior Project Role
Troxler, Tiffany	Faculty
Wdowinski, Shimon	Faculty
Casal, Teresa	K-12 Teacher
Breithaupt, Joshua	Postdoctoral (scholar, fellow or other postdoctoral position)
Dessu, Shimelis	Postdoctoral (scholar, fellow or other postdoctoral position)
Duran, Alain	Postdoctoral (scholar, fellow or other postdoctoral position)
Flower, Hilary	Postdoctoral (scholar, fellow or other postdoctoral position)
Kiszka, Jeremy	Postdoctoral (scholar, fellow or other postdoctoral position)
Lee, Dong Yoon	Postdoctoral (scholar, fellow or other postdoctoral position)
Liao, Heming	Postdoctoral (scholar, fellow or other postdoctoral position)
Marazzi, Luca	Postdoctoral (scholar, fellow or other postdoctoral position)
May, Jeremy	Postdoctoral (scholar, fellow or other postdoctoral position)
Mazzei, Viviana	Postdoctoral (scholar, fellow or other postdoctoral position)
Mercado Molina, Alex	Postdoctoral (scholar, fellow or other postdoctoral position)
Olivar, Talib	Postdoctoral (scholar, fellow or other postdoctoral position)
Regier, Peter	Postdoctoral (scholar, fellow or other postdoctoral position)
Santos, Rolando	Postdoctoral (scholar, fellow or other postdoctoral position)

Name	Most Senior Project Role
Wilson, Benjamin	Postdoctoral (scholar, fellow or other postdoctoral position)
Yoder, Landon	Postdoctoral (scholar, fellow or other postdoctoral position)
Coronado, Carlos	Other Professional
Fitz, Carl	Other Professional
Julian, Paul	Other Professional
Pisani, Oliva	Other Professional
Rodriguez, Jessica	Other Professional
Rugge, Michael	Other Professional
Sanders, Colin	Other Professional
Vanderbilt, Kristin	Other Professional
Absten, Michael	Technician
Bauman, Laura	Technician
Gastrich, Kirk	Technician
Kuhn, Paul	Technician
Standen, Emily	Technician
Stumpf, Sandro	Technician
Tobias, Franco	Technician

Name	Most Senior Project Role
Travieso, Rafael	Technician
Viadero, Natasha	Technician
Castaneda, Edward	Staff Scientist (doctoral level)
Davis, Stephen	Staff Scientist (doctoral level)
Frankovich, Tom	Staff Scientist (doctoral level)
Kiszka, Jeremy	Staff Scientist (doctoral level)
Allen, Joshua	Graduate Student (research assistant)
Charles, Sean	Graduate Student (research assistant)
Clasen, Hunter	Graduate Student (research assistant)
Eggenberger, Cody	Graduate Student (research assistant)
Emery, Meredith	Graduate Student (research assistant)
Gann, Daniel	Graduate Student (research assistant)
Garcia, Laura	Graduate Student (research assistant)
Gervasi, Carissa	Graduate Student (research assistant)
Hauck, Carson	Graduate Student (research assistant)
James, Ryan	Graduate Student (research assistant)
Lamb-Wotton, Luke	Graduate Student (research assistant)

Name	Most Senior Project Role
Massie, Jordan	Graduate Student (research assistant)
Onwuka, Ike	Graduate Student (research assistant)
Paz, Valeria	Graduate Student (research assistant)
Roebuck, Alan	Graduate Student (research assistant)
Sanchez, Jessica	Graduate Student (research assistant)
Sarker, Shishir	Graduate Student (research assistant)
Servais, Shelby	Graduate Student (research assistant)
Strickland, Bradley	Graduate Student (research assistant)
Tasci, Yasemin	Graduate Student (research assistant)
Zhang, Boya	Graduate Student (research assistant)
Zhao, Xiaochen	Graduate Student (research assistant)
Campbell, Lajhon	Undergraduate Student
Collins, Stormie	Undergraduate Student
Cordoba, Nicole	Undergraduate Student
Dalton, Robert	Undergraduate Student
Das, Arundhati	Undergraduate Student
Jonas, Ariana	Undergraduate Student

Name	Most Senior Project Role
Maxberry, Imani	Undergraduate Student
Ramirez, Paulina	Undergraduate Student
Rives, Andre	Undergraduate Student
Romero, Nadia	Undergraduate Student
Schinbeckler, Rachel	Undergraduate Student
Seitz, Cameron	Undergraduate Student
Sisco, Sarah	Undergraduate Student
Sola, Andres	Undergraduate Student
Stephens, Cody	Undergraduate Student
Westerfield, William	Undergraduate Student
Goldberg, Liza	High School Student
Born, Connor	Research Experience for Undergraduates (REU) Participant
Denis, Evelyn	Research Experience for Undergraduates (REU) Participant
Puig-Santana, Allesandra	Research Experience for Undergraduates (REU) Participant
Roebling, Suzy	Research Experience for Undergraduates (REU) Participant
Turrent, Daniel	Research Experience for Undergraduates (REU) Participant

Partner Organizations

Name	Location
Clark University	Worcester, MA
College of William & Mary	Williamsburg, Virginia
Dartmouth College	Hanover, NH
Encounters in Excellence, Inc.	Miami, 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 State University	Tallahassee, Florida
Indiana University	Bloomington, Indiana
Leibiniz Institute for Tropical Marine Research	Bremen, Germany
Louisiana State University	Baton Rouge, Louisiana
Miami-Dade County Public Schools	Miami-Dade County, Florida
National Aeronautics and Space Administration	Pasadena, California
National Audubon Society - Tavernier Science Center	Tavernier, Florida
National Oceanic and Atmospheric Administration - AOML	Miami, Florida
National Park Service - South Florida/Caribbean Network	Palmetto Bay, Florida
Sam Houston State University	Huntsville, Texas
South Florida Water Management District	West Palm Beach, Florida

Name	Location
The Deering Estate	Miami, Florida
The Pennsylvania State University	University Park, Pennsylvania
University of Alabama	Tuscaloosa, Alabama
University of California, Los Angeles	Los Angeles, California
University of Central Florida	Orlando, Florida
University of Florida	Gainesville, Florida
University of Hawaii at Manoa	Honolulu, HI
University of Miami	Coral Gables, Florida
University of North Florida	Jacksonville, Florida
University of South Carolina	Columbia, South Carolina
University of South Florida	Tampa, Florida
University of South Florida St. Petersburg	St. Petersburg, Florida
USGS	Reston, Virginia
Zoological Society of Florida	Miami, Florida

Impacts

Impact on the development of the principal disciplines

FCE science is integral to understanding the long-term dynamics of coastal estuaries, and we have particularly advanced comparative coastal ecosystem studies through research in the tropics. Our studies of disturbance dynamics are informing general models, and we have led two synthesis efforts across LTER sites to populate those models with long-term data to test core disturbance theory. In addition, through two leveraged grants from NASA, we are contributing the global blue carbon assessment and relating those assessments to biodiversity patterns across wetland types. Studies of organic matter processing in FCE have especially advanced these estimates because of our more thorough understanding of the relative importance of nutrients in controlling net carbon storage in reduced and oxidized environments in the face of sea level rise. In addition, our intensive experimental research on carbon stability is helping inform mechanisms of peat collapse, a phenomenon being recognized recently in wetlands around the world.

Our global studies have helped reveal how natural and human disturbances influence the stability of coastal wetlands not only in the neotropics, but also in other tropical and subtropical latitudes around the world through comparative projects from Mexico to Africa. We used the mangrove geomorphic conceptual framework tested in the FCE LTER to advance studies in Eastern Africa (Tanzania) as part of an NSF funded project in the Coupled Natural-Human systems program. This project aims to develop a predictive socio-ecological model that could determine the ecosystem-wide environmental and economic effects of fishing and mangrove deforesting in a given sector along the resource rich Tanzania coastline. Victor Rivera-Monroy's collaboration with Centro de Investigaciones Biologicas del Noroeste Mexico also benefited from FCE LTER work, since most of the methods used in the FCE study sites are now being implemented in a number of study areas in Baja California Mexico.

Impact on other disciplines

FCE science is informing socio-ecological solutions to global challenges, such as sea level rise and current interdisciplinary research of urban resilience to extreme events. Through the Sea Level Solutions Center at FIU and an NSF Sustainability Research Network grant (Urban Resilience to Extremes), FCE researchers are working closely with architects, designers, communications specialists, and computer scientists to develop user-friendly tools for the resource managers and the general public to use to visualize the outcomes of decisions under different future scenarios. FCE hydro-ecological models are being translated into augmented reality platforms to provide experiences that guide decision-making to create a more resilient South Florida. Social scientists will be studying the impact of these next generation tools on policy decisions.

