



Harmful Algal Bloom Extension Program for the Indian River Lagoon

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ADDITIONAL INDEX WORDS. algae, water quality, Indian River

In Summer 2016, St. Lucie County, Florida, was impacted by harmful algal blooms in the waters of the Indian River Lagoon estuary. The Indian River Lagoon runs through a densely populated portion of St. Lucie County. Public health authorities in neighboring counties issued recommendations for people to protect themselves, their families, and pets from exposure to harmful algal blooms. This news resulted in dramatic negative impacts on businesses, residents, and visitors in St. Lucie County. These episodes demonstrate the importance of having informed citizens with an understanding of the problems and threats. In St. Lucie County, University of Florida Institute of Food and Agricultural Science research and extension faculty developed the Harmful Algal Bloom Extension Program to address the need to obtain long-term algae and water quality data, to engage local citizens in these efforts, and to develop solutions to the problem. With the assistance of local volunteers, we increased data and real-time local information, while engaging the community and bringing science into homes, and conducting groundbreaking outreach and research on harmful algal blooms.

The Indian River Lagoon is a 156-mile long estuary along the east coast of Florida. It is the most biodiverse estuary in North America with over 2200 plants and 2100 animal species calling it home (FMEL 2018). In St. Lucie County, the Indian River Lagoon provides a recreational, environmental and economic benefit to the community.

The increase of nutrients into aquatic bodies, coupled with the advent of climate change, has increased harmful algal blooms (HABs) worldwide. This is especially prevalent in Florida since the state is a “hodgepodge” of rural and urban areas affected by environmental disturbances from urban runoff, sewage and agriculture. In Summer 2016, neighboring Florida Treasure Coast communities in Martin and St. Lucie Counties were impacted by news stories of harmful algal blooms in the section of the Indian River Lagoon estuary in Martin County. Fresh water releases from Lake Okeechobee greatly affected the delicate estuarine environment through runoff pollution and decreased salinity. Public health authorities issued recommendations for people to protect themselves, their families and pets from exposure to cyanobacterial HABs in the Indian River Lagoon estuary. The news of HABs in Martin County resulted in dramatic impacts on businesses, residents, and visitors in St. Lucie County as the

news spread worldwide on Cable News Network (CNN) and other media outlets.

In 2017, the University of Florida, Institute of Food and Agricultural Science (UF/IFAS) natural resources extension agent for St. Lucie County worked in conjunction with a survey team from the UF/IFAS School of Forest Resources and Conservation to conduct Indian River Lagoon focus group discussions with St. Lucie County residents and interested stakeholders (Maynard et al. 2017). Focus group participants expressed concerns about HABs and the health of the Indian River Lagoon. Several participants were still afraid to go in the water because of news of HABs in the Indian River Lagoon in neighboring Martin County the previous year.

Materials and Methods

FOCUS GROUPS. The St. Lucie County Extension office collaborated with the UF/IFAS School of Forest Resources and Conservation to conduct citizen focus groups to determine perceptions of the Indian River Lagoon. Two focus groups were conducted on 1 June 2017—one at the Manatee Observation and Education Center in Fort Pierce and the other at the St. Lucie West Services District commission chambers in Port St. Lucie. A summary report from these citizen focus groups provided background information used for research and extension outreach efforts to address the expressed needs of citizens related to the Indian River Lagoon.

Funding for this program was provided by St. Lucie County’s Board of County Commissioners and the University of Florida, Institute of Food and Agricultural Science. Much thanks to our dedicated Volunteer Algae Monitoring Program (VAMP) team of Karl Mangino, Susan Hamburger, Neil Stover, and Vicki Cowles.
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VOLUNTEER ALGAE MONITORING PROGRAM (VAMP) IN THE INDIAN RIVER LAGOON. Ken Gioeli, UF/IFAS natural resources extension agent for St. Lucie County, worked in conjunction with H. Dail Laughinghouse IV, UF/IFAS assistant professor of applied phycology, and Lisa Krimsky, UF/IFAS Southeast Florida regional specialized water extension agent, to develop the methodology for VAMP. This methodology involved establishing set waypoints for water sampling to determine the presence of microcystin-producing harmful algal blooms. Waypoints were in areas indicative of typical conditions in the Indian River Lagoon and not sites likely to be directly impacted by point source pollution. Sampling protocols and water chemistry needed for phycology research were determined.

A team of Florida Master Naturalists received specialized training, support and supplies (such as Water Watch water chemistry kits) to conduct water quality testing and algae collection at established waypoints. Training was conducted by the UF/IFAS natural resources extension agent for St. Lucie County. Algae samples were sent to the Phycology Laboratory at the UF/IFAS Fort Lauderdale Research and Education Center where algae counts and genetic tests were conducted to determine the presence of harmful algae expressing microcystin-producing genes. Monthly reports were submitted to the UF/IFAS Extension St. Lucie County, where local decision makers assessed results and the need for additional action.

PUBLIC AND PROFESSIONAL OUTREACH. A multifaceted approach to public outreach for the HAB extension program for the Indian River Lagoon included teaching short courses and presentations for the general public. Social media was also utilized. The UF/IFAS natural resources extension agent for St. Lucie County, working with Florida Master Naturalist volunteers, the UF/IFAS assistant professor of applied phycology with the UF/IFAS Fort Lauderdale Research and Education Center and the UF/IFAS Southeast Florida Regional specialized water extension agent comprised the core instructional team.

