

A POWERFUL PARTNERSHIP FOR America's Everglades

Everglades Foundation & FIU Partnership Newsletter 2016

FIU FOREVERGLADES FELLOWS

WHERE ARE THEY NOW?

► lorida International University and the Everglades Foundation form a powerful partnership for protecting and restoring the Everglades. With the generous support from donors, FIU's School of Environment, Arts and Society (SEAS) and the Everglades Foundation are able to provide scholarships and fellowships to full-time FIU graduate students pursuing Everglades restoration-related research. The FIU ForEverglades Scholarship awards up to \$20,000 to Ph.D. students and up to \$10,000 to master's degree students.

Since 2008, we have supported 14 students conducting cutting-edge scientific research that informs policy and management decisions and engages the public to ultimately protect and restore America's Everglades. Our support allows students to conduct research critical to Everglades restoration and prepare for careers in environment restoration and conservation fields.

ForEverglades fellow Sylvia Lee has been recognized for her work in identifying three new species of algae in the Everglades and is now continuing her research at the U.S. Environmental Protection Agency (EPA). For Sylvia, the scholarship was critical in helping her understand how important algae are for monitoring and protecting our water resources. She adds, "at the EPA, I am excited to apply my knowledge and skills to make an impact on current water quality issues."

Another fellow making waves within the federal government is Jay Munyon. The ForEverglades scholarship helped him explore the roles of phosphorus and hydroogy as drivers of productivity in the Everglades ecosystem. Jay is now employed by the U.S. Department of Agriculture (USDA) working to reduce agricultural nutrient runoff by studying the use of agricultural byproducts to improve agricultural competitiveness and sustainability for farmers.

Paying it forward: The results of these students' work have led to further investigations by other graduate students. In addition, students supported through this program have extended the scope of their work by participating in multiple education and outreach events.



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O STUDENTS CONTINUE THEIR EVERGLADES RESEARCH AT FIU

STUDENTS ARE PAYING-IT-FORWARD THROUGH COMMUNITY OUTREACH





FIU FOREVERGLADES: FELLOWS HIGHLIGHTED

Through the FIU ForEverglades Scholarship, current FIU Ph.D. student Sean Charles (pictured right) is examining the effects of sea level rise on inland mangrove migration in the Everglades ecosystem. His research will provide a greater insight into the influence of saltwater intrusion on coastal wetlands and the important ecosystem services they provide.

Sean's favorite part of gathering scientific data is being able to spend time in the Everglades and have access to hard-to-reach sites. The ForEverglades support is enabling Sean to apply cutting edge tools like radio carbon dating and



remote sensing technology to track the pace of coastal wetland migration due to sea level rise, in order to guide restoration efforts.

To pay it forward, Sean is working with K-12 students in Collier and Miami-Dade counties in a coastal plant restoration project. The project, dubbed "Marsh-Mangroves," allows students to grow mangrove seedlings to be planted at local restoration sites.



Another current fellow, Mustafa Kamal Sikder (pictured left), also wants more people to engage in Everglades restoration efforts. The FIU master's student is examining Floridians' opinions on the various benefits they currently enjoy from the Everglades, including water purification, storm protection, recreational opportunities and wildlife habitat. Through the ForEverglades scholarship, he also wants to explore their opinions about restoring it. "Policy decisions that have a direct or indirect impact on people requires knowing the public's preference to ensure its sustainability," said Mustafa. He hopes that his research will serve as an important step in aligning perceptions with restoration efforts by providing policymakers important insights to reduce conflict and facilitate project implementation.

Both FIU ForEverglades Fellows agreed that actively engaging the public in restoration projects will help people better understand the importance of environmental conservation efforts. Sean adds, "Many students in our area see coastal wetlands on a daily basis but don't realize

how vital they are for the ecosystem. Hopefully through science, we can make a small positive change in our environment and a big impact in students' understanding and engagement with the natural world."



SOUTH FLORIDA ESTUARIES IN DECLINE



► lorida Bay is a shallow estuary between the Florida Keys and the southernmost tip of the Florida peninsula (see map). It is the epicenter of the largest contiguous seagrass bed in the world and is surrounded by one of the largest mangrove forests in North America. Florida Bay is home to the most important wintering shorebird habitat in North America and is renowned for being the Fishing Capital of the World.

