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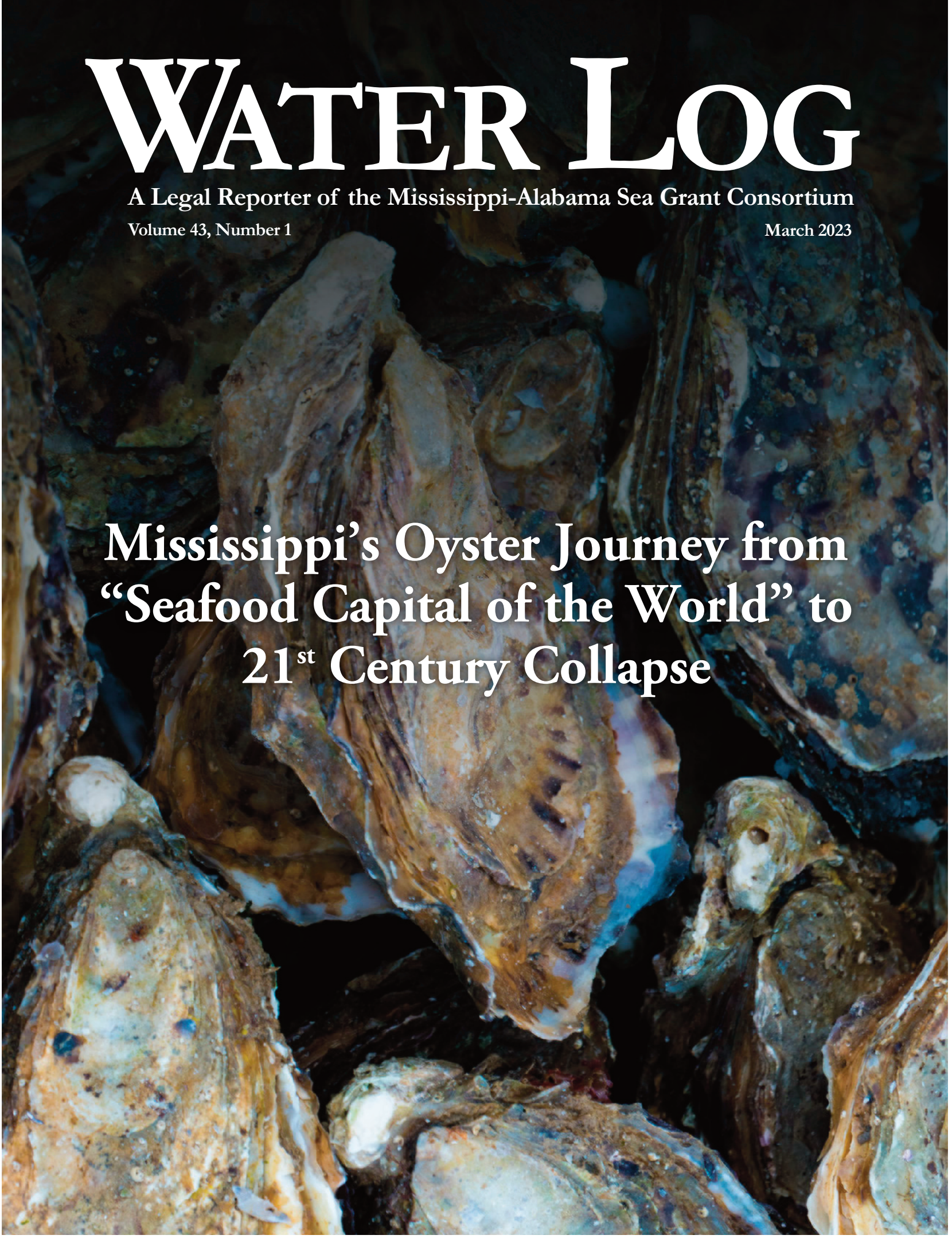

Mississippi's Oyster Journey from "Seafood Capital of the World" to 21st Century Collapse

Inside This Issue . . .

