



# Junior Scientists Make Waves

THROUGH A PARTNERSHIP BETWEEN HARBOR BRANCH  
OCEANOGRAPHIC INSTITUTE AND INDIAN RIVER LAND TRUST,  
YOUNG MINDS ARE HELPING SHAPE THE FUTURE OF CONSERVATION

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**B**ehind a south Vero Beach housing development lies a hidden world anchored by thick mangroves and wetlands that eventually blend with the Indian River Lagoon. A short walk on a mosquito dike brings me to Dr. Dennis Hanisak, research professor at Florida Atlantic University's Harbor Branch Oceanographic Institute. Hanisak is waiting for a boat to dock, and it soon arrives for the five eager high school students gathered along with their nets, tools and high-tech gear for some scientific field research, the kind normally reserved for graduate students and grant recipients. "These five kids are doing a great job," he says proudly. "Every one of them has been here every week and they all share the load."

Anjaleah from Sebastian River High School passes equipment onto the boat from the dock. "We'll record data on how the seagrass is growing and see how we can possibly

grow more, both for the animals that depend on it and to help clean and oxygenate the water." They bundle into the boat and take off for a uniquely robust seagrass bed just offshore to measure the health and quantity of seagrass species as part of the Junior Scientist Fellows Program, a partnership between Harbor Branch and the Indian River Land Trust. The original 191-acre property, dubbed the Coastal Oaks Preserve, was purchased by the Land Trust in 2011.

The lagoon supports seven species of seagrass, more than any other place in North America, although declines have been marked. The students will take turns in the water, identifying which seagrass species exist there, along with the percentage of coverage, blade and shoot heights and overall canopy height.

Hanisak leads the Junior Scientist Fellows Program,



Griffin and Jose canoe through an impoundment, collecting water samples.



David Heuberger, with Florida Atlantic University's Harbor Branch Oceanographic Institute

**“These team projects provide scientific information needed for conservation and management of the Indian River Lagoon.”**

— DR. DENNIS HANISAK

begun in 2013 to secure research opportunities for exceptional high school students. “These team projects provide scientific information needed for conservation and management of the Coastal Oaks Preserve and the Indian River Lagoon,” he says. Their data will help determine where and how restoration occurs in areas such as the newest part of the Coastal Oaks Preserve, 29 additional acres reaching from the lagoon to U.S. 1 just north of the St. Lucie County line, purchased by IRLT in 2016.

The preserve houses ancient oak trees, bottomland hardwood forests and wetlands. We open the gate from the U.S. 1 side and bump down the dirt road. Hanisak points out a drainage canal running to the lagoon on our left and a large pond to our right. “The Department of Transportation put in this retention pond as part of a mitigation project.” Wading birds sun themselves at the pond’s edge or peek out from high grasses and native lilies, resting between fishing expeditions. “All that runoff and collected fresh water went unchecked into the lagoon before the pond went in. In the early years of the Junior Scientist Fellows Program, the students saw there were water quality issues here,” he says. “The following year, they could demonstrate how the water quality had improved due to the pond’s shore plants and water plants filtering out some of the harmful nutrients like nitrogen and phosphorus.”

Much of the research this year centers around culverts installed to enable tidal exchange of water in existing mosquito impoundments. “The Indian River Mosquito Control District originally formed because there were big clouds of salt marsh mosquitoes back in the 1950s,” explains Ken Grudens, executive director of IRLT. The mention of mosquitoes usually brings to mind standing water, but this particular species needs exposed mud to lay eggs, so impounding water interrupts the mosquitoes’ breeding and reduces their numbers. “In the ‘80s, Mosquito Control realized that isolating these wetlands was detrimental to fish and other marine life,” he says. “They understood they needed a way to allow these fish to come in from the lagoon to escape predation as they grew.” A few culverts were installed and the impoundments were allowed to better ebb and flow with the normal lagoon tides. The Land Trust recognized the importance of installing multiple culverts on its properties and working with Mosquito Control. Funding was obtained for six more culverts within the Coastal Oaks Preserve that are opened from October through April. During mosquito season, lagoon water is pumped into the impoundments and culverts are shut.

The Land Trust met with Harbor Branch to determine the scope of each of this year’s research projects, including three that look at the culverts’ effects. Students from Vero Beach High School, Sebastian River High School and Indian



Anika preserves a  
water sample on ice.