A defining characteristic of estuaries, Florida Bay and the Caloosahatchee and St. Lucie estuaries to the north, all depend on a balance of fresh and ocean water to maintain a healthy habitat for fish and shellfish. These estuaries are hotspots of ecological, recreational and economic significance to the state.

Freshwater inflows to Florida Bay come from the Everglades. However, because of decades of drainage and overdevelopment, the Everglades is no longer connected to Lake Okeechobee. Today, Everglades National Park is dependent on precipitation to provide Florida Bay with sufficient fresh water. To the north, the Caloosahatchee and St. Lucie estuaries have the opposite problem. Unnatural discharges of polluted fresh water from Lake Okeechobee are destroying estuarine seagrass and oyster habitat in both these Northern estuaries and along the east and west coast of Florida. Historically, this water was clean and would flow through the Everglades all the way to Florida Bay.

Following a drought in 2015, Florida Bay went several months with no fresh water from the Everglades. The combination of low inflow and drought conditions drove salinity levels in the bay to record-high levels. In July, a "yellow fog" was spotted in an area that would later exhibit seagrass die-off, and by October, large-scale seagrass die-off was documented along with localized fish kills, mangrove dieback and spotty algae blooms.

Currently, the estimated area of seagrass die-off is 50,000 acres and growing, approaching 10 percent of the total bay area. Based on observations from a similar seagrass die-off event in the late 1980s, last year's event may trigger a years-long algae bloom that could have a lasting impact on seagrass habitat and fisheries in Florida Bay.



SOUTH FLORIDA ESTUARIES IN DECLINE CONTINUED...

By the end of 2015, record high rainfall across South Florida led to dangerously high water levels in Lake Okeechobee, threatening the integrity of the Herbert Hoover Dike and triggering regulatory releases of fresh water to the Caloosahatchee and St. Lucie rivers. Nearly 340 billion gallons of polluted lake water have been discharged to the estuaries, killing seagrass and oyster habitat and, more recently, leading to health advisories over the quality of the water. To make matters worse, these polluted releases may persist throughout 2016 as the wet season approaches.



Symptoms of trouble in Florida Bay caused by extremely low inflow of freshwater to the Everglades in 2015. Sources counter clock wise from upper left: National Park Service, National Oceanic and Atmospheric Administration, Fish and Wildlife Commission, Florida Audubon.

At this point, there is nothing we can do but try to nurture Florida Bay back to health by restoring the freshwater flow from the Everglades. The lost seagrass habitat may take years to recover, or even more due to persistent algae blooms. This is a critical topic in need of further scientific investigation. For the Caloosahatchee and St. Lucie estuaries, restoring water flow south back to the Everglades will reduce the need for these regulatory discharges and provide much-needed fresh water for Florida Bay. Recovery from this year's discharges will take time-likely years. There are no shortterm solutions for these problems, but the long-term solution is known - completing the Comprehensive

Everglades Restoration Plan, which will alleviate discharges to the Caloosahatchee and St. Lucie estuaries and send that water south to be cleaned through Stormwater Treatment Areas before being discharged into the Everglades and, ultimately, Florida Bay.

A video describing the Florida Bay seagrass die-off and its impact on recreational fishing and the Florida Keys ecology and economy was developed in partnership with the Everglades Foundation and FIU's Dr. Jim Fourqueran, a renowned seagrass expert. The video and supplemental information are available at: www.evergladesfoundation.org/floridabay

OBAMA'S EARTH DAY ADDRESS IN THE EVERGLADES



On Earth Day 2015, President Obama chose Everglades National Park as the location to discuss risks of climate change and ways in which his administration is addressing the issue. The Everglades was described as being "ground zero" for vulnerability and solutions-oriented work to address risks of sea level rise. He took to the podium to remind the crowd of the importance of preservation, noting the immediate need for large-scale restoration efforts to move more clean water into the Everglades to sustain our natural resources.

Following his speech, the president met with FIU researchers and Everglades Foundation leaders and introduced plans for educating the public, outlining federal commitments for moving the restoration forward.



FUTURE PROJECTS: THE WESTERN BASINS

n collaboration with Drs. Melodie Naja and Yogesh Khare from the Everglades Foundation, Prof. Todd Crowl from FIU's Southeast Environmental Research Center (SERC; sercweb.fiu.edu) is working on a project to assess water quality in two basins located west of the Everglades. The L-28 and Feeder Canal Basins (also called "Western" Basins), located in Hendry and Collier Counties, cover a total area of about 141,000 acres and discharge flows and phosphorus to Water Conservation Area (WCA)-3A. Portions of the Seminole and Miccosukee Indian reservations are located within this basin.

