

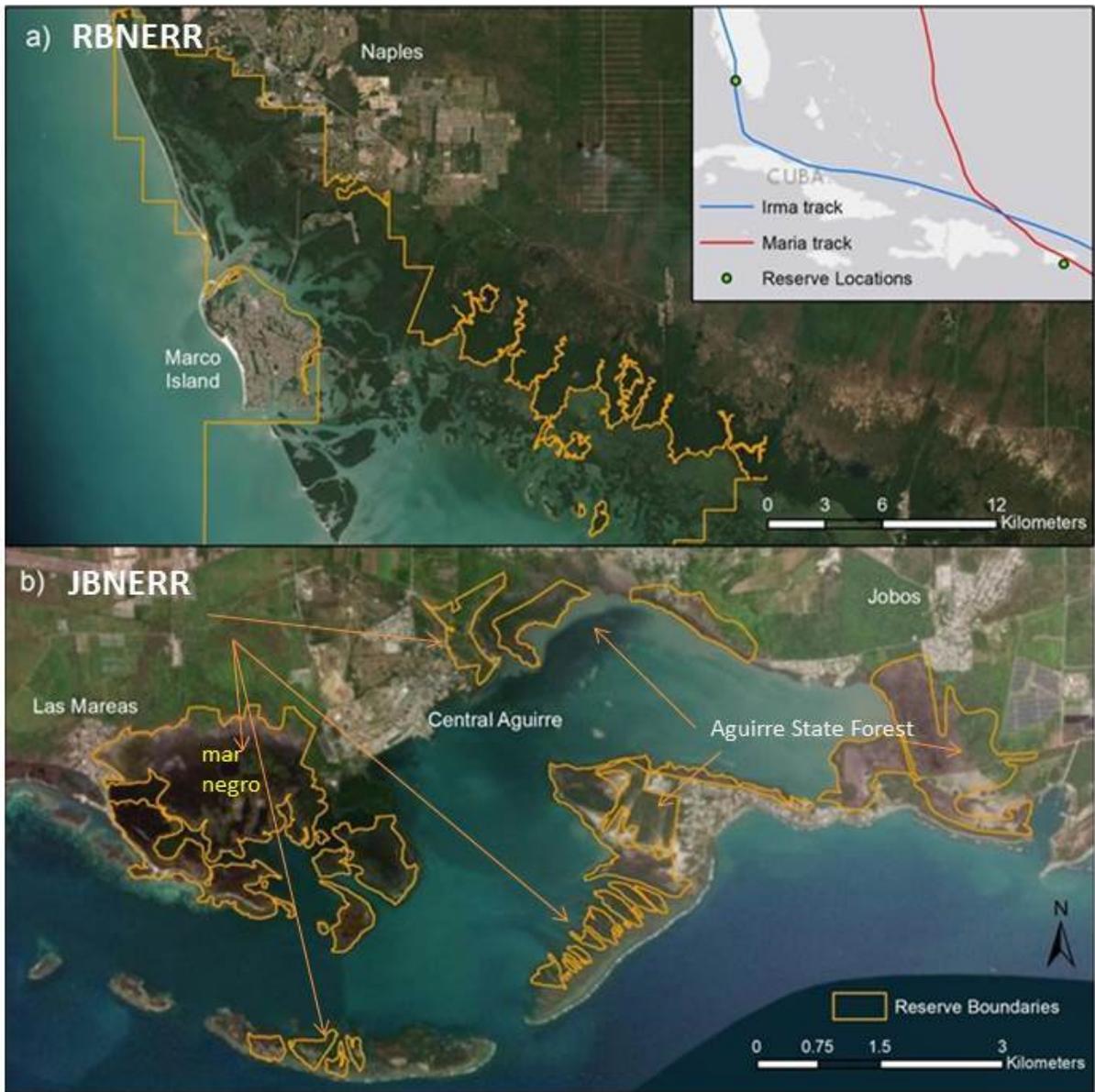
A Collaborative Project Between Jobos Bay National Estuarine Research Reserve and Rookery Bay National Estuarine Research Reserve