Cover photograph

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Table of Contents photograph

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• UPCOMING EVENTS •

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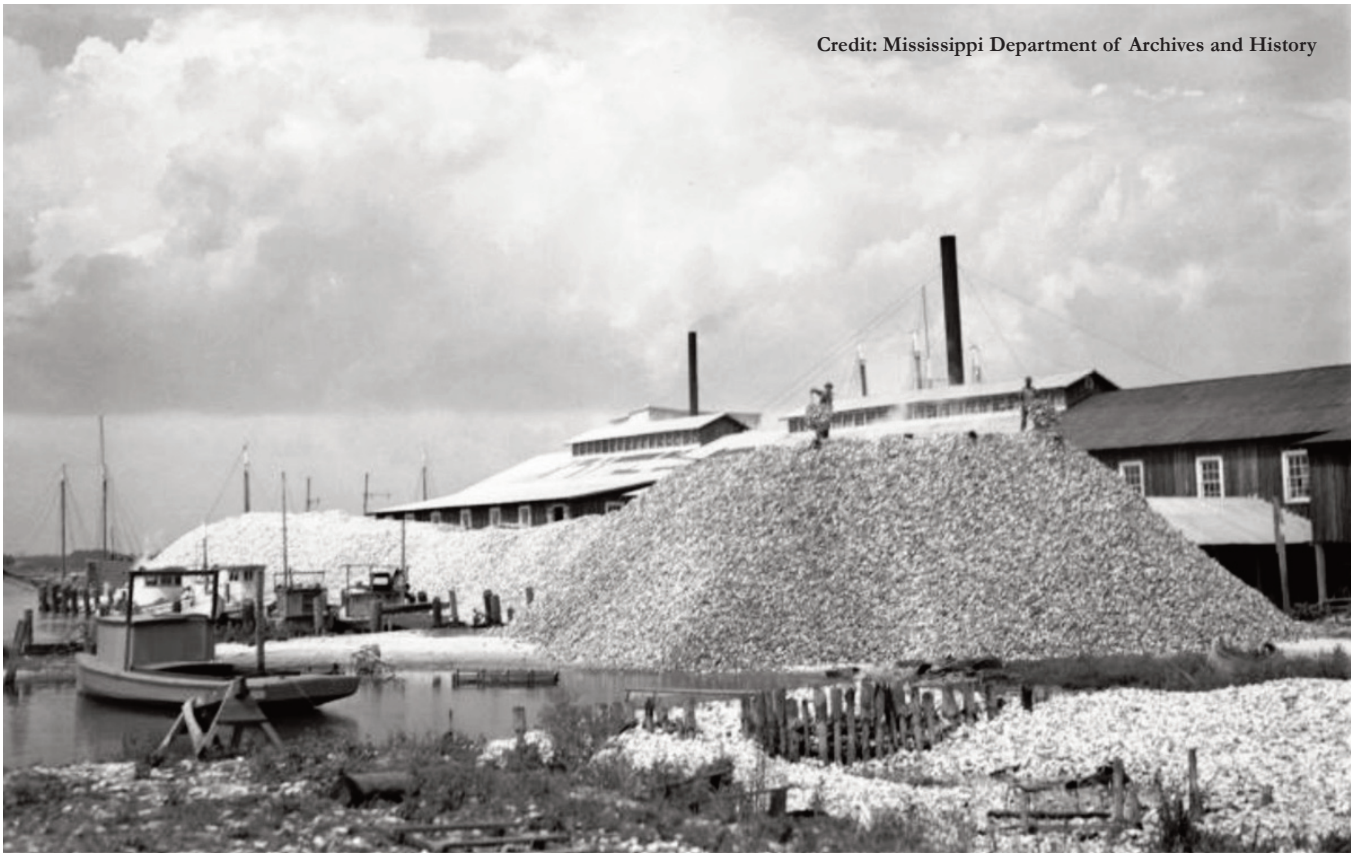
Mississippi's Oyster Journey from "Seafood Capital of the World" to 21st Century Collapse

Jessica Pruett and Stephanie Otts



Oyster shell pile in 1900's.