Our new developed technique for flooding inundation can be applied for flooding hazard assessment in various environments, including detection of flooding in urban areas.

Visioning of Everglades National Park under future climate change scenarios spurred conversations among agencies as to future conditions that must be taken into consideration in planning Everglades restoration.

Impact on the development of human resources

Research, Training and Mentoring

Exposing Teachers, Young People, and the Public to Science

Combining the research at FCE LTER with training and mentoring across the K-20 spectrum is critical for impacting human resource development in science, engineering, and technology. FCE has continued to offer a variety of opportunities for pre- and professional service teachers, K-12 students, undergraduates, and graduate students, in order to expose them to our research, and to provide them with training and mentoring.

Professional and Pre-Service Teachers

Partnering with the STEM Transformation Institute and the FIUteach program, we have worked with The National Tropical Botanical Garden (NTBG) to continue offering the *Kampong's Science Teachers Enrichment Program (K-STEP)*. This year, 22 middle and high school science teachers, from 17 Miami Dade County Public Schools (MDCPS), participated in K-STEP Fall 2017 professional development at NTBG's mainland garden, The Kampong. Participants worked with several botanical experts in conservation biology, ethnobotany, and economic botany to develop lesson plans to improve student performance on low performing standards.

RAHSS and K-12 Programs

Our scientists have also continued to mentor exceptional K-12 students through the Research Experience for Secondary Students (RESSt) and RAHSS program. Over the last year, four of our scientists have formally mentored seven high school students in 12 semester units (SU) of mentoring.

RAHSS Liza Goldberg has been working with Dr. David Lagomasino at the University of Maryland and NASA Goddard Space Flight Center to develop a map that shows the potential vulnerability of mangrove coastlines with respect to urban and agricultural expansion and shoreline erosion. The initial results were presented at the 2018 FCE All Scientist Meeting and once complete, the maps will be displayed on the interactive web portal EcoMap: Electronic Coastal Monitoring and Assessment Program.

FCE continues to expand the distribution of our book, One Night in the Everglades, to local schools. In July 2018, an additional 200 copies of were delivered to Broward County Public Schools for distribution in: 136 elementary schools; 37 middle school; 8 K-8 centers ; and 17 K-12 centers. We are currently working with the Everglades Foundation (EF) to distribute the book to Orange and Palm Beach County Schools along with the EF's Everglades Literacy Curriculum (https://www.evergladesfoundation.org/education/).

REU and Undergraduate Mentoring

In 2018, Dr. John Kominoski and Shelby Servais mentored REU Alessandra Puig-Santana in her research project *Biotic and abiotic mechanisms behind organic matter loss across a salinity gradient*. The objective of this study was to quantify the effects of abiotic and biotic

contributions on soil carbon from wetlands exposed to short-term increases in salinity. The results were presented in a poster at the annual *Florida International University Biology Symposium, CREST REU Symposium* and the *2018 FCE LTER All Scientists Meeting* where Alessandra was recognized as the *Best Undergraduate Poster*.

The second REU was awarded to the Rehage lab and was shared between two FIU undergraduates Daniel Turrent and Evelyn Denis. Their project examined how varying environmental conditions may be affecting the trophic dynamics in the coastal Everglades fish communities. Once complete, Daniel and Evelyn plan to present their results at the FIU's Conference for Undergraduate Research (CURFIU) and the 2019 FCE All Scientist Meeting. REU Marina Howarth concluded her 2017 project with Dr. Jose Fuentes that examined the factors controlling evapotranspiration in mangroves after Hurricane Wilma. The results of her work suggest that the hurricane did not cause much change in the stomatal conductance due to the availability of water during the wet season, however, it instead caused a shift in the energy balance towards higher turbulent heat fluxes, and therefore increased evaporation, through the increased radiation exposure and resultant heating of the water underneath the canopy. Marina presented her work at the *2017 Annual Meeting of the American Meteorological Society* in a poster and summarized in a final report entitled "*Controls on Evapotranspiration Rates in a Mangrove Forest Following Hurricane Wilma in the Everglades, FL*"

Previously unreported, REU Steven Nanez examined trophic dynamics in the coastal Everglades with a project focused on expanding our understanding of trophic structure, dietary niche breath for key consumers and on the effects of enrichment. His research used stable isotope to track the origin and fate of production and nutrients in producers and consumers of the coastal lakes region of Florida Bay in the McCormick Creek and Alligator Creek subestuaries. These sites represent two coastal systems with varying nutrient status (enriched vs. unenriched) that provide a setting for comparison of the effects of enrichment. Preliminary analyses show that epiphytes appear to be the major energetic basal source in both systems, and that key consumers and recreational species (tarpon, snook and spotted seatrout) occupy a higher trophic level in the unenriched McCormick Creek system. Consumers here appear to have broader diets, incorporating diet items at different trophic levels relative to the enriched Alligator Creek system. This may possibly indicate prey limitation in Alligator Creek relative to McCormick Creek since consumers appear to need to rely on a higher range of resources to satisfy foraging needs. Steven continues to work on additional analyses to increase samples sizes for consumers, include prey in analyses and pair examination of the movement of consumers with their trophic dynamics in the coming year. Steven presented his research with a poster at the *American Fisheries Society*national meeting in Tampa, FL in August 2017, two posters at the FCE LTER ASM meeting in May 2017, and at the Greater Everglades Ecosystem Restoration Conference in April 2017.

In addition to formal REUs, FCE continues to provide a range of opportunities for research, teaching and mentoring in science. Over the last year, FCE scientists have provided 98 semester units (SU) of mentoring to 51 undergraduates and 7 high school students, in 13 FCE labs. The

majority (93%) of the students mentored can be identified as traditionally underrepresented in STEM, consisting of 70% are female (n=28) and more than 80% (n>32) are considered ethnic minorities.

FCE scientists are also including our research results as part of their course materials. Since last year, 19 scientists report discussing FCE research, in 62 courses to 1,158 students.

Improving Retention of Underrepresented Groups

FCE has begun working with the Associate Provost and the *FIU Office to Advance Women, Equity, and Diversity* to draft the FCE LTER Diversity Plan. In addition, we continue to work with Herbert Wertheim College of Medicine to improve retention of underrepresented groups in STEM through the *Florida Science Training and Research Student (Florida-STARS) Fellowship*. Over the last three years, participants from underserved populations toured the Everglades by airboat with FCE scientists. During the excursion they learned about the public health issues associated with the Everglades restoration. The goal of the program is to encourage students to continue their STEM education and to assist with their matriculation into medical school through career counseling, mentoring, and preparing them for medical school application and matriculation. The 2018 cohort was composed of 19 students between the ages of 18-20 from Xavier University of Louisiana, Bethune -Cookman University, Florida Memorial University, and FIU.

Impact on information resources that form infrastructure

Databases

The FCE Information Management System contains 172 datasets which are publicly available on FCE LTER's website (http://fcelter.fiu.edu/data/core/) and in the EDI Data Repository. Datasets include climate, consumer, primary production, water quality, soils, and microbial data as well as other types of data. A table of FCE LTER datasets in the EDI Data Repository with dataset titles and DOI is included as a supporting file in the Products section of this report.

Impact on information resources that form infrastructure

The FCE IM team (K. Vanderbilt and M. Rugge) continue to support 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 datasets are regularly published in both locations in compliance with the FCE Data Management Policy and LTER Data Access Policy. FCE LTER now has 172 data packages in the EDI Data Repository. FCE updates to LTER Network databases ClimDB and HydroDB are being made automatically through a service provided by GCE LTER information manager Wade Sheldon. The FCE IM team lends its expertise to researchers by providing assistance with metadata development, data submissions, individual project database design, collaborations on GIS work and research graphics.

IT Infrastructure
The FCE information management system's web server, Oracle 12c database and FTP server are loaded on four virtual servers housed on FIU's Division of Information Technology's equipment. The FCE Disaster Recovery Plan calls for data to be backed up offsite at the Northwest Florida Regional Data Center (NWRDC) located on the campus of Florida State University in Tallahassee, Florida.