By: Michael Barry

It seemed like bad news to the Institute for Regional Conservation's (IRC) research associate Mike Barry when the newly appointed governing board for South Florida Water Management District cut all funding for exotic control in Picayune Strand State Restoration Project. Mike had been a key specialist for exotics identification and mapping for the past 15 years in this part of south Florida. Never one to be idle, Mike used his free time well by saying "yes" to interesting and rewarding volunteer work with a collaborative project between Jobos Bay National Estuarine Research Reserve (JBNERR) in south Puerto Rico and Rookery Bay National Estuarine Research Reserve (RBNERR) in southwest Florida. Both reserves were heavily impacted in the 2017 hurricane season, when Irma hit RBNERR and María damaged JBNERR. The reserves share important ecological similarities, such as dominance of mangroves along the coast; but there are also differences in resource use needs and land use within the watersheds. Since Mike has been a close partner with RBNERR for the past decade and an expert in sub-tropical landscapes, research coordinator Brita Jessen reached out to see if he would be interested in a 10-day trip to scout the post-Maria landscape of south Puerto Rico and compare it with southwest Florida post-Irma.

Jobos Bay NERR is located on the dry south coast of Puerto Rico between the municipalities of Guayama and Salinas within an historic sugarcane farming watershed. <http://www.drna.pr.gov/jbnerr/sobre-nosotros/> Jobos Bay is an estuarine ecosystem with mangroves, coral reefs, seagrass beds and freshwater inputs primarily from underground aquifers. JBNERR is roughly 3,000 acres managed by Puerto Rico Department of Natural and Environmental Resources since designation in 1981 as part of NOAA NERR system, as is RBNERR in Collier County, FL. <https://coast.noaa.gov/nerrs/reserves/jobos-bay.html> .

The scoping work Mike participated in indirectly led into a collaborative three-year proposal made by scientists and coastal managers at RBNERR and JBNERR, Florida International University, the University of South Florida, and Duke University's Nicholas School for the Environment entitled "Resilience of the Mangrove Coast: Understanding Links between Degradation, Recovery, and Community Benefits". The purpose of this project is to better understand how the combined effects of hurricane disturbance, prior land-use legacies (e.g., freshwater hydrological alteration), and climate change in general (changes in precipitation, sea level rise) can lead to irreversible regime shifts, resulting in the loss of mangrove ecosystem functions and the services they provide to the wider community. Mike's contribution to the project team was to help identify similar impacts of acute events (like hurricanes) and long-term stress (like sea level rise) in both reserves.



When Mike arrived at JBNERR to tour the reserve with Research Coordinator Ángel Dieppa and review historic aerial imagery with the Stewardship Coordinator Milton Muñoz, both of whom eagerly included so many details and personal observations along the way, he found similar clues in the landscape compared with southwest Florida: The mangroves of JBNERR have undergone dramatic changes over the past century, including loss of the majority of the basin black mangrove forests in the Mar Negro which were evident on 1936 and 1951 aerial photographs but gradually died off through the 60s through the nineties, replaced by large shallow lagoons which continue to expand today. Mike became

fascinated by these longer-term changes that led to the increasing black mangrove basin die-offs in both JBNERR and RBNERR.

During Mike's visit, the JBNERR staff provided a nearly overwhelming amount of information and stories about the recent history of the reserve, including weather changes and past land use practices in the area that greatly impacted the reserve's natural resources. For example, the uplands within JBNERR's watershed have been highly impacted by intense agriculture and associated industry (processing, shipping) beginning more than a century ago, with peak activity by the famous mainland-U.S. owned "Aguirre company" in the middle of the last century. Indeed, the entire town of Aguirre was created for the sugarcane plantation owners and workers. The result of the intense agriculture not only reduced biodiversity in the uplands, but also impacted the JBNERR estuary (and aquifers upstream) through flood irrigation practices. In the 1990s, when sugar production was almost completely abandoned and other crops with drip irrigation were adopted, the mangrove ecosystem suffered another abrupt hydrological change. This more recent drying out has since been further exacerbated by increasing stress from droughts, including one of the most severe droughts during the summer of 2015, which also affected our own Everglades National Park causing extensive seagrass die-off in Florida Bay. Ángel Dieppa, research coordinator had expressed "It was one of the worst I experienced."