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River Charter High School apply for the program with their teachers' recommendations and may receive school credit for their work. "We wanted to study the Land Trust properties and expose kids to field science," says Grudens. "The baseline of information these students are giving us is all tied to a bigger picture."

Vero Beach High School student Andrew wades in mud boots to the edge of an impoundment that has been re-connected to the lagoon via a culvert opened just a few weeks ago. Using a long collecting pole with a sample bottle attached, he deftly scoops water to be measured for salinity, pH, dissolved oxygen, temperature and the bacteria Enterococci. Data will be compared both before and after culverts are opened. "Extremely low oxygen levels are indicative of closed impoundments vs. opened culverts," Andrew explains, adding that these low levels are not supportive of marine life. "Even the water color, which used to be almost orange in a closed impoundment, now looks just like lagoon water." Ben is also in this study group. "Once the culvert was open, it took only a week to normalize," he notes.

Back at the Harbor Branch lab, the students plug in their data and start working on the poster presentation of their study findings. These will be displayed at FAU Harbor Branch's Indian River Lagoon Symposium, which brings scientists from all over Florida to present and discuss their work.

Skye's group studies the influence of new culverts on mangrove invertebrate communities, the bottom-of-the-food-chain organisms that are a bellwether for overall water quality. "We have been going out into the lagoon and installing acrylic plates onto PVC among mangrove prop roots. We pull the plates weekly and check what is growing," she says. "Much of what we are looking for is tiny. One is called a Bryozoan, which is flat and lacy-looking in a circular shape. One is a shell commonly called a lady slipper, and because the shell is almost clear, you can see the organism inside it." The posters will incorporate materials and methods used, graphs, charts and conclusions; they will be judged alongside the work of college students.

The day arrives for the Indian River Lagoon Symposium to begin, and Harbor Branch's Johnson Education Center is bursting at the seams. After the speeches and workshops wind down, students take their places in front of their posters, answering questions and talking about their study data. The decibel level in the room rises as more people file in. For many students, this will be their first time presenting, both to other scientists and grad students, as well as members of the public who have come to hear about the health of the lagoon.





Andrew collects a water sample from an impoundment.



Ben and Andrew transport their research gear down the impoundment road.



Max and Anika do their part in transporting supplies into the field.

Logan is with the seagrass project team, which determined that there are three species off the Coastal Oaks Preserve. "One thing that surprised us was the decrease in *Thalassia testudinum*, compared with how much *Halodule wrightii* rebounded from previous years; that's an exponential change." Logan wants to study bioengineering and bio-mining at the University of Alabama, where he has already been accepted. He offers an example of practical application of these sciences. "Certain sponge species will clean out the water and produce proteins that people cannot produce. If we can extract the DNA that makes those proteins and have bacteria synthesize it for us, we can put it into medicine, just like insulin replacement for diabetics." His father, Jason, stands a few feet away, watching his son present the findings. "I think this has been great for Logan. We grew up along the waterway; fishing is a big part of our lives," he says. Commenting on the technology now available to his son, he adds, "We could never dream of what he is doing now 30 years ago."

At the Improvements in Water Quality project poster, students Vincent and Michael discuss the results of opening the 50-year-old South Bills impoundment via a new culvert allowing lagoon water to exchange with the tides. "This gave us all a new appreciation for lagoon life," says Vincent. "We learned a lot about the ecosystem and how everything relates, which highlights how something as seemingly simple as an impoundment dike can affect a lot of species." Michael adds that their study results were as expected. "Our hypothesis was accurate, that there would be a marked improvement in water quality. This happened within a day or two," he says. "We hope they will open the culvert when it is not mosquito season to allow natural estuarial environments." Sherry is Michael's mother. "He was very engaged in this project; he never missed a day, and even when he had other functions, this was his first priority," she recalls. "My son applied for this without us being involved and then came home and announced his inclusion in the program."

The poster session slowly empties as people make their way to the awards presentations. One Junior Scientist project, the Influence of Culverts on Mangrove Invertebrate Communities, is a double winner. The team receives the Outstanding Student Presentation Award and the People's Choice Award for Best Poster. "It's always inspirational seeing college-level work in high school," says Grudens. "They aren't just going through the motions. They are really thinking about the problems and potential approaches that help the Land Trust manage this and other conservation properties." He adds, "It's a meaningful experience that will give them a new perspective on conservation and ecological function." For these junior scientists, this is the real discovery. ☀