Florida Coastal Everglades (FCE)

The Florida Coastal Everglades (FCE) LTER site was established in 2000 when NSF expanded the LTER network to include 3 new coastal sites. The Florida Coastal Everglades LTER Program (FCE) is located in south Florida, where a rapidly growing human population of over 6 million people live in close proximity to—and in surprising dependence upon—the Florida Everglades. The FCE site is entirely within the bound-aries of Everglades National Park, the third largest wilderness in the continental United States. The FCE LTER program is based at Florida International University in Miami, Florida, and includes over 50 senior scientists and 40 students from 16 institutions.

Site description and characteristics

The Everglades is quite young, having been formed in the last 5000 years during the Holocene climate stabilization, as the southern Florida peninsula became steadily wetter. Everglades National Park covers approximately 6110 km^2 of south Florida and is part of the greater Everglades ecosystem which extends north to Lake Okeechobee and the Kissimmee River. The region experiences a dry season from November to May and a wet season from June to October. Annual precipitation averages 155 cm, with a dry season average of 45 cm and a wet season average of 115 cm. Temperatures average 19°C in January and 27.5°C in July. The elevation gradient in the Everglades is minute but significant; water flows to the estuaries from an elevation of approximately 2 meters at the northern boundary of Everglades National Park. Since the coastal Everglades covers a large area that is [effectively] topographically flat, it is thus susceptible to dramatic transgressive changes in response to sea level rise. Hurricanes and storms are common, and add "pulse" disturbance features to this slow "press" of rising sea level.

Mangroves in Taylor River

FCE sites occur along transects oriented with the natural flow of water in Everglades National Park's two main drainage basins: Shark River Slough and Taylor Slough. The transects include freshwater marsh (a mosaic of sawgrass ridges, sloughs, and tree islands) at the upstream end and estuarine mangroves and seagrass estuary ecosystems at the downstream end. Peat soils are common in freshwater Shark River Slough and tree islands, while Taylor Slough tends to have marl soil. Oligotrophy is a defining characteristic of FCE, and FCE estuaries are biogeochemically "upside down" because the source of limiting nutrients is the ocean, not the watershed.

Research focus

FCE research focuses on population and ecosystem dynamics in the oligohaline ecotone regions of Taylor Slough and Shark River Slough, where freshwater and estuarine ecosystems meet. The overarching theme of FCE is: In the coastal Everglades landscape, population and ecosystem-level dynamics are controlled by the relative importance of water source, water residence time, and local biotic processes. This phenomenon is best exemplified in the oligohaline ecotone, where these three factors interact most strongly and vary over many

temporal and spatial scales. FCE researchers are investigating the hydrologic, climatological, and human drivers that affect oligohaline ecotone dynamics, as well as the processes that regulate biophysical inputs to the ecotone from upstream freshwater Everglades marshes and the estuary proper.

Human impacts and Everglades restoration

Freshwater Shark River Slough

Human influence on the Everglades became significant only about 100 years ago. At that time, there were fewer than 2000 non-native people living in south Florida, while today there are over 6 million. Over the last century, human activity has dramatically altered the Everglades, reducing it to half its original extent and compartmentalizing the remaining system with over 2500 km of canals and levees. Over 95% of the people living in south Florida get their drinking water from the shallow Biscayne aquifer, which is recharged in near real time by the Everglades. A primary focus of Everglades Restoration (a 20 year, $8 billion rehabilitation based on a state and federal partnership) is to return the remaining Everglades to a healthy and stable state so that it can continue to provide critical ecosystem services. Human activities tied to water management and Everglades Resto-ration directly affect both freshwater and groundwater inputs. The FCE LTER site is thus an excellent laboratory for understanding how coastal ecosystem dynamics respond to, and influ-ence, human activities in the coastal zone.