(<https://www.youtube.com/watch?v=eZMFdjoIZdc&fbclid=IwAR1qU47OeSoGH-whxOw9wYaLoloHGhmi3qR6xwLKbllqLsRf9LWsdWOQ4WI>) Such droughts occurring at increased frequency and a general drying of Puerto Rico are predicted by climate models (IPPC reports <https://ipcc.ch>). The altered groundwater salinities in the ecosystems of JBNERR from both natural and human influence, may be critical in understanding the longer term changes and potential stress to the mangroves of the reserve.

Mike became so impassioned during the field visit that he has been dedicating personal time to creating a more detailed vegetation map for JBNERR, with the aid of an ESRI license provided via IRC. Layers will include post María (first step), pre María, 2010, 1951 (1936 instead of 1951 if missing aeriels acquired). These data can be used for larger scale automated work proposed in the collaborative project, but by doing the work Mike is gaining more insight mangrove changes here in Florida. If the collaborative project is funded, Mike will engage as a technical advisor and stakeholder to ensure the team's success.

Mike's ultimate vision is to support a restoration project within JBNERR for the disturbed uplands including primarily invasive exotic control. To that end, he is helping to compile a list of plant species observed on the Reserve and researching methods to control the dominant invasives, which is a critical first step to designing a successful restoration project. Mike has relied on existing documents such as the reserve's management plan and supporting descriptive reports, and the work of George Gann and Carlos Trejo's in Puerto Rico such as the web-based plant list <https://regionalconservation.org/ircs/database/site/IntroPR.asp>, and the Plantas en Puerto Rico Facebook community which helped him identify plants from photos taken on the trip. Mike is dedicated to helping JBNERR restore some of its historical ecology and community services by addressing its extensive invasive plant problem and promoting native plants within the uplands which have been excluded over the past century.

Beyond the natural beauty, it was the people of JBNERR, and Aguirre in general, that most affected Mike. He arrived on a Sunday afternoon to find the reserve's director, Aitza Pabón, busy volunteering with a large group of local children for a Boy Scouts event. He later learned she had devoted much more than a single afternoon over the years and deeply cared about these children, many of whom lived in difficult situations. She cared about the entire community and was a pillar in the neighborhood during and after hurricane María. He was again in awe the first morning at JBNERR accompanying the passionate Ivelisse Rodriguez with her routine bird census which she hopes will continue over the long term and provide useful information relating to the very same ecosystem shifts discussed above. Also, the research coordinator, Ángel Dieppa, has a deep understanding of the area's history, well beyond his expected expertise in marine biology, which he gladly took the time to explain when his very busy work schedule allowed. And of course, the environmental education efforts which are so important for our future generations, led by Ernesto Olivares, were very encouraging, and he too apparently went above and beyond the call of duty following María, as did many at JBNERR.

Mike's partner Sydney Kilgus-Vesely, traveling with him, was also strongly moved by the staff of JBNERR. During the trip, she, with the help of staff members Ivelisse, Waldemar Velez, and José Guilfu, purchased paint and materials to cut and paint wooden wildlife cut outs for use in environmental education at the visitor center. Both Mike and Sydney remain completely "*encantados*" with the reserve and the dedicated, warm, and impressive staff. They hope to bring some of the positive energy felt in Aguirre back to SW Florida, and to help with JBNERR's many challenges any way possible into the future. Since their visit to JBNERR in December of 2019, a major earthquake shook the island, making their already insurmountable challenges stemming mostly from economic hardship and a long history of political inequality.

Photos from the project are provided below:





