A FLORIDA TAXWATCH BRIEFING

Red Tide Mitigation Using Southern Hard Clams

Mitigating the harmful impacts of red tides along the western Gulf Coast of Florida through the reintroduction of southern hard clam beds.

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EACH YEAR MORE THAN 100 MILLION TOURISTS VISIT FLORIDA, attracted by its theme parks and attractions, comfortable year-round weather, water-related recreational activities, and state and national parks. But the number one reason, by far, that so many visitors schedule their vacations in Florida is its natural beauty. With 2,200 miles of coastline, and more than 600 miles of beaches, visitors have a variety of locations where they can enjoy the soft, sugar white sands, warm waters, and beautiful sunsets that have made Florida's beaches famous all over the world.

Florida also boasts more than 1,500 miles of navigable inland and intracoastal waterways, much of which is used for commercial (e.g., boating and fishing) and recreational activity. Florida's beaches and inland waterways are the most important feature of the state's brand and a major driver of the state's economy. Water-related economic activities employ thousands of Floridians and generate a significant portion of state and local tax revenues. The importance of healthy Florida beaches and inland waterways to the state's economy cannot be overstated.

Florida red tide (Karenia brevis) is a naturally-occurring microscopic alga that has been documented along the Gulf Coast of Florida for more than 150 years. Blooms (higher-than-normal concentrations) form offshore in the Gulf of Mexico and are carried inshore by currents and winds. Red tide produces a paralyzing neurotoxin that prevents fish and other marine life from breathing and causes them to drown. When airborne, the neurotoxin can be dangerous to humans, especially those with respiratory ailments.

History shows that harmful algal blooms like red tide blooms cause fish kills, shellfish contamination, and respiratory irritation or illness in humans. These negative biological impacts often generate negative economic consequences that are borne by the affected residents, tourists, governments, and businesses. Regions that have endured harmful algal blooms often experience economic impacts due to the environmental effects of the blooms.

Some of these impacts are direct, such as the cost of health care for affected humans, expenses associated with rescue efforts for marine mammals, the cost of collecting data and monitoring the development of blooms, expenses to remove dead fish from beaches, and lost revenue for the marine-related businesses (e.g., commercial fishing, seafood markets, water proximate restaurants, coastal lodging, and marine-based activity rental fees). Other impacts may be indirect and more difficult to quantify such as the value of lost recreational opportunities of visitors or lost wages to residents.[1]

Recent outbreaks of red tide along the Southwest Florida coast and Tampa Bay region have threatened the continued health of beaches and inland waterways in those areas. Nitrogen and phosphorus occur naturally in marine ecosystems, stimulating the growth of algae and aquatic plants which, in turn, provide habitat and food for marine life. Excess nitrogen and phosphorus levels cause an overgrowth of algae, which consumes oxygen and blocks sunlight from underwater plants, making it impossible for marine life to survive.

1 Charles M. Adams, Sherry L. Larkin, "Economics of Harmful Algal Blooms: Literature Review," University of Florida, April 19, 2013.

Unprecedented fish kills as a result of the red tide bloom, along with a rotting stench and burning toxic air, have forced local governments to close popular beaches. Cleanup crews in Pinellas County, for example, have collected more than 500 tons of dead and rotting sea life since cleanup efforts began in early July.[2] Visitors are cancelling reservations and spending their vacation dollars elsewhere. These outbreaks spotlight the need for corrective action.

> *"…This is a quality of life issue, it's an economic and it's a tourism issue. And it's really impacting the life blood of Florida and our Gulf Coast."*
>
> — Rick Kriseman, Mayor, City of St. Petersburg[3]

Strategies to combat the harmful red tide fall into one of three categories. Prevention measures are designed to limit the discharge of nutrient-laden and polluted water from septic tanks, fertilizer runoff, and increased development into Florida's coastal and inland waters. Mitigation measures avoid, minimize, or eliminate the negative impacts of the blooms on public health; recreation, commerce, and tourism; communities; ecosystems; and fisheries. Control measures physically remove algal cells from the water; limit the area covered by the bloom with physical barriers; or kill algal cells through physical or chemical means.

An August 2019 report of the Florida Harmful Algal Bloom State of the Science Symposium discusses the current state of knowledge and recommends research priorities to improve levels of certainty regarding harmful algae blooms (HABs) in Florida.[4] Priority #2 under Bloom Mitigation and Control addresses conducting coastal watershed investments/restoration activities that would reduce the occurrence, duration, and severity of future blooms. The Symposium recommended that mitigation strategies should be considered that kill red tide cells, reoxygenate water, and restore water to nontoxic conditions. A toolbox of potential mitigation strategies should be developed to address different adverse impacts, target what needs to be protected, and provide integrated information dissemination.[5]

Research and development priorities identified in the state's aquaculture plan include restorative and conservation aquaculture projects that, among other things, address coastal issues such as nutrient pollution, shoreline erosion, and the restoration of aquatic plant, shellfish, and fish populations.[6]

Discussion

One restoration/mitigation technique worthy of consideration is the reintroduction of southern hard clams to Tampa Bay and Southwest Florida estuaries. One hundred years ago, the southwest coast of Florida supported one of the largest, if not the largest, hard clam beds in the United States. Years of dredging and harvesting have virtually wiped out these clam beds.