FCE Website
The FCE website provides outstanding support for site and network science. FCE project information and minimal research data metadata are stored in an Oracle12c database that drives the FCE website. The site's homepage (http://fcelter.fiu.edu) design provides a simple, user-friendly gateway to a wealth of information ranging from the FCE LTER project overview to a searchable database of FCE publications. Scientists seeking data may select from FCE LTER Data Products, LTER Network Data, and Outside Agency Data, where links are available to multiple external databases. FCE Core Research Data are searchable through a sophisticated interface. The FCE Data Summary Table for each dataset displays a link to complete metadata, a link to download the data, and the dataset citation, including the DOI as generated by the EDI Data Repository. This summary table also contains links to a web-based data visualization tool that allows researchers to rapidly visualize complex data streams. All datasets are publicly accessible except where an embargo has been granted while a graduate student publishes on a dataset.

The FCE IM team has initiated an update to the FCE LTER website so that it will be consistent with the *Guidelines for LTER Website Design and Content, Version 2.0* released in 2018. The new website will have the look and feel of other websites in FIU's College of Arts, Sciences & Education. Static content from the current FCE website will be migrated into the Cascade content management system used by FIU. Dynamic content, which is stored in FCE's Oracle 12c database, will still be served from the FCE webserver through a re-designed template. For the convenience of FCE researchers, the new website will still feature the same query interface to locate datasets. The dataset summary displays, however, will be generated using the PASTA+ API and REST web services available through the EDI Data Repository.

Other contributions
The FCE IM served on the LTER information management subcommittee that updated Version 1 of *Guidelines for LTER Website Design and Content to Version 2*, adopted by the LTER Science Council in 2018. She co-authored one paper, a survey of the types of datasets generated by LTSER sites (of which FCE LTER is one) throughout the International LTER (Dick et al. 2018). The FCE IM works quarter time for the EDI Data Repository. In this role, she has co-led information management training workshops that include new LTER IMs. She co-led a "hackathon" that brought together programmers from LTER, agencies, and industry to begin populating an "Information Management Code Registry (IMCR)". The IMCR will point to well-documented code, from snippets to mature software, that information managers will be able to

search to find code to help them organize, document, quality control, and archive environmental datasets.

Impact on society beyond science and technology

FCE science is deliberately transdisplinary and coproduces knowledge for science and society. In addition, we continue to work through the Institute of Water and Environment (InWE) at Florida International University to ensure that this research is connecting to communities of interest through public events, workshops, and teach-ins. For example, we participated in the InWE Water and Environment Security Conference. Faculty and graduate students are actively engaged in meetings with stakeholders and agency scientists to ensure the Everglades is adaptively managed according to the science we generate.

Appendix: Table of FCE LTER Data Sets in PASTA

FCE Datasets Published in the EDI Data Repository (Title, DOI, Creators, and Date of Publication)	**Core Area**
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), South Florida from December 2000 to Present doi:10.6073/pasta/1f61bffd880b6c90d31d92f501bfe3be Rivera-Monroy, Victor; Castaneda, Edward (2018)	Inorganic Nutrients
Biogeochemical data collected from Northeast Shark Slough, Everglades National Park (FCE) from September 2006 to 2008 doi:10.6073/pasta/ee08228027fd32182996ce39cfde7e22 Gaiser, Evelyn; Scinto, Leonard (2009)	Inorganic Nutrients
Biomass data from the Peat Collapse-Saltwater Intrusion Field Experiment within Everglades National Park (FCE), collected from October 2014 to September 2016. doi:10.6073/pasta/6a18d0ec3a960a82b6989c18f01205b2 Wilson, Ben; Troxler, Tiffany (2018)	Primary Production
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 doi:10.6073/pasta/e84cc609ffbc63bb45bd484810e6746b Jaffe, Rudolf; Pisani, Oliva (2015)	Organic Matter
Bulk Parameters for Soils/Sediments from the Shark River Slough and Taylor Slough, Everglades National Park (FCE), from October 2000 to January 2001 doi:10.6073/pasta/435f4c70788b8199849b43c5445d3367 Mead, Ralph (2004)	Organic Matter
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 doi:10.6073/pasta/04a8792fed9ceed4237bd3273a97e8f8 Heithaus, Michael; Matich, Philip (2011)	Populations
Capture data for sharks caught in standardized drumline fishing in Shark Bay, Western Australia, with accompanying abiotic data, from February 2008 to July 2014. doi:10.6073/pasta/5541d081239577c69c87c0df5ff3a52e Heithaus, Michael; Thomson, Jordan (2019; Dissertation data)	Populations

FCE Datasets Published in the EDI Data Repository (Title, DOI, Creators, and Date of Publication)	**Core Area**
Capture data for sharks caught in standardized drumline fishing in Shark Bay, Western Australia, with accompanying abiotic data, from January 2012 to April 2014. doi:10.6073/pasta/3f664bf54f492e77fe408543f9eeafa8 Heithaus, Michael; Thomson, Jordan (2019; Dissertation data)	Populations
Characterization of dissolved 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 doi:10.6073/pasta/cc9f23891b8bb977eaf5d7eb6f76005f Jaffe, Rudolf (2005)	Inorganic Nutrients
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 doi:10.6073/pasta/76696c297746734756f827ec748eb20f Jaffe, Rudolf (2002)	Inorganic Nutrients
Cichlasoma urophthalmus cytochrome b sequences collected from the Florida Everglades (FCE) and Central America from January 2012 to May 2014 doi:10.6073/pasta/406058160f1adb10a2ec578c56db5df8 Harrison, Elizabeth; Trexler, Joel (2014)	Populations
Cichlasoma urophthalmus microsatellite fragment size collected from the Florida Everglades (FCE) and Central America from June 2010 to March 2013 doi:10.6073/pasta/de1ec3c490268a9b3d784a9266fa2ebf Harrison, Elizabeth; Trexler, Joel (2014)	Populations
Common snook (Centropomus undecimalis) movements within the Shark River estuary (FCE), Everglades National Park, South Florida from February 2012 to Present doi:10.6073/pasta/58414574e57fd558d71cfab0952c0dc1 Rehage, Jennifer (no Pub date; non-FCE-funded research)	Populations
Consumer Stocks: Fish Biomass from Everglades National Park (FCE), South Florida from February 1996 to March 2000 doi:10.6073/pasta/4c6f16f6825cc77204ef76f21e86b75a Trexler, Joel (2004)	Populations
Consumer Stocks: Fish Biomass from Everglades National Park (FCE), South Florida from February 2000 to April 2005 doi:10.6073/pasta/b0e2ae3fb140447717b8dd9fdc3f4ac5 Trexler, Joel (2004)	Populations

FCE Datasets Published in the EDI Data Repository (Title, DOI, Creators, and Date of Publication)	**Core Area**
Consumer Stocks: Fish, Vegetation, and other Non-physical Data from Everglades National Park (FCE), South Florida from February 2000 to April 2005 doi:10.6073/pasta/354b4b6ac638551cc947a9e83e17805d Trexler, Joel (2007)	Populations
Consumer Stocks: Physical Data from Everglades National Park (FCE), South Florida from February 1996 to April 2008 doi:10.6073/pasta/bc7e38fe4b8f5f976f1adb9e6395a8f8 Trexler, Joel (2008)	Disturbance
Consumer Stocks: Wet weights from Everglades National Park (FCE), South Florida from March 2003 to April 2008 doi:10.6073/pasta/7ff817fdf10aac0ad84a64acd6ca1c95 Trexler, Joel (2008)	Populations
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 doi:10.6073/pasta/fac4bf481caf8149f86ea357455abb86 Heithaus, Michael; Nowicki, Robert (2019; Dissertation data)	Populations
Cross Bank Benthic Aboveground biomass, Everglades National Park (FCE), South Florida from 1983 to 2014 doi:10.6073/pasta/8e96bfec4be54df2a5e0d4a1741d4dab Fourqurean, James; Howard, Jason (2015)	Primary Production
Cross Bank sediment characteristics, Everglades National Park (FCE), South Florida from 2014 doi:10.6073/pasta/8a665416247299616dfd90a9feca8dcd Fourqurean, James; Howard, Jason (2015)	Disturbance; Inorganic Nutrients, Organic Matter
Diatom Species Abundance Data from LTER Caribbean Karstic Region (CKR) study (FCE) in Yucatan, Belize and Jamaica during 2006, 2007, 2008 doi:10.6073/pasta/84241f5358c01c8dacd832b42d3fc736 Gaiser, Evelyn (2012)	Primary Production
DIC and DOC 13C tracer data from Shark River Slough and Harney River (FCE), Everglades, South Florida in November 2011 doi:10.6073/pasta/dd9da92e48b2506cc0c2a352a5cbea8f Anderson, William (2018)	Disturbance
Environmental data from FCE LTER Caribbean Karstic Region (CKR) study in Yucatan, Belize and Jamaica during Years 2006, 2007 and 2008 doi:10.6073/pasta/5a01d59e5f7d73bd1f7baee2c71af765 Gaiser, Evelyn (2012)	Inorganic Nutrients