In September 2019, the Mississippi Commission on Marine Resources voted to close the state's public oyster reefs for the 2019-2020 season. Earlier that year, heavy rainfall within the Mississippi River basin resulted in the U.S. Army Corps of Engineers opening the Bonnet Carré Spillway twice to relieve the threat of flooding to New Orleans. This was the first time since its completion in 1931 that the spillway had been open twice in one year.

Due to the increase of freshwater in the Mississippi Sound during these openings, salinity levels dropped significantly and were often near zero between the months of March and July. Researchers from the Mississippi Based RESTORE Act Center of Excellence[1] (MBRACE) documented 100% oyster mortality by September 2019 on all reefs surveyed in the western Mississippi Sound. Almost no spat (baby oysters) settled between July and October. Oyster populations have yet to show signs of recovery.

The oyster industry has a long and important history in the state of Mississippi, but the story of the fishery is a familiar one in natural resource management. Overharvesting and lax management lead to population crashes that result in stricter regulations and significant financial investments to try and rebuild populations. However, Mississippi oyster industry's journey from "Seafood Capital of the World" to complete fishery collapse in just over 100 years has an additional layer – repeated natural and human-induced disasters. Important lessons can be learned from the past to gain a better understanding of the health of oyster populations in Mississippi and inform future management decisions.

History of Mississippi Oyster Fishery

Oyster consumption in Mississippi pre-dates European settlement.[2] Oyster shells up to 8 inches long found in coastal Native American middens date back 2,500 years. After French arrival in 1699, oysters continued to be harvested from nearshore reefs by hand or using tongs. Signs of problems on the Mississippi reefs occurred even before official oyster landing records began in 1880. The state legislature enacted the first Mississippi oyster-related law in 1860 to prohibit dredging, but this was later repealed in 1865 due to stakeholder pushback.

Prior to state management, Mississippi coastal counties controlled local oyster reefs starting in 1896. Then, in 1902, the Board of Oyster Commissioners was appointed by the governor to help maintain and replenish the state's reefs. The Mississippi Oyster Commission, later renamed the Mississippi Seafood Commission, conducted regular shell and seed plantings on public oyster reefs using state funds and taxes. Oyster harvesting not only removes the animal, but also its habitat, and oyster fishery managers have long recognized the importance of needing to maintain oyster habitat by replacing shell or hard material lost due to harvesting or other natural events.

However, in the years leading up to World War II, Mississippi's reefs were unregulated, overfished, and shell material was not returned to the reefs. Then, in 1945, the Bonnet Carré Spillway was opened for the second time ever, resulting in up to 100% oyster mortality on western Mississippi Sound reefs. As a result, Congress authorized the U.S. Fish and Wildlife Service to appropriate $3 million to Louisiana and Mississippi as reimbursement for damages to the oyster industry caused by the Spillway.[3] Unfortunately, these restoration efforts were curtailed by the Hurricane of 1947 and several years of above average rainfall. The heavy rainfall, coupled with high freshwater river discharges, resulted in salinity conditions unfavorably low for oyster recovery.

The opposite, but no less damaging, situation occurred in the 1950s. Prolonged drought conditions resulted in high salinities on oyster reefs. High salinity favors the survival of voracious oyster predators, such as oyster drills. Overall, the fishery struggled between 1945-1959 due to these major environmental challenges and limited regulatory authority of the Mississippi Seafood Commission.

A new agency, the Mississippi Marine Conservation Commission,[4] was created in 1960, with new powers, management authorities, and legal requirements that allowed Mississippi oyster landings to flourish throughout the decade. Led by a marine biologist, the Marine Conservation Commission routinely planted shell and seed on the public oyster reefs. They also cultivated reefs after heavy spring rains by using dredges to re-expose clean shell surface in time for summer spat settlement.