The Western Basins mainly consist of agricultural lands, pastures and wetlands (Figure 1). Runoff with high phosphorus levels is reaching the canals and discharging into WCA-3A. During the last 5 years, the Western Basins contributed an average of 10 metric tons per year of phosphorus to the Everglades ecosystem, representing 33 percent of the total surface phosphorus load to WCA-3A. Water flowing from the Western Basins into the Everglades Protection Area has an average phosphorus level of 55 parts-per-billion, the highest level currently reaching WCA-3A. This has led to ecosystem degradation and the spread of invasive species immediately downstream of the canal inflow point (Figure 2).

Lack of monitoring is often cited as the main reason for stalled progress in addressing high phosphorus loads flowing into WCA-3A from the Western Basins. This is why FIU will be investing two years into monitoring the basin. In partnership with the university, scientists at the Everglades Foundation will oversee simulation of water flow and quality in the Western Basins to identify and quantify phosphorus sources and test agricultural best management practices and their impact on the outlet phosphorus levels. This powerful collaboration will help prioritize the projects needed to improve water quality of the Western Basins and the Everglades.



Figure 1. Land use classification of the Western Basins.



Figure 2. Ecosystem impacts from phosphorus flowing out of the Western Basins

GREAT STRIDES FOR DR. RUDOLF JAFFÉ, GEORGE M. BARLEY, JR. ENDOWED CHAIR

Kudolf Jaffé—the George M. Barley, Jr. Endowed Chair at FIU—and his students have made great strides through this endowed support. Funds were used to sponsor graduate student researchers and visiting scientists, while providing travel support for presenting and disseminating new findings. Dr. Jaffé notes that "the financial support has significantly improved the productivity of my research group, and thus of FIU, over the years."

In 2015, Dr. Jaffé was granted the Florida Coastal Everglades Collaborator of the Year Award for his leadership and service to Everglades research. His group also produced a record 19 publications in the same year!

The research group has expanded their work on the effect of fire on aquatic biogeochemistry (initially developed in the Everglades) and added additional study sites in Alaska and Colorado. The goal of the Barley Chair is to support research activities largely focused on the Everglades; but by applying innovative approaches to study landscape effects on rivers worldwide, it has expanded the significance of the Barley Chair to a global scale.



EVERGLADES FOUNDATION & SERC 20TH ANNIVERSARY





he powerful partnership for the Everglades formed by FIU and the Everglades Foundation has been at work making significant impacts for more than two decades. In the early 1990s FIU established its framework for conducting research to inform policy and management decisions, while at the same time the Everglades Foundation was conceived.

In 1993, FIU established the Southeast Environmental Research Program in response to the growing regional need for scientific investigations in threatened environments of South Florida. Shortly after, the program grew into a specialized, multi-institutional center, the Southeast Environmental Research Center (SERC), comprised of experts from a variety of disciplines who work together on environmental research efforts in the Southeastern United States.

The Everglades Foundation, established in 1993 by a group of businessmen and women, has led the charge to restore and protect the greater Everglades ecosystem as a venerable science-based organization. Through the advancement of scientifically sound and achievable solutions, the Foundation seeks to halt and reverse the damage inflicted on the ecosystem and provide policymakers and the public with an honest and credible resource to help guide decision-making on complex restoration issues. With a talented staff of 20, the Everglades Foundation is actively engaged in several scientific projects and analyses to improve the Greater Everglades ecosystem from Orlando to Florida Bay.

Since its inception, SERC researchers have provided leadership in many of the most pressing issues confronting our environment and society, including early work that proved instrumental in developing federal limits to excess phosphorus in water discharged into the Everglades. SERC continues to generate data and recommendations on complicated issues including Everglades restoration, water quality monitoring, effects of the Deepwater Horizon oil spill, and threats of tropical storms and sea level rise. As continued population growth and urban development put increased pressure on our ecosystem, the need for information to help understand the ramifications increases exponentially.



EVERGLADES FOUNDATION & SERC 20TH ANNIVERSARY

he Everglades Foundation utilizes scientific information to provide our leaders with defensible and economically feasible solutions to restore the Everglades. FIU's experimental research was crucial for establishing the phosphorus criterion that limits inputs from the Everglades Agricultural Area to the Everglades Protection Area.