FCE Datasets Published in the EDI Data Repository (Title, DOI, Creators, and Date of Publication)	**Core Area**
Evaporation Estimates for Long Key C-MAN Weather Station, Florida Bay (FCE) from July 1998 to May 2004 doi:10.6073/pasta/c40d320f5d15fdd36a65ef7a2ef93f17 Smith, Ned (2005)	Disturbance
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) doi:10.6073/pasta/6d2e26bc8c8cd2322981d22a095ab968 Jaffe, Rudolf (2006)	Organic Matter
FCE Redlands 1994 Land Use, Miami-Dade County, South Florida doi:10.6073/pasta/1d696e0668ed238469adeaed24dd7bc1 Onsted, Jeff (2012)	Disturbance
FCE Redlands 1994 Land Use, Miami-Dade County, South Florida doi:10.6073/pasta/e7856aad78610c7c365cf620f47a5ef5 Onsted, Jeff (2012)	Disturbance
FCE Redlands 1998 Land Use, Miami-Dade County, South Florida doi:10.6073/pasta/ab8e1dea7bc33019195125750934 60fc Onsted, Jeff (2012)	Disturbance
FCE Redlands 1998 Roads, Miami-Dade County, South Florida doi:10.6073/pasta/f5831e56dffab52a99bbe8a1a2563b1d Onsted, Jeff (2012)	Disturbance
FCE Redlands 2001 Land Use, Miami-Dade County, South Florida doi:10.6073/pasta/b1c64a9c7c616829ace724de8d41785b Onsted, Jeff (2012)	Disturbance
FCE Redlands 2001 Zoning, Miami-Dade County, South Florida doi:10.6073/pasta/e6e6563f64ae6d6aa4cb07b294f1ec95 Onsted, Jeff (2012)	Disturbance
FCE Redlands 2006 Land Use, Miami-Dade County, South Florida doi:10.6073/pasta/b7e35d8321a2db2138748b869993dacd Onsted, Jeff (2012)	Disturbance
FCE Redlands 2006 Roads, Miami-Dade County, South Florida doi:10.6073/pasta/c1e2b4bdf4d5a1ad441e69b7417cdfab Onsted, Jeff (2012)	Disturbance
FCE Redlands 2008 Slope Mosaic, Miami-Dade County, South Florida doi:10.6073/pasta/f0c0fcaaca44b472112745262c372628 Onsted, Jeff (2012)	Disturbance

FCE Datasets Published in the EDI Data Repository (Title, DOI, Creators, and Date of Publication)	**Core Area**
FCE Redlands Flood Zones, Miami-Dade County, South Florida doi:10.6073/pasta/54138174a44f11a0000279a7e480b632 Onsted, Jeff (2012)	Disturbance
Fish and consumer data collected from Northeast Shark Slough, Everglades National Park (FCE) from September 2006 to September 2008 doi:10.6073/pasta/4eda63d153f0859a70c4398c3762be9e Gaiser, Evelyn; Trexler, Joel (2009)	Populations
Fish community data obtained from Antillean-Z fish trap deployment in the Eastern Gulf of Shark Bay, Australia from June 2013 to August 2013 doi:10.6073/pasta/3eed6e46081423861d71e6d6a6ee3194 Heithaus, Michael; Nowicki, Robert (2019; Dissertation data)	Populations
Fish trap catch, set, and environmental data from Shark Bay Marine Park, Western Australia from May 2010 to July 2012 doi:10.6073/pasta/4a273aa566c090cd059f5f8780f566be Heithaus, Michael; Bessey, Cindy (2019; Dissertation data)	Populations
Florida Bay Braun Blanquet, Everglades National Park (FCE), South Florida from October 2000 to Present doi:10.6073/pasta/608dfa3320fbf68708c3fc2e51b9879b Fourqurean, James (2017)	Primary Production
Florida Bay Nutrient Data, Everglades National Park (FCE), South Florida from August 2008 to Present doi:10.6073/pasta/7fd7b4f3931c622acfa8d905f224190f Fourqurean, James (2018)	Primary Production
Florida Bay Physical Data, Everglades National Park (FCE), South Florida from January 2001 to February 2002 doi:10.6073/pasta/f0e13c236606c1ed6efe5618e3eee8c0 Frankovich, Thomas (2002)	Disturbance
Florida Bay Physical Data, Everglades National Park (FCE), South Florida from September 2000 to Present doi:10.6073/pasta/71e031011df956555758ad9f94cac835 Fourqurean, James (2017)	Disturbance
Florida Bay Productivity Data, Everglades National Park (FCE), South Florida from September 2000 to Present doi:10.6073/pasta/7bac5b8ba8ec4683f2785a4a4e8cad64 Fourqurean, James (2018)	Primary Production

FCE Datasets Published in the EDI Data Repository (Title, DOI, Creators, and Date of Publication)	**Core Area**
Florida Bay Seagrass Canopy Temperature Data, Everglades National Park (FCE), South Florida from September 2000 to Present doi:10.6073/pasta/129a5a1629f4d71951964caa726e2e6d Fourqurean, James (2017)	Disturbance
Florida Bay Stable Isotope Data Everglades National Park (FCE), South Florida from January 2005 to Present doi:10.6073/pasta/64e07590ba95e8b003242a6f19f47371 Fourqurean, James (2017)	Inorganic Nutrients
Florida Bay, South Florida (FCE) Seagrass Epiphyte Light Transmission from December 2000 to February 2002 doi:10.6073/pasta/393fd3bbbd5a520e5cf372483113f2ce Frankovich, Thomas (2005)	Primary Production
Flux data from the Peat Collapse-Saltwater Intrusion Field Experiment within Everglades National Park, collected from October 2014 to September 2016. doi:10.6073/pasta/a84048bfa2552499fad8d80f313db008 Wilson, Ben; Troxler, Tiffany	Primary Production
Flux measurements from the SRS-6 Tower, Shark River Slough, Everglades National Park (FCE), South Florida from October 2006 to Present doi:10.6073/pasta/da2dd08561a8df482d64180735e416dc Barr, Jordan; Fuentes, Jose; Engel, Vic; Zieman, Joseph (2014)	Disturbance
Flux measurements from the SRS-6 Tower, Shark River Slough, Everglades National Park, South Florida (FCE) from January 2004 to August 2005 doi:10.6073/pasta/aec87311dc582fde9adf4a11a198e0aa Barr, Jordan; Fuentes, Jose; Zieman, Joseph (2011)	Primary Production
Fluxes of dissolved organic carbon from the Shark River Slough, Everglades National Park (FCE), South Florida from May 2001 to September 2014 doi:10.6073/pasta/02cf0405c4f560746a5e5275ef6e225b Regier, Peter; Jaffe, Rudolf (2017)	Organic Matter
Gastropod Biomass and Densities found at Rabbit Key Basin, Florida Bay (FCE) from March 2000 to April 2001 doi:10.6073/pasta/e9498a3ecfd1d497c6b4c266901c9d4b Frankovich, Thomas (2004)	Populations
Global Climate Change Impacts on the Vegetation and Fauna of Mangrove Forested Ecosystems in Florida (FCE): Nekton Mass from March 2000 to April 2004 doi:10.6073/pasta/beb355c2f21efc3653f888709cf49637 McIvor, Carole (2004)	Disturbance