Hurricane Camille struck the Mississippi coast in 1969, physically damaging nearshore oyster reefs, and destroying fishing boats and many oyster processing factories. The state thus began, once again, the slow process of rebuilding the reefs through significant shell planting operations. Larval oysters from less damaged populations in the Mississippi Sound settled on these rebuilt reefs, but oysters suffered high mortality during the Bonnet Carré Spillway openings of 1973, 1979, and 1983. Oyster management also shifted during this period when the Mississippi Department of Wildlife Conservation was created in 1978, and the Bureau of Marine Resources was given authority to manage the state's fisheries resources.[5]

During the 1960s, Mississippi coastal development rapidly expanded and reef closures due to sewage pollution became a major problem for the oyster industry. Pascagoula Bay reefs were entirely closed to harvesting in 1961 after hepatitis outbreaks. Biloxi Bay closures first began with Back Bay in 1945 and moved southward until the entire bay was closed by 1967. Oyster landings reached an all-time low between 1987 to 1991 as a result of decreased fishing efforts caused by the increase in restricted zones and reduced public demand for oysters from the Gulf of Mexico.

In 1994, oyster management shifted again with the creation of the Mississippi Commission on Marine Resources and the Mississippi Department of Marine Resources.[6] Under the jurisdiction of the Commission on Marine Resources, the Department of Marine Resources was given the power and resources to manage, protect, and maintain the state's public oyster reefs. Between 1996 and 2004, annual oyster landings were averaging as high as during the 1960s. That continued until, as in 1969, a devasting hurricane hit Mississippi.

21st Century Declines on Mississippi Oyster Reefs

Hurricane Katrina, which made landfall in Mississippi in August 2005, damaged 90% of Mississippi's oyster reefs. The reefs were closed to harvest for the following two years to allow oyster populations to rebuild. Extensive cultch planting and oyster relaying, paid for with federal funding from the Emergency Disaster Recovery Program, led to a recovery of the oyster population by 2008.

University of Mississippi researchers surveying oyster mortality during 2019 Bonnet Carré Spillway opening.

Then on April 20, 2010, an unprecedented disaster impacted the northern Gulf of Mexico. The Deepwater Horizon explosion released hundreds of millions of liters of crude oil into the Gulf, which ultimately affected over 2,000 km of coastline. Oyster deaths from direct oil exposure were reported on Louisiana and Mississippi oyster reefs and, until 2014, limited oyster recruitment was observed in these areas. A year after Deepwater Horizon, the 2011 Bonnet Carré Spillway opening inflicted additional stress on western Mississippi Sound oyster reefs already heavily impacted by the oil spill.

Following the Deepwater Horizon settlement, millions of dollars have been made available for oyster reef restoration across the Gulf of Mexico.[7] The Mississippi Oyster Cultch Restoration Project during Phase I of the Natural Resource Damage Assessment (NRDA) Early Restoration was the largest cultch deployment in Mississippi history. Between 2013-2014, over 188,000 cubic yards of hard material were deployed to enhance more than 1,400 acres of reef area in the western Mississippi Sound. This $11 million project showed promising signs of oyster recruitment in the first two years post-cultch deployment.

Unfortunately, a major hypoxic event in 2016 and the multiple 2019 Bonnet Carré Spillway openings caused major mortality on the restored reefs. No harvest has been allowed from public reefs since 2019. A record breaking 2020 Atlantic hurricane season and record regional rainfall in coastal Mississippi during 2021 further compounded the environmental problems. Mississippi's oyster populations are lower now than they were immediately following the Deepwater Horizon oil spill, despite extensive restoration efforts and a 2017 ban on basket dredging.[8]

Future of Mississippi Oyster Reef Recovery

The continued closure of the public oyster fishery in Mississippi demonstrates the state's commitment to long-term restoration of oyster reef ecosystems, despite the loss in economic benefits from harvesting. Off-bottom aquaculture, introduced in 2016,[9] provides an alternative means of oyster production which can offset some of the economic losses from the closure of the wild fishery and relieve wild harvesting pressures in the future. While aquaculture operations can provide some of the same environmental benefits as natural reefs, such as water filtration and habitat creation, they are not a substitute for all of the beneficial ecosystem services that oyster reefs provide, like shoreline protection. Further, not all commercial oyster harvesters are able to or want to transition into aquaculture, and there can be conflicts with coastal property owners. Sustainable oyster reef restoration is therefore critical to the future environmental and economic health of the Gulf of Mexico and its coastal communities.