The Everglades Foundation also used FIU's phosphorus limit to develop a set of restoration projects to achieve the phosphorus limit at the Stormwater Treatment Areas (STAs) effluent level. More recently, the Everglades Foundation has been focusing its collaborative research on phosphorus with FIU's Professor Chenzhong Li to develop cost-effective detection methodology. In addition, collaborative research with Dr. Tiffany Troxler, John Kominoski, and Evelyn Gaiser is helping to understand the effects of phosphorus enrichment and salt-water intrusion on the sustainability of coastal Everglades habitats.



Arial view of Flume study in 2003

In 2001, SERC received National Science Foundation (NSF) funding to

establish a Long Term Ecological Research program in the Florida Coastal Everglades (FCE LTER) – part of a network of 25 sites across the nation. Today, the program is based at FIU and includes 70 senior scientists and 74 students from 30 institutions who study how different drivers such as hydrology, climate and human activities affect ecosystem and population dynamics in FCE. In addition to fostering research with a long-term perspective, the FCE-LTER allows researchers to study regional restoration problems in a larger ecological context and facilitate expansion of key research ideas to other sites in the Caribbean. It provides a practical training ground for undergraduate and graduate students at FIU and engages K-12 students through extensive educational outreach programming.

Now in its 20th year, SERC is composed of 24 lead faculty who have generated \$90 million in external research support from federal agencies, organizations and the private sector. These research funds are used in part to support the education and training of future scientists and– the next generation of thought leaders who will be instrumental in guiding management decisions and discovering innovations for long-term resilience of our ecosystem.

On the heels of its own 20th anniversary, the Everglades Foundation is focused on developing a cutting-edge restoration plan for the Everglades, which can only be achieved by correcting the mistakes of the past and redirecting water south. The Everglades Foundation policy team has worked tirelessly during the past two years to secure the funding necessary to undertake restoration projects, decrease harmful discharges to St. Lucie and Caloosahatchee estuaries and bring more freshwater to the Everglades and Florida Bay.

Support such as the FIU ForEverglades Scholarship is critical to enabling us to train future scientists and leaders. The joint scholarship program provides another bridge for FIU and the Everglades Foundation to leverage their expertise and shared goals to drive Everglades restoration.



THE EVERGLADES SERVICE-TO-ACTIVISM WORKSHOP



Last October, Bob Graham, former U.S. senator and governor of Florida, and his former press secretary Chris Hand, gathered with advocates, scientists, and public officials to discuss Everglades restoration. FIU was selected by The Bob Graham Center for Public Service to organize the service-to-activism workshop along with the Florida Conservation Coalition, the Everglades Foundation and 1000 Friends of Florida.

Fifty participants listened to presentations on Everglades science, restoration, policy and litigation, and they discussed issues relating to the Florida Water and Land Conservation Initiative. Each participant partnered with a legislator and continues to work with the Graham Center to convey science to these parties as Everglades decisions are made. Jessica Lee, Everglades Foundation scholarship recipient, now recognizes the importance of connecting science to policy and activism and plans to utilize lessons learned in her developing career.

FUND A FELLOW ~ FUND OUR FUTURE

Powerful partnerships are fueled through the shared belief and investment of supporters like you. With only one goal, we work together to protect and restore America's Everglades.

Won't you join us and invest in the young minds that will forever benefit this national treasure?



Your gift will directly support these students and their quest to understand, solve and advocate for Everglades restoration solutions.

Gifts to \$ 1,000	Friend of FIU-ForEverglades Fellowship
Gifts to \$ 2,500	Partner of FIU-ForEverglades Fellowship
Gift of \$ 10,000	FIU-ForEverglades Graduate Fellow Benefactor
Gift of \$ 20,000	FIU-ForEverglades Doctorate Fellow Benefactor

As a FIU-ForEverglades Fellowship supporter:

You will have the opportunity to meet with Fellows in the field and learn about their research You will be recognized on the Everglades Foundation and FIU websites as well as in our publications.

For more information on how you can become involved with the Everglades Foundation, contact Gloria Calle, <u>gcalle@evergladesfoundation.org</u> or (786) 249-4419.

For more information on how you can become involved with FIU's School of Environment, Arts and Society (SEAS), contact Camille Polk at <u>camille.polk@fiu.edu</u> or (305) 348-6298.

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