FCE Datasets Published in the EDI Data Repository (Title, DOI, Creators, and Date of Publication)	**Core Area**
Global Climate Change Impacts on the Vegetation and Fauna of Mangrove Forested Ecosystems in Florida (FCE): Nekton Portion from March 2000 to April 2004 doi:10.6073/pasta/7b0e0c1a9a93965c79fd66bd4bbae46d McIvor, Carole (no Pub date; non-FCE-funded research)	Disturbance
Greenhouse experiment (FCE) in April and August 2001: Responses of neotropical mangrove saplings to the combined effect of hydroperiod and salinity/Biomass doi:10.6073/pasta/b4200968cd7c84d47fd59a3d271e11b8 Cardona-Olarte, Pablo; Rivera-Monroy, Victor; Twilley, Robert (2005)	Primary Production
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 doi:10.6073/pasta/c559309bdc4b90e325b1e8772e1de60a Cardona-Olarte, Pablo; Rivera-Monroy, Victor; Twilley, Robert (2005)	Primary Production
Groundwater and surface water phosphorus concentrations, Everglades National Park (FCE), South Florida for June, July, August and November 2003 doi:10.6073/pasta/2b42a17496155b8a7ce2191ae90e193b Price, Rene (2006)	Inorganic Nutrients
Institutional Dimensions of Restoring Everglades Water Quality - Social Capital Analysis (FCE), Florida Everglades Agricultural Area from September 2014 to July 2015. doi:10.6073/pasta/05944589bc8b526ead9b1df50797e00a Yoder, Landon; Roy Chowdhury, Rinku (2018)	Disturbance
Institutional Dimensions of Restoring Everglades Water Quality -Interview Notes (FCE), September 2014-July 2015. doi:10.6073/pasta/94d1f65d4c822af1150bc9e7694e59d1 Yoder, Landon; Roy Chowdhury, Rinku (2018)	Disturbance
Isotopic Variation of Soil Macrofossils from Shark River Slough, Everglades National Park (FCE) in December 2004 doi:10.6073/pasta/2bcdb06ad4018aac1783c25701fa086b Saunders, Colin (2011)	Organic Matter
Large consumer isotope values, Shark River Slough, Everglades National Park (FCE LTER), May 2005 to Present doi:10.6073/pasta/cca071aa3f4f9d6b3c0754b391f6af05 Heithaus, Michael; Matich, Philip; Rosenblatt, Adam (2018)	Populations

FCE Datasets Published in the EDI Data Repository (Title, DOI, Creators, and Date of Publication)	**Core Area**
Large shark catches (Drumline), water temperatures, salinities, and dissolved oxygen levels, and stable isotope values in the Shark River Slough, Everglades National Park (FCE) from May 2009 to May 2011 doi:10.6073/pasta/0f02b8eb2fa3c0751be63d67cccb2000 Heithaus, Michael; Matich, Philip (2016)	Populations
Leaf nutrient and root biomass data from the Peat Collapse-Saltwater Intrusion Field Experiment within Everglades National Park (FCE), collected from October 2014 to September 2016. doi:10.6073/pasta/0412d0e992558af65cf22110ef8f0e1b Wilson, Ben; Troxler, Tiffany (2018)	Primary Production
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 doi:10.6073/pasta/d6bea805dbfa2dca53bfd60735de1af8 Barr, Jordan; Fuentes, Jose; Zieman, Joseph (2002)	Primary Production
Macroalgae Production in Florida Bay (FCE), South Florida from May 2007 to Present doi:10.6073/pasta/6e69036588a3b161593ad320a2e900fd Collado-Vides, Ligia (2017)	Primary Production
Macrofossil Characteristics of Soil from Shark River Slough, Everglades National Park (FCE) from July 2003 to February 2006 doi:10.6073/pasta/e8f697869b4be3ac9c0cecff377d94d8 Saunders, Colin (2011)	Organic Matter
Macrophyte count data collected from Northeast Shark Slough, Everglades National Park (FCE) from September 2006 to Present doi:10.6073/pasta/effd9e98134913af21b670febebd6233 Gaiser, Evelyn (2010)	Primary Production
Mangrove Forest Growth from the Shark River Slough, Everglades National Park (FCE), South Florida from January 1995 to Present doi:10.6073/pasta/0c8f485c7095dfed160e66b9b959f470 Twilley, Robert; Rivera-Monroy, Victor; Castaneda, Edward (2018)	Primary Production
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 doi:10.6073/pasta/7390d5ffed6b06f0b881a8942a53e880 Barr, Jordan; Fuentes, Jose; Zieman, Joseph (2002)	Organic Matter

FCE Datasets Published in the EDI Data Repository (Title, DOI, Creators, and Date of Publication)	**Core Area**
Mangrove Litterfall from the Shark River Slough and Taylor Slough, Everglades National Park (FCE), South Florida from January 2001 to Present doi:10.6073/pasta/3652feeb67338a8b9c9f5080d77dbfe0 Rivera-Monroy, Victor; Castaneda, Edward; Twilley, Robert (2018)	Primary Production
Mangrove Soil Chemistry Shark River Slough and Taylor Slough, Everglades National Park (FCE), from December 2000 to May 23, 2002 doi:10.6073/pasta/542c044a50f7081beb454d1314fddff2 Castaneda, Edward; Rivera-Monroy, Victor; Twilley, Robert (2005)	Organic Matter
Mangrove soil phosphorus addition experiment from July 2013 to August 2013 at the mangrove peat soil mesocosms (FCE), Key Largo, Florida doi:10.6073/pasta/3dda94cbf11483f7ae9c48f255fb9787 Kominoski, John; Gaiser, Evelyn (2017)	Organic Matter, Disturbance, Inorganic Nutrients
Mangrove soil phosphorus addition experiment from June 2013 to August 2013 at the mangrove peat soil mesocosms (FCE), Key Largo, Florida doi:10.6073/pasta/983b021dc50ac84755806b07f3c65dc3 Kominoski, John; Gaiser, Evelyn (2017)	Organic Matter, Disturbance, Inorganic Nutrients
Marine turtles captured during haphazard at-sea surveys in Shark Bay, Australia from February 2008 to December 2013 doi:10.6073/pasta/0ae2eafe1fd94702a8471a80741b8cb1 Heithaus, Michael; Thomson, Jordan (2019, Dissertation data)	Populations
Mean Seagrass Epiphyte Accumulation for Florida Bay, South Florida (FCE) from December 2000 to September 2001 doi:10.6073/pasta/0d88f0cd8f29d6f227e19050bde91896 Frankovich, Thomas (2004)	Primary Production
Meteorological measurements at Key Largo Ranger Station, South Florida (FCE) for July 2001 to August 2001 doi:10.6073/pasta/d0950d21f1ba78c9e91ae08d867174be Barr, Jordan; Fuentes, Jose; Zieman, Joseph (2002)	Disturbance
Microbial Sampling from Shark River Slough and Taylor Slough, Everglades National Park, South Florida (FCE) from January 2001 to Present doi:10.6073/pasta/4c8501ea776921f442de1593bb987584 Briceno, Henry (2018)	Organic Matter
Minnowtrap Data from Rookery Branch and the North, Watson, and Roberts Rivers National Park (FCE) from November 2004 to April 2008 doi:10.6073/pasta/91d7c7dd18e2580c7b1523c562db8021 Rehage, Jennifer (2011)	Populations

FCE Datasets Published in the EDI Data Repository (Title, DOI, Creators, and Date of Publication)	**Core Area**
Modeled flux data from the Peat Collapse-Saltwater Intrusion Field Experiment within Everglades National Park (FCE), collected from October 2014 to September 2016. doi:10.6073/pasta/54104d869d122b20b4bcfa3cf8acad1c Wilson, Ben; Troxler, Tiffany (2018)	Primary Production
Monitoring of nutrient and sulfide concentrations in porewaters of mangrove forests from the Shark River Slough and Taylor Slough, Everglades National Park (FCE), South Florida from December 2000 to December 2004 doi:10.6073/pasta/035fa41859dfc4541c04e20cadee1b84 Castaneda, Edward; Rivera-Monroy, Victor; Twilley, Robert (2018)	Inorganic Nutrients
Monthly monitoring fluorescence data for Florida Bay, Ten Thousand Islands, and Whitewater Bay, in southwest coast of Everglades National Park (FCE) for February 2001 to December 2002 doi:10.6073/pasta/1bb7981116c89e6f414964b0a113b294 Jaffe, Rudolf (2002)	Organic Matter
Monthly monitoring fluorescence data for Shark River Slough and Taylor Slough, Everglades National Park (FCE) for October 2004 to February 2014 doi:10.6073/pasta/3938d3bb664d57584afc749c6a768f31 Jaffe, Rudolf (2018)	Organic Matter
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) for January 2002 to August 2004 doi:10.6073/pasta/09d51db8543d43cb6f8f4e21f9630611 Jaffe, Rudolf (2006)	Organic Matter
Monthly water balance data for southern Taylor Slough Watershed (FCE) from January 2001 to December 2011 doi:10.6073/pasta/1fb384a7c943af6f367dbdc46493f566 Price, Rene (2015)	Inorganic Nutrients, Organic Matter, Disturbance
NOAA Daily Surface Meteorologic Data at NCDC Everglades Station (ID-082850) (FCE), South Florida from February 1924 to Present doi:10.6073/pasta/a27e3e1a20d6aa9f1dc827a5c25069c7 (2016)	Disturbance
NOAA Daily Surface Meteorologic Data at NCDC Flamingo Ranger Station (ID-083020) (FCE), South Florida from January 1951 to Present doi:10.6073/pasta/7bae64d38e108bd316c0e4b0058df94e (2016)	Disturbance