Current oyster restoration activities in the state need to maintain focus on rebuilding adult populations by adding live oysters to restored sites and existing reefs.[10] Projects like the Department of Marine Resources Remote Oyster Setting Facility enhance oyster populations by settling hatchery-reared larvae on oyster shells in onshore tanks, and then moving this spat-on-shell to restored reefs in the Mississippi Sound. Allowing oysters to grow to a larger size in controlled or maintained environments before placing them on reefs can improve their chances of survival. The Mississippi Oyster Gardening Program recruits volunteers with access to docks to grow and cultivate young oysters prior to planting them on local restored oyster reefs. As populations begin to rebound, the creation of no-harvest sanctuary reefs will be critical to ensure spawning populations that produce sufficient larval supply to populate public oyster reefs.

Restoration planning and decision-making also need to consider the environmental challenges of freshwater flooding and major storms that have historically plagued Mississippi oyster reefs and will continue to escalate in frequency and intensity with climate change. Moreover, if Mississippi restoration efforts are to succeed, changes must be made in Bonnet Carré Spillway operations. After a recent federal court ruling,[11] the Army Corps of Engineers must consult with the National Marine Fisheries Service on ways to avoid harm to Louisiana and Mississippi coastal resources in the future. Historically, the most detrimental openings are the ones with the largest volume of freshwater discharge, and those occurring in late spring (April – June) when temperatures are higher and oysters are less able to cope with salinity stress. Future impacts of Spillway openings on salinity levels in the Mississippi Sound may be predicted using computer models developed by the University of Southern Mississippi and validated with MBRACE field measurements during the 2019 openings.

Conclusion

Since state management began in 1902, oyster landings in Mississippi have fluctuated dramatically due to complex interactions between natural and man-made disasters, variability in salinity regimes, and alterations in management authority. Previous efforts to rebuild Mississippi oyster populations have focused on adding materials to reefs to provide suitable substrate for oysters to settle and survive on, with the primary focus of restoring commercial landings. Yet, recovering and sustaining the full array of environmental and non-harvest economic benefits of healthy oyster reefs will require an ecosystem-based management approach that encompasses goals beyond increases in oyster landings. Comprehensive science- and technology-based research, such as that funded by MBRACE, is essential to implementing such an approach and achieving sustainable use of oyster resources in Mississippi.

Jessica Pruett, Postdoctoral Research Associate, University of Mississippi.

Stephanie Otts, Director, National Sea Grant Law Center.

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Endnotes

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At Last: Development of Long Beach, Mississippi's First Casino May Proceed

Emma Tompkins[1]

Following a dispute between the Mississippi Secretary of State and Long Beach Harbor Resort spanning several years, the Mississippi Supreme Court recently affirmed a trial court's grant of summary judgment allowing a Long Beach casino project to proceed.[2] The dispute centered around a relatively small parcel of land south of U.S. Highway 90. This parcel of land is crucial to the project because it serves to connect the proposed gaming operations located north of Highway 90 to the mean high water line, a regulatory requirement from the Mississippi Gaming Commission.[3] The resort has leased the property at issue from the City of Long Beach since 2010; however, the Secretary of State argued that the city did not have the authority to lease the property at issue under the Public Trust Tidelands Act, so the resort's lease was therefore void. Accordingly, the state argued, the Mississippi Gaming Commission should not have approved the casino project for failure to comply with the commission's regulatory requirements.[4]