Clams have the ability to absorb pollutants, viruses, and bacteria in polluted waters. The southern hard clam and other bivalve shellfish are efficient filter feeders, each capable of filtering five gallons of seawater daily. Large populations of hard clams can reduce harmful algae blooms by consuming the algae that cause red tides and removing nitrogen and phosphorus from the water. Nitrogen and phosphorus are removed from the water through filter feeding and stored in the clams' shells and meat.

Clams also stimulate bacteria that are capable of changing nitrogen in the water to harmless nitrogen gas, effectively making it unusable for algae.[7] The resulting clearer water permits sunlight to penetrate

2 Kelly Hayes, "'Please, we need your help': Rick Kriseman pleads for state help with red tide crisis," Politico, July 14, 2021.

3 Richard Tribou, "'It's pretty awful': Red tide fish kills in Florida prompt calls for help from government officials," Orlando Sentinel, June 14, 2021.

4 Sea Grant Florida. "State of the Science for Harmful Algal Blooms in Florida: Karena brevis and Microcystis spp.," August 2019.

5 Sea Grant Florida. "State of the Science for Harmful Algal Blooms in Florida: Karena brevis and Microcystis spp.," August 2019.

6 Florida Aquaculture Review Council, "Florida Aquaculture Plan," October 2020.

7 The ABC Plan for Clam Restoration, "A Billion Clams for a Healthier Charlotte Harbor," retrieved from https://clamrestoration.com/, July 15, 2021.

deeper, which promotes the growth of sea grasses and supports greater diversity of marine life.

This Briefing examines two mitigation options for reintroducing southern hard clams along the western Gulf of Mexico. The first option involves securing an Aquaculture Certificate of Registration under Chapter 597, Florida Statutes; the second involves the establishment of a mitigation bank under Chapter 373, Florida Statutes.

Aquaculture, the cultivation of aquatic organisms, is considered by the Florida Legislature to be agriculture and is subject to regulation by the Florida Department of Agriculture and Consumer Services (FDACS).[8] Aquatic organisms and any product derived from aquatic organisms that are owned and propagated, grown, or produced under controlled conditions are considered to be aquaculture products; however, aquatic organisms harvested from the wild for depuration,[9] wet storage,[10] or relay for purification, are not considered to be aquaculture products.

Anyone engaging in aquaculture must be certified by the FDACS. Prospective aquaculture producers must submit an application for a certificate of registration which, if approved, is subject to annual renewal. The applicant must have first received a shellfish harvester education training certificate, which is submitted as part of the application for a certificate of registration. The FDACS has adopted best management practices (BMPs) intended to "preserve environmental integrity while eliminating cumbersome, duplicative, and confusing environmental permitting and licensing requirements."[11]

Shellfish culture occurs mainly on sovereign submerged land that is leased from the state. Applicants submit applications to lease sovereign submerged lands[12] to FDACS and, if approved, enter into a submerged lands lease agreement. Only indigenous shellfish or hybrids of indigenous shellfish can be cultivated on submerged lands. If an aquaculturist intends to sell the clams, then broodstock[13] that originated in Florida waters must be used.

The BMPs make an important distinction between clams that are being produced for human consumption and clams that are not. Clams that are produced for sale as food for human consumption can only be cultured within the boundaries of FDACS-managed shellfish harvesting areas. This requirement does not apply to clams that are used solely for their ecological benefits and that will not be sold as a food product.

Setting aside sufficient acreage to support the reintroduction of southern hard clams has the potential to not only mitigate the impacts of red tide blooms on the economy of the Tampa Bay region and the public health of its residents and visitors, but also has the potential to support the continued economic development and ecological functioning of the region through the creation and management of a "mitigation bank."

Mitigation banks are highly regulated environmental areas where units of restored, created, enhanced or preserved land are expressed as "credits" which may subsequently be withdrawn to offset "debits" incurred at a project development site.[14] Mitigation bankers restore, enhance, create and preserve water resources or other significant natural areas and assume responsibility for their long-term maintenance, earning mitigation credits, recognized by the regulatory agencies, for their efforts.[15]

8 §597.002, Florida Statutes.

9 Depuration is the action or process of freeing something of impurities.

10 Wet storage is the temporary storage of shellfish from growing areas in containers or floats in natural water bodies or in tanks that contain natural or synthetic seawater.