Results and Discussion

FOCUS GROUPS RESULTS. Two focus groups were conducted in St. Lucie County on 1 June 2017, to determine citizen perceptions of the Indian River Lagoon. All participants agreed that a priority should be placed on research and extension outreach to find solutions that protect the environmental quality of the Indian River Lagoon estuary. Perceptions of both the “Experienced Group” and “Less Experienced Group” are shown in Table 1.

VAMP IN THE INDIAN RIVER LAGOON RESULTS. The extension agent conducted three field demonstrations designed to teach VAMP volunteers how to collect water samples, conduct basic water chemistry analysis and process samples using Lugol’s iodine and algal concentration techniques. VAMP volunteers collected and processed water samples monthly at three locations from May–Nov. (excluding Oct.) 2017, that were shipped to the phycology laboratory for algae species diversity assessment and toxicity analysis. As a result, VAMP volunteers satisfactorily processed twenty-one algae samples from these sites. The applied phycologist determined that additional genetic testing was needed for July and August algae samples as potentially harmful algae species were present. It was determined that while microcystin toxin was not detected at the three VAMP waypoints in the July and August samples, there was a semiquantitative increase in amplification in saxitoxin from July–Aug. 2017, at Hermans Bay and Wilcox VAMP waypoints. Saxitoxin is not unusual;

Table 1. Perception survey result comments regarding the Indian River Lagoon made by members of two focus groups surveyed in St. Lucie County, FL, on 1 June 2017.

Experienced Group Perceptions (n=14)

Knows someone who died because of the bacteria in the lagoon (bacteria presence increases with algae); Pleasant and life changing interaction with manatees...wants to protect them and their habitat; Over time, sees thinner sea grass, less fish catches; Geographic differences (able to swim up north, and to come down and not be able to swim in this body of water is “such a shocker”); Increase in “fear” of the water over time; Learning the connection of water bodies and the connections from on land sources (i.e. stormwater) and knowledge of the impact that people can have and how it can lead to the lagoon

Less Experienced Group Perceptions (n=27)

Many feel “afraid to go into the water” due to health risks; Overall health of lagoon; Seagrass loss; “Going in the water”; Correlation between toxins in the water and liver disease; Toxins being leached into the drinking water supply; Real estate values; Local wildlife; “Change...reduction in diversity – types of fish in the lagoon”; Dead fish; People just want the pretty water.... but don’t understand that they need the animals as well; Geographic relationships between other water bodies; Drainage issues; Septic tanks; Differing opinions among the public—getting something done seems impossible/very difficult.

however, it is a type of harmful algal bloom known to impact pufferfish and other marine organisms. There was no saxitoxin or microcystin detection in July or August at the Jaycee Park VAMP site.

Because of the saxitoxin finding, the VAMP team recommended the following:

1. The UF/IFAS Southeast Florida Regional water agent should notify the Florida Fish and Wildlife Commission (FWC) Harmful Algal Bloom office. FWC is the regulatory agency tasked with determining if outreach or additional testing is needed.
2. St. Lucie County administration personnel should be updated on the microcystin and saxitoxin findings.

PUBLIC AND PROFESSIONAL OUTREACH RESULTS. The HAB extension program team began outreach efforts in 2017. The extension agent, Florida Master Naturalist volunteers, the UF/IFAS assistant professor of applied phycology and UF/IFAS Southeast Florida Regional specialized water quality agent conducted outreach efforts. Outreach reached 271 participants through public presentations. In addition, 305 people were reached through presentations at professional conferences. The effectiveness of outreach efforts were evaluated and showed significant increased knowledge.

EXAMPLE OF KNOWLEDGE CHANGE INDICATOR. Five students participating in the VAMP presentation at Savannas Preserve State Park in Jan. 2018, were evaluated for knowledge change. A review of survey results indicated that the level of highest knowledge gain was “Presence of cyanobacteria (blue-green algae) does not necessarily mean toxins are being produced” at a 43% increase while the area of lowest knowledge gain was “Harmful algal blooms can be toxic to fish as well as people” with a 9.5% knowledge gain.

SUMMARY OF OUTREACH EFFORTS. The goal of VAMP outreach efforts was to connect UF/IFAS research-based information to the community’s needs for credible educational information about

harmful algal blooms. The VAMP team used a multi-faceted approach to outreach that included presentations, exhibits and displays, social media and published works. Presentations were conducted for the general public at locations such as the Savannas Preserve State Park while professional audiences were reached at conferences such as the Florida Institute of Technology's Indian River Lagoon Research Institute's Technical Conference on Coastal Water Quality.

Conclusion

Overall, the goals of the Harmful Algal Bloom (HAB) Extension Program for the Indian River Lagoon were achieved. We increased data and real-time local information through volunteer algae monitoring in the Indian River Lagoon. We brought science-based facts about harmful algal blooms to the community.

Groundbreaking outreach and research on algae management was achieved. Volunteers and UF/IFAS faculty are committed to continued research and extension to address water quality and harmful algal blooms in the Indian River Lagoon region.

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