The Public Trust Tidelands Act

The Mississippi Public Trust Tidelands Act grants the Secretary of State authority over the state's tidelands. In 1988, the United States Supreme Court ruled that the State of Mississippi, upon entry into the Union, "received ownership of all lands under waters subject to the ebb and flow of the tide."[5] One year later, in 1989, the Mississippi legislature enacted the Public Trust Tidelands Act.[6] The legislative purpose of the Tidelands Act was to preserve the natural state of the public trust tidelands and resolve the uncertainty and disputes which have arisen as to the location of the boundary between the state's public trust tidelands and the upland property.[7] The Secretary of State is designated as a trustee of the Public Tidelands Trust with the power to rent or lease surface land, tidelands, or submerged lands owned or controlled by the state.[8] The Mississippi Supreme Court has expressly acknowledged this legislative grant of authority,[9] but has also stated that nothing prevents the legislature from creating an exception to the Secretary of State's authority over the tidelands.[10]

A Slew of Agreements

In February 2010, the City of Long Beach Port Commission and Long Beach Harbor Resort entered into a lease agreement that granted the resort the exclusive rights to two parcels of property along U.S. Highway 90 across from the Long Beach Harbor. The first parcel (Parcel A) is located north of Highway 90 where a building is to be constructed, and presumably where the gaming operations will be housed. The second parcel (Parcel B) consists of a parking lot located south of Highway 90. The lease expressly stated that it was the intention of the parties that the premises may be used in connection with a gaming establishment, provided that it was in compliance with the rules of the Mississippi Gaming Commission, and no gaming activities were to be conducted on the property south of Highway 90.

In May 2011, the City of Long Beach Port Commission entered into a Boundary Agreement with the state, through the Secretary of State, to delineate the Public Trust Tidelands within the Long Beach harbor – a small portion of which included Parcel B of the resort lease. On the same day, the city entered into a Public Trust Tidelands Lease with the Secretary of State which authorized the city to use the tidelands defined by the Boundary Agreement within the harbor for harbor and development uses only.

In December 2017, Long Beach Harbor Resort entered into an Option Agreement with the Secretary of State for a Public Trust Tidelands Lease. The purpose of the Option Agreement was to allow the resort and the Secretary of State to come to an agreement on the terms of a lease for


Credit: City of Long Beach

Parcel B, the parcel of land the resort was leasing from the city that was located within the tidelands. The Option Agreement expired approximately six months later in April 2018, but the Secretary of State and the resort never entered into a tidelands lease.

Litigation Unfolds

Following the expiration of the Option Agreement, the resort continued development of the leased premises and obtained site approval from the Mississippi Gaming Commission in early 2019. Pursuant to state statute and Mississippi Gaming Commission regulations, the gaming site was to be constructed with the entire proposed gaming area located onshore within eight hundred feet of the mean high water line of the Mississippi Sound. Parcel B, which contained the leased parking lot on the tidelands, was used to satisfy these requirements.

In September 2019, the Secretary of State sent a proposed tidelands lease to the resort. In the proposed lease, the Secretary of State required the tidelands property at issue to be removed from any prior leases, including the resort lease between the city and the resort. The resort filed a declaratory judgment action against the state, urging the chancery court to declare that the resort did not need a tidelands lease because the real property on which Parcel B is located is not part of the Mississippi Public Trust Tidelands, and that the Mississippi Gaming Commission's approval of the site negated the need for approval from the Secretary of State pursuant to Mississippi law.

The Secretary of State responded, arguing that the Boundary Agreement was binding and required that the resort have a lease for the tidelands property. Additionally, the state argued that the tidelands property is held in trust by the state, with the Secretary of State as the trustee,

so any acquisition of tidelands property by the resort was therefore void under the Public Trust Tidelands Act.