11 Chapter 5L-3, Florida Administrative Code.

12 §253.69, Florida Statutes.

13 Broodstock refers to a group of mature individuals used for breeding or replacement purposes.

14 Florida Association of Mitigation Bankers, "What is Mitigation Banking?", retrieved from https://floridamitigationbanking.org/mitigation-banking/, July 28, 2021.

15 Florida Association of Mitigation Bankers, "What is Mitigation Banking?", retrieved from https://floridamitigationbanking.org/mitigation-banking/, July 28, 2021.

Credits can be sold to permittees and others who must compensate for having impacted water resources or other natural areas.

One type of mitigation bank --- conservation banks --- offers credits that satisfy regulatory compliance for Sections 7 and 10 of the federal Endangered Species Act, and other state and local regulations, for mitigating unavoidable impacts to threatened and endangered species and their habitats and other sensitive habitat areas.[16] The "bank" is the site itself and the "banker" can be a public agency or private entity who is responsible for setting up and managing the bank. The bank's currency is a "credit" which represents the "ecological value equivalent to the complete restoration of one acre."[17]

Mitigation Banking Permits

The Environmental Reorganization Act of 1993[18] authorizes the Florida Department of Environmental Protection and the water management districts to adopt rules governing mitigation banking in Florida. These rules permit both public and private entities to operate a mitigation bank as long as they can demonstrate sufficient legal interest in the property and meet their financial responsibilities.

A mitigation bank requires federal authorization, a Mitigation Bank Instrument (MBI), which is reviewed and signed by the U.S. Army Corps of Engineers and a host of state and federal agencies.

The applicant for a mitigation bank must show that the mitigation bank:

- Improves ecological conditions within the regional watershed;
- Provides viable and sustainable ecological and hydrological functions for the proposed mitigation service area;
- Is effectively managed (long-term);
- Does not destroy areas with high ecological value;
- Achieves mitigation success; and
- Is adjacent to lands that will not adversely affect the long-term viability of the bank because of unsuitable land uses or conditions.[19]

The permit application requirements are established in Chapter 62-342.450, Florida Administrative Code. A prospective mitigation banker must include in the application for a permit the following information:

- A description of the location of the proposed mitigation bank;
- A description of the ecological significance of the proposed mitigation bank in relation to the regional watershed in which it is located;
- A description and assessment of current site conditions;
- A mitigation plan describing the actions proposed to establish, construct, operate, manage and maintain the mitigation bank;
- An assessment of anticipated changes in ecological value as a result of proposed mitigation actions;
- Evidence of sufficient legal or equitable interest in the property which is to become the mitigation bank;
- Draft documentation of financial responsibility documentation and financial assurance mechanism for the construction and implementation of the bank and the perpetual management and maintenance of the bank; and
- Any additional information that may be necessary to evaluate whether the proposed mitigation bank meets established criteria.

As part of the permitting process, the permitting agency determines the number and type(s) of "credits" the bank is expected to achieve. A credit is defined as "the ecological equivalent of one acre of successful creation/restoration (i.e., restoring one acre with no wetland function to optimal wetland function)."

16 Ibid.

17 Florida Department of Environmental Protection, "Mitigation and Mitigation Banking," retrieved from https://floridadep.gov/water/submerged-lands-environmental-resources-coordination/content/mitigation-and-mitigation-banking, July 28, 2021.

18 §373.4135, Florida Statutes.

19 §373.4135(1), Florida Statutes.

Upon issuance, the permit will include a ledger that specifies:

- The total number and types of credits awarded to the bank;
- An up-to-date accounting of credits available for sale or use; and
- An accounting of the number and type of credits used for each impact permit.

Mitigation credits are available to the banker for sale or use to offset adverse environmental or ecological impacts of a project.

Recommendations

The reintroduction of southern hard clams along the western Gulf of Mexico represents an innovative, effective, and environmentally sustainable approach for controlling and mitigating the impacts of red tide.

Whether through a lease of sovereign submerged land, or through the establishment of a conservation bank where the bank is some amount of submerged acreage that is home to a new population of southern hard clams, the reintroduction of southern hard clams is consistent with Florida's conservation laws, which emphasize the restoration and enhancement of degraded ecosystems and the restoration of ecological communities that were historically present.[20]

Florida TaxWatch recommends the state of Florida evaluate the reintroduction of southern hard clams as an effective and environmentally sustainable method for mitigating the impacts of red tide blooms on the economy of the Tampa Bay region and the public health of its residents and visitors.

20 §373.4135, Florida Statutes.

RESEARCH PROJECT TEAM

Tony Carvajal	*Executive Vice President*
Robert G. Nave	*Sr. Vice President of Research* Primary Author
Chris Barry	*VP of Communications & External Affairs* Design, Layout, Publication

All Florida TaxWatch research done under the direction of Dominic M. Calabro, President, CEO, Publisher & Editor.