FCE Datasets Published in the EDI Data Repository (Title, DOI, Creators, and Date of Publication)	**Core Area**
NOAA Daily Surface Meteorologic Data at NCDC Miami International Airport Station (ID-085663)(FCE), South Florida from January 1948 to Present doi:10.6073/pasta/a5ba3ca4e949c16a95825fc1620c93d0 (2016)	Disturbance
NOAA Daily Surface Meteorologic Data at NCDC Royal Palm Ranger Station (ID-087760)(FCE), South Florida from May 1949 to Present doi:10.6073/pasta/4fd84503fa9cb81fe9f7f30b0c8e41cd (2016)	Disturbance
NOAA Daily Surface Meteorologic Data at NCDC Tavernier Station (ID-088841)(FCE), South Florida from June 1936 to May 2009 doi:10.6073/pasta/dd507279ead6dab518823bdcafec8071 (2016)	Disturbance
NOAA Monthly Mean Sea Level Summary Data for the Key West, Florida, Water Level Station (FCE) (NOAA/NOS Co-OPS ID 8724580) from 01-Jan-1913 to Present doi:10.6073/pasta/4fca540ab6a8146f26b97c4eb1186a80 (2016)	Disturbance
Non-continuous meteorological data from Butternut Key Weather Tower, Florida Bay, Everglades National Park (FCE), April 2001 to August 2013 doi:10.6073/pasta/93ac051825af8798aaee03fcc37acb57 Price, Rene (2016)	Disturbance
Non-continuous TS/Ph7b Weather Tower Data, Everglades National Park (FCE), South Florida from May 2008 to August 2013 doi:10.6073/pasta/6d96be1549a77e16c0bb9178ca7de695 Price, Rene (2017)	Disturbance
Nutrient data from the Peat Collapse-Saltwater Intrusion Field Experiment from brackish and fresh water sites within Everglades National Park (FCE), collected from October 2014 to September 2016. doi:10.6073/pasta/e7d34d1816de4cc5b9ae1c08c708be04 Wilson, Ben; Troxler, Tiffany (2018)	Inorganic Nutrients
Overnight Shark River Surveys from Shark River Slough, Everglades National Park (FCE), South Florida from October 2001 to March 2002 doi:10.6073/pasta/8b6e429fb37dbeaeaa22f962af725a42 Boyer, Joseph; Dailey, Susan (2002)	Populations

FCE Datasets Published in the EDI Data Repository (Title, DOI, Creators, and Date of Publication)	**Core Area**
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 doi:10.6073/pasta/272c332a1c3d83dd522c5ed6324e0df9 Heithaus, Michael; Nowicki, Robert (2019; Dissertation data)	Primary Production
Percentage of Carbon and Nitrogen of Soil Sediments from the Shark River Slough, Taylor Slough and Florida Bay within Everglades National Park (FCE) from August 2008 to Present doi:10.6073/pasta/3665add421ff8cbfda25519464523ad8 Chambers, Randy; Russell, Timothy; Hatch, Rosemary; Katsaros, Dean (2017)	Inorganic Nutrients, Organic Matter
Periphyton Accumulation Rates from Shark River Slough, Taylor Slough and Florida Bay, Everglades National Park (FCE) from January 2001 to Present doi:10.6073/pasta/7477bf727706ae28a449926bf661ab49 Gaiser, Evelyn (2018)	Primary Production
Periphyton and Associated Environmental Data From the Comprehensive Everglades Restoration Plan (CERP) Study from February 2005 to November 2014 (FCE) doi:10.6073/pasta/7ed04d64d07a7dd7a4694615df8211a6 Gaiser, Evelyn (2017)	Primary Production
Periphyton Biomass Accumulation from the Shark River and Taylor Sloughs, Everglades National Park (FCE), from January 2003 to Present doi:10.6073/pasta/d9cac9a1796bf98284f9df5a2806cd29 Gaiser, Evelyn (2017)	Primary Production
Periphyton data collected from Northeast Shark Slough, Everglades National Park (FCE) from September 2006 to 2008 doi:10.6073/pasta/03e9d26feab9b1eb156477057aa587b7 Gaiser, Evelyn (2009)	Primary Production
Periphyton data from LTER Caribbean Karstic Region (CKR) study in Yucatan, Belize and Jamaica (FCE) during 2006, 2007, 2008 doi:10.6073/pasta/f3a6a99aa7dacb1d338cf2d6d1698482 Gaiser, Evelyn (2012)	Primary Production
Periphyton, hydrological and environmental data in a coastal freshwater wetland (FCE), Florida Everglades National Park, USA (2014-2015) doi:10.6073/pasta/4e6dc2b1aab5c02c224a27c2eaff2e82 Mazzei, Viviana; Gaiser, Evelyn (2018)	

FCE Datasets Published in the EDI Data Repository (Title, DOI, Creators, and Date of Publication)	**Core Area**
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 doi:10.6073/pasta/6cd7783c4871eaf3527ab177deacd035 Troxler, Tiffany; Childers, Daniel (2008)	Primary Production
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 doi:10.6073/pasta/6b1a16e33753fdd17053c94d3e69c044 Troxler, Tiffany; Childers, Daniel (2005)	Primary Production
Periphyton Nutritional Data across the freshwater Everglades (FCE): June 2016-Feb 2017 doi:10.6073/pasta/70cdfca241ed9dffefdb7b3608d20ef1 Trexler, Joel; Sanchez, Jessica (2018)	Populations
Periphyton Productivity from the Shark River Slough and Taylor Slough, Everglades National Park (FCE), from October 2001 to Present doi:10.6073/pasta/f828681aee80f5cdf2ec7800a7266be9 Gaiser, Evelyn (2018)	Primary Production
Physical and Chemical Characteristics of Soil Sediments from the Shark River Slough and Taylor Slough, Everglades National Park (FCE) from August 2004 to Present doi:10.6073/pasta/b5b9528aa9e1f8c85b96091c4c90a945 Chambers, Randy; Russell, Timothy (2017)	Organic Matter
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 doi:10.6073/pasta/da883a9edecd3c2a2be661531b16a780 Jaffe, Rudolf (2006)	Organic Matter
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 doi:10.6073/pasta/07272b339cff887abca38b8676789a56 Jaffe, Rudolf (2006)	Organic Matter
Physical Characteristics and Stratigraphy of Deep Soil Sediments from Shark River Slough, Everglades National Park (FCE) from 2005 and 2006 doi:10.6073/pasta/43f9e2156680db7372e8ad4db497eb0d Saunders, Colin (2011)	Organic Matter

FCE Datasets Published in the EDI Data Repository (Title, DOI, Creators, and Date of Publication)	**Core Area**
Physical Hydrologic Data for the National Audubon Society's 16 Research Sites in coastal mangrove transition zone of southern Florida (FCE) from November 2000 to Present doi:10.6073/pasta/995902ba06bad81c9696381907db5e54 Lorenz, Jerry (2017)	Disturbance
Pond Cypress C-111 Basin, Everglades (FCE), South Florida Dendroisotope Data from 1970 to 2000 doi:10.6073/pasta/9e929b1d4c7ab02e3afd12652391f3a3 Anderson, William (2012)	Disturbance
Precipitation from the Shark River Slough, Everglades National Park (FCE), South Florida from November 2000 to Present doi:10.6073/pasta/9d61464601c0a485e067d462456a2262 Price, Rene; Childers, Daniel (2017)	Disturbance
Precipitation from the Taylor Slough, Everglades National Park (FCE), South Florida from July 2000 to Present doi:10.6073/pasta/865e4fb2913f6e9d7a9a9cf14a599bf5 Troxler, Tiffany; Childers, Daniel (2017)	Disturbance
Precipitation from the Taylor Slough, just outside Everglades National Park (FCE), South Florida from August 2000 to December 2006 doi:10.6073/pasta/6581a4898452afd4bc1f6665b44aeb4f Troxler, Tiffany; Childers, Daniel (2008)	Disturbance
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:10.6073/pasta/22916d1d52d8a756020b8c7537b1bd87 Jaffe, Rudolf (2005)	Organic Matter
Radiation measurements at Key Largo Ranger Station, South Florida (FCE) for July 2001 doi:10.6073/pasta/7682f3f1180f6048716b39531328a0b4 Barr, Jordan; Fuentes, Jose; Zieman, Joseph (2002)	Disturbance
Radiometric Characteristics of Soil Sediments from Shark River Slough, Everglades National Park (FCE) from 2005 and 2006 doi:10.6073/pasta/c0cb8ff0f150e429674ecf0db15bedc5 Saunders, Colin (2011)	Disturbance
Rainfall Stable Isotopes collected at FIU-MMC (FCE), Miami Florida, from October 2007 to Present doi:10.6073/pasta/bc089cfb2ae5f53b84a8f2cbe30aa453 Price, Rene (2018)	Inorganic Nutrients

FCE Datasets Published in the EDI Data Repository (Title, DOI, Creators, and Date of Publication)	**Core Area**
Relative Abundance Diatom Data from Periphyton Samples Collected for the Comprehensive Everglades Restoration Plan (CERP) Study (FCE) from February 2005 to November 2014 doi:10.6073/pasta/cb0f7e88d28075a6ff1f59d008bb732c Gaiser, Evelyn (2017)	Primary Production
Relative Abundance of Soft Algae from the Comprehensive Everglades Restoration Plan (CERP) Study (FCE) from February 2005 to November 2014 doi:10.6073/pasta/6e16b97781030e670fd94221ac812f5d Gaiser, Evelyn (2017)	Primary Production
Rubisco limited photosynthesis rates of Red mangrove leaves at Key Largo, Watson River Chickee, Taylor Slough, and Little Rabbit Key, South Florida (FCE) from July 2001 to August 2001 doi:10.6073/pasta/6a3a958ec35ea159a935be9ceb214fe8 Barr, Jordan; Fuentes, Jose; Zieman, Joseph (2002)	Primary Production
Sawgrass Above and Below Ground Total Nitrogen and Total Carbon from the Shark River Slough, Everglades National Park (FCE), from September 2002 to Present doi:10.6073/pasta/2cbb4ca68b40f95b4cd5048f82b38268 Gaiser, Evelyn; Childers, Daniel (2018)	Primary Production
Sawgrass Above and Below Ground Total Nitrogen and Total Carbon from the Taylor Slough, Everglades National Park (FCE), South Florida for March 2002 to Present doi:10.6073/pasta/792a7c68dfb410462bbedac3549a6c51 Troxler, Tiffany; Childers, Daniel (2017)	Primary Production
Sawgrass Above and Below Ground Total Phosphorus from the Shark River Slough, Everglades National Park (FCE), from September 2002 to Present doi:10.6073/pasta/2df4470a7df2480ed15a311d976c19f3 Gaiser, Evelyn; Childers, Daniel (2018)	Primary Production
Sawgrass Above and Below Ground Total Phosphorus from the Taylor Slough, Everglades National Park (FCE), South Florida for March 2002 to Present doi:10.6073/pasta/5609c84fe54d7ceab4cd755c5cde0c08 Troxler, Tiffany; Childers, Daniel (2017)	Primary Production
Sawgrass above ground biomass from the Shark River Slough, Everglades National Park (FCE), South Florida from November 2000 to Present doi:10.6073/pasta/b28039119d1a48d51ee9563343b341f7 Gaiser, Evelyn; Childers, Daniel (2017)	Primary Production

FCE Datasets Published in the EDI Data Repository (Title, DOI, Creators, and Date of Publication)	**Core Area**
Sawgrass above ground biomass from the Taylor Slough, Everglades National Park (FCE), South Florida from August 1999 to Present doi:10.6073/pasta/247ce69e445fb7b80c64c51d9eccbb92 Troxler, Tiffany; Childers, Daniel (2017)	Primary Production
Sawgrass above ground biomass from the Taylor Slough, just outside Everglades National Park (FCE), South Florida from October 1997 to December 2006 doi:10.6073/pasta/e6640b978d38e54d88f2231ebc7db92d Troxler, Tiffany; Childers, Daniel (2008)	Primary Production
Seagrass Epiphyte Accumulation for Florida Bay, South Florida (FCE) from December 2000 to September 2001 doi:10.6073/pasta/2bf2a1f1d9c7904b12b137ba58956203 Frankovich, Thomas (2004)	Primary Production
Seagrass Epiphyte Accumulation: Epiphyte Loads on Thalassia testudinum in Rabbit Key Basin, Florida Bay (FCE) from March 2000 to April 2001 doi:10.6073/pasta/5aadc198730a74b48ae27b6c1e11f3a8 Frankovich, Thomas (2004)	Primary Production
Seasonal Electrofishing Data from Rookery Branch and Tarpon Bay, Everglades National Park (FCE) from November 2004 to Present doi:10.6073/pasta/ed3febe89ff59f68ae2aedf6c87b7eff Rehage, Jennifer (no Pub date; non-FCE-funded research)	Populations
Sediment Elevation Change (Feldspar Marker Horizon Method) from Northeastern Florida Bay (FCE) from 1996 to Present doi:10.6073/pasta/1755e84862607d90e33bcefe6ce997e2 Coronado, Carlos A; Sklar, Fred (2017)	Organic Matter
Sediment Elevation Change (SET Method) from Northeastern Florida Bay (FCE) from 1996 to Present doi:10.6073/pasta/0edc80f91191e66eea6b4b0ebd407a0d Coronado, Carlos A; Sklar, Fred (2017)	Organic Matter
Shark catches (longline), water temperatures, salinities, and dissolved oxygen levels, and stable isotope values in the Shark River Slough, Everglades National Park (FCE) from May 2005 to Present doi:10.6073/pasta/c4cb7d543f468f982a5c146f4c3950e6 Heithaus, Michael; Matich, Philip (2018)	Populations
Soil Characteristic and Nutrient Data from the Taylor Slough, within Everglades National Park (FCE), from March 2002 to April 2004 doi:10.6073/pasta/6040a745baed01378e215c8070d0126d Troxler, Tiffany; Childers, Daniel (2005)	Inorganic Nutrients

FCE Datasets Published in the EDI Data Repository (Title, DOI, Creators, and Date of Publication)	**Core Area**
Soil Characteristics and Nutrient Data from the Shark River Slough, within Everglades National Park (FCE), from March 2003 to March 2004 doi:10.6073/pasta/b159b26b251d40494258f3d4430f4dfc Troxler, Tiffany; Childers, Daniel (2005)	Inorganic Nutrients
Soil Physical Data from the Shark River Slough, Everglades National Park (FCE), from November 2000 to January 2007 doi:10.6073/pasta/903576c777c0b7dc6bf87cd86f9fbc05 Troxler, Tiffany; Childers, Daniel (2008)	Organic Matter
Soil Physical Data from the Taylor Slough, just outside Everglades National Park (FCE), from October 1998 to October 2006 doi:10.6073/pasta/81e0fc75f420c948340b17715a4d78a5 Troxler, Tiffany; Childers, Daniel (2008)	Organic Matter
Soil Physical Data from the Taylor Slough, within Everglades National Park (FCE), from September 1999 to November 2006 (2008) doi:10.6073/pasta/ac54452865f50d6ca972a4c196522e4f Troxler, Tiffany; Childers, Daniel	Organic Matter
Standard Lengths and Mean Weights for Prey-base Fishes from Taylor River and Joe Bay Sites, Everglades National Park (FCE), South Florida from January 2000 to April 2004 doi:10.6073/pasta/73c32ad91eddd1843338e4081754d41e Lorenz, Jerry (no Pub date; non-FCE-funded dataset)	Populations
Stationary camera observations, set, and environmental data from Shark Bay Marine Park, Western Australia from July 2011 to June 2012 doi:10.6073/pasta/351008458935802ef0436d43bfb487ba Heithaus, Michael; Bessey, Cindy (2019; Dissertation data)	Populations
Subsurface Water Temperatures taken in Shark River Slough and Taylor Slough, Everglades National Park, South Florida (FCE) from May 2010 to December 2015 doi:10.6073/pasta/56a7c2c88e4e20dc8c2b0100c3de9a1d Rains, Mark (2016)	Populations
Surface Water Quality Monitoring Data collected in South Florida Coastal Waters (FCE) from June 1989 to Present doi:10.6073/pasta/15a68e643d4c359a8c62efe1099b508f Briceno, Henry (2018)	Inorganic Nutrients
Temperatures, salinities, and dissolved oxygen levels in the Shark River Slough, Everglades National Park (FCE LTER), from May 2005 to Present doi:10.6073/pasta/b6a32d593cf8810a59a4ff519358ef8e Heithaus, Michael; Matich, Philip; Rosenblatt, Adam (2016)	Populations

FCE Datasets Published in the EDI Data Repository (Title, DOI, Creators, and Date of Publication)	**Core Area**
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 doi:10.6073/pasta/bf798892c1105cb3a157f7132165c732 Frankovich, Thomas (2004)	Primary Production
Trophic transfer of Everglades marsh consumer biomass to Everglades Estuaries (FCE), Everglades National Park, South Florida from December 2010 to Present doi:10.6073/pasta/bb567fd4066fa2866419a1a200a89c92 Rehage, Jennifer (no Pub date; non-FCE-funded research)	Primary Production
Water flow velocity data, Shark River Slough (SRS) near Black Hammock island, Everglades National Park (FCE), South Florida from October 2003 to 2009) doi:10.6073/pasta/d14efe4f113f59a36e4af3c63041ec3b Price, Rene (2009)	Disturbance
Water flow velocity data, Shark River Slough (SRS) near Chekika tree island, Everglades National Park (FCE) from January 2006 to Present doi:10.6073/pasta/e70c047df7e633bbd88afd4d258796af Price, Rene (2017)	Disturbance
Water flow velocity data, Shark River Slough (SRS) near Frog City, south of US 41, Everglades National Park (FCE) from October 2006 to July 2009 doi:10.6073/pasta/eb350d627455e94f0566adea2a7c65e8 Price, Rene (2009)	Disturbance
Water flow velocity data, Shark River Slough (SRS) near Gumbo Limbo Island, Everglades National Park (FCE) from October 2003 to Present doi:10.6073/pasta/30fb9294438795c61ea879abab696bf5 Price, Rene (2017)	Disturbance
Water flow velocity data, Shark River Slough (SRS) near Satinleaf Island, Everglades National Park (FCE) from July 2003 to December 2005 doi:10.6073/pasta/c63a5d588755fa961bcd0dfc041e6d19 Price, Rene (2009)	Disturbance
Water Levels from the Shark River Slough and Taylor Slough, Everglades National Park (FCE), South Florida from May 2001 to Present doi:10.6073/pasta/d241ada3c2dafac1a6b10e5d947c3f35 Rivera-Monroy, Victor; Castaneda, Edward (2018)	Disturbance
Water Levels from the Shark River Slough, Everglades National Park (FCE), South Florida from October 2000 to Present doi:10.6073/pasta/d756577ebf1b9a2bad4aea1b6c594787 Price, Rene; Childers, Daniel (2017)	Disturbance

FCE Datasets Published in the EDI Data Repository (Title, DOI, Creators, and Date of Publication)	**Core Area**
Water Levels from the Taylor Slough, Everglades National Park (FCE), South Florida from August 1999 to Present doi:10.6073/pasta/c66a3111977828c21b6fa31cc9d25bcf Troxler, Tiffany; Childers, Daniel (2017)	Disturbance
Water Levels from the Taylor Slough, Everglades National Park (FCE), South Florida from April 1996 to September 2012 doi:10.6073/pasta/c6f897f83cf418015657eab9bcc4a6b4 Troxler, Tiffany; Childers, Daniel (2013)	Disturbance
Water Levels from the Taylor Slough, just outside the Everglades National Park (FCE), South Florida from October 1997 to December 2006 doi:10.6073/pasta/2bb421d19f71704ed7476ca128bacb72 Troxler, Tiffany; Childers, Daniel (2008)	Disturbance
Water Quality Data (Extensive) from the Shark River Slough, Everglades National Park (FCE), from October 2000 to Present doi:10.6073/pasta/32826025b5f61d967f80aa502c712e1a Gaiser, Evelyn; Childers, Daniel (2017)	Inorganic Nutrients
Water Quality Data (Extensive) from the Taylor Slough, Everglades National Park (FCE), from April 1996 to Present doi:10.6073/pasta/c3971619b22e1ded0f9a258e95f4e2a7 Troxler, Tiffany (2017)	Inorganic Nutrients
Water Quality Data (Extensive) from the Taylor Slough, Everglades National Park (FCE), South Florida from July 1999 to Present doi:10.6073/pasta/691c0c43bb31f494daf9c7cdd5503071 Troxler, Tiffany (2017)	Inorganic Nutrients
Water Quality Data (Extensive) from the Taylor Slough, just outside Everglades National Park (FCE), from August 1998 to December 2006 doi:10.6073/pasta/3a668167984681792eb010cd334d19af Troxler, Tiffany; Childers, Daniel (2008)	Inorganic Nutrients
Water Quality Data (Grab Samples) from the Shark River Slough, Everglades National Park (FCE), from May 2001 to Present doi:10.6073/pasta/494e64e9c51e979df3ea9e0f39874a6d Gaiser, Evelyn; Childers, Daniel (2017)	Inorganic Nutrients
Water Quality Data (Grab Samples) from the Taylor Slough, Everglades National Park (FCE), from May 2001 to Present doi:10.6073/pasta/bcdd358fd32d2c0b8c5e3cc8951545a4 Troxler, Tiffany; Childers, Daniel (2017)	Inorganic Nutrients

FCE Datasets Published in the EDI Data Repository (Title, DOI, Creators, and Date of Publication)	**Core Area**
Water Quality Data (Grab Samples) from the Taylor Slough, Everglades National Park (FCE), South Florida from September 1999 to Present doi:10.6073/pasta/e5993c51cbcd81faf14faf986a8024f2 Troxler, Tiffany (2017)	Inorganic Nutrients
Water Quality Data (Grab Samples) from the Taylor Slough, just outside Everglades National Park (FCE), for August 1998 to November 2006 doi:10.6073/pasta/cd96927a753e84af3d9d2a07b02fa322 Troxler, Tiffany; Childers, Daniel (2008)	Inorganic Nutrients
Water Quality Data (Porewater) from the Shark River Slough, Everglades National Park (FCE), from January 2001 to Present doi:10.6073/pasta/d4828e6bf3f27761065392f428a49f0c Gaiser, Evelyn; Childers, Daniel (2017)	Inorganic Nutrients
Water Quality Data (Porewater) from the Taylor Slough, Everglades National Park (FCE), South Florida from September 1999 to December 2006 doi:10.6073/pasta/d4e923e473d693cce2a896d82348e112 Troxler, Tiffany; Childers, Daniel (2008)	Inorganic Nutrients
Water Quality Data (Porewater) from the Taylor Slough, just outside Everglades National Park (FCE), from August 1998 to October 2006 doi:10.6073/pasta/1c4f9019e3dc4306b17a067f455430ad Troxler, Tiffany; Childers, Daniel (2008)	Inorganic Nutrients
Water, Soil, Floc, Plant Total Phosphorus, Total Carbon, and Bulk Density data (FCE) from Everglades Protection Area (EPA) from 2004 to 2016. doi:10.6073/pasta/f66a58d857b76740e03c3c48da16cc73 Sarker, Shishir (2018)	Inorganic Nutrients; Organic Matter
Water Temperature measured at Shark River, Everglades National Park (FCE) from July 2007 to June 2011 doi:10.6073/pasta/a50dd41d188c25bc122deee65c2c73a9 Rosenblatt, Adam (2012)	Populations; Disturbance
Water Temperature measured at Shark River, Everglades National Park (FCE) from October 2007 to August 2008 doi:10.6073/pasta/274fb25dec72d09d8226f147cdfbecb1 Rosenblatt, Adam (2008)	Populations: Disturbance
Water Temperature, Salinity and other physical measurements taken at Shark River, Everglades National Park (FCE) from February 2010 to March 2014 doi:10.6073/pasta/65bf262c4bfd8ab956effc63f920c4d3 Rosenblatt, Adam (2014)	Populations; Disturbance