The trial court found that the resort has a valid and enforceable property right, albeit a leasehold interest, in the leased premises by virtue of its lease with the Port Commission and the City of Long Beach. Further, the court found that the Port Commission had full jurisdiction, control, and management of the leased premises as of the date of the resort lease, which was more than a year prior to the Boundary Agreement and the Public Trust Tidelands Lease the city and the Secretary of State entered into in May 2011. The state appealed the chancery court's final judgment granting the resort's motion for summary judgment, arguing that neither the city nor the Port Commission had the authority to lease the tidelands property, and therefore, the resort should be required to obtain a tidelands lease.[11]

Did the City Have the Authority to Lease the Tidelands Property?

Although both the Secretary of State and the resort set forth numerous arguments regarding the city's authority to enter into a lease for the tidelands property before the trial court and on appeal, the court determined that an analysis of such arguments was unnecessary. Instead, the court firmly stated that the case turns on one simple principle: the Boundary Agreement and Tidelands Lease between the Secretary of State and the City of Long Beach ratified the 2010 resort lease.

Simply put, the city entered into a lease with the resort. The Secretary of State subsequently entered into a Boundary Agreement and Public Trust Tidelands Lease with the city regarding the tidelands which, in part, allowed the city to use and lease the tidelands property for development uses identical to those set forth in the resort lease with prior approval of the Secretary of State. The Public Trust Tidelands Lease then specifically recognized the resort lease and the right of the city to partially assign the lease to the resort for the purpose of assuring good leasehold title, so long as the rights conveyed were in conformity with the lease between the Secretary of State and the city. In doing so, the Secretary of State ratified the prior lease between the city and the resort.

The court went on to further note that had the state not leased the right to partially assign the lease away to the city – and to the resort by ratification – through the Public Trust Tidelands Lease, the state would be well within its rights as Trustee of the Tidelands to require the resort to enter into a separate tidelands lease. However, the State did in fact lease this right away to the city, and the city exercised its leased right by continuing its lease with the resort.[12]

What's Next for Long Beach Harbor Resort?

The developer of the resort property, Jim Parrish, plans to construct the $180 million casino, featuring a 300-room hotel, three restaurants, and 40,000 feet of gaming space. Although the resort obtained a favorable ruling, the resort still faces a few developmental obstacles. The Mississippi Gaming Commission must approve the financial plans of the development and the proposed plan must meet the gaming standards before any groundwork begins. Overall, both the resort developers and City of Long Beach officials seem to appreciate the court's ruling, as this decision means the resort is one step closer to construction and may further negotiations for other developments within the city.[12]

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Barnes v. Town Council of Perdido Beach: Alabama Municipalities and Governmental vs. Proprietary Functions

Conner Linkowski[1]

In October, the Alabama Supreme Court ruled on a challenge to the Town Council of Perdido Beach's plan to construct a public boat launch and pier funded by a grant resulting from the 2010 BP Deepwater Horizon oil spill.[2] Neighboring residents brought the suit, seeking an injunction to stop the development of the project. The neighbors alleged that the town's rezoning of the property to allow the development was arbitrary and capricious, in part because it violated the wetland setback requirements in the town's zoning ordinances. The Alabama Supreme Court ruled in favor of the Town Council, affirming that the project was a governmental function exempt from zoning ordinances.

Governmental and Proprietary Functions

The main issue in this case was whether the Town Council's Boat-Launch Project was a governmental or proprietary function. In Alabama, a municipality enjoys freedom from constraints created by certain ordinances and regulations when the municipality is performing a governmental function. Governmental functions include actions taken by a municipality that promote the "public peace, health, safety, and morals, as well as the expenditure of money for public improvements. . . ."[3] In other words, a governing entity undertakes a governmental function when it exercises its power for the benefit of its citizens. For instance, a municipality's operation of a landfill for garbage disposal or the construction of a facility where school property can be stored are governmental functions because they are actions that benefit the general public. If a municipality's actions are deemed a governmental function, any zoning ordinances that would ordinarily regulate the development will not apply.

A municipality does not, however, enjoy this same freedom if it is performing a proprietary function. Proprietary functions are "essentially commercial transactions involving the purchase or sale of goods and services and other activities for the commercial benefit of a particular government agency."[4] Where a municipality is charging its citizens a fee for goods or services, it is engaging in a proprietary function. Proprietary functions include, for example, a municipality receiving compensation for providing water service or charging an entrance fee at a park, because they are actions taken for the commercial benefit of the municipality. If a municipality's actions are deemed a proprietary function, any zoning ordinances that would ordinarily govern the activity will apply.

Barnes v. Town Council of Perdido Beach

Central to the dispute in *Barnes* was Section 10.1.4 of the Perdido Beach Land Use and Zoning Ordinance and Section 12.3 of Perdido Beach's Subdivision Regulations—each of which required that the setback line for building developments near wetlands be at least thirty feet away from the wetland. The Town Council intended to construct the boat launch within one foot of the wetlands. While the Town Council did not make any amendments to Section 10.1.4 or Section 12.3, it did make several amendments to other sections of the Perdido Beach Land Use and Zoning Ordinance to ensure the Boat-Launch Project could move forward.

Dennis E. Barnes, Chris Chandler, and Jan B. Chandler (collectively "Barnes") filed suit against the Town Council, seeking an injunction to prevent construction from taking place. After a bench trial, the trial court decided in favor of the Town Council, allowing construction to move forward. On appeal, Barnes argued that 1) the Boat-Launch Project violated the public dedication of the street at the end of which the boat launch would be constructed, 2) the Boat-Launch Project was a proprietary rather than governmental function, and 3) the Town Council's amendments to the Perdido Beach Land Use and Zoning Ordinance were arbitrary and capricious.

Barnes argued that the boat launch would "encroach" on the end of the street, thereby violating the public dedication of the street. Barnes asserted that municipalities do not have the power to encroach on public streets by using them for a purpose for which they were not originally dedicated. The Alabama Supreme Court disagreed, stating that, because the boat launch would be placed at the end of the street, it would not interfere with the street's use as a public road. Further, the court stated that the addition of the boat launch would enhance the street's "use as an area of public recreation, rendering it easier for citizens to launch boats, to fish at the pier, and to picnic in the adjacent designated public park," concluding that the Boat-Launch Project would not divert the street from its dedicated purpose.[5]

Next, Barnes argued that the Boat-Launch Project was a proprietary rather than governmental function. Barnes based this argument largely on a Minnesota case in which the court found that a harbor for mooring boats was proprietary because it only benefitted those citizens who owned boats.[6] Barnes asserted that the same would be true of the boat launch in Perdido Beach. However, the Alabama Supreme Court readily distinguished the facts of that case, noting that the Minnesota municipality was charging fees for mooring boats in the harbor. The court found no evidence that the Town Council would charge a fee to use the boat launch. Additionally, the court noted that the boat launch would also benefit those renting boats and those travelling with boat owners—not to mention that the Boat-Launch Project also provided for a public pier and park that "would benefit the public as a whole."[7] Accordingly, the court concluded that the Boat-Launch Project was a governmental rather than proprietary function. As a result, the Town Council was not subject to Section 10.1.4 of the Perdido Beach Land Use and Zoning Ordinance nor Section 12.3 of Perdido Beach's Subdivision Regulations in pursuing the Boat-Launch Project.

Lastly, Barnes argued that the Town Council's amendments to the Perdido Beach Land Use and Zoning Ordinance were arbitrary and capricious. The Town Council had 1) rezoned the area designated for the Boat-Launch Project from a residential area to an outdoor recreation area, 2) changed the minimum lot size for outdoor recreation areas, and 3) changed "the designation for using an [outdoor recreation] district for a public park, a public pier, or a public boat launch from 'conditional uses' to 'permitted uses'".[8] Barnes asserted that evidence presented at trial indicated that the boat launch would create a public safety hazard and that, because the amendments were only made to help the Boat-Launch Project move forward rather than for the public's benefit, the Town Council's zoning amendments were arbitrary and capricious—necessitating judicial intervention. However, the court noted that Barnes and the Town Council presented conflicting evidence as to the boat launch's possible effects. According to the court, the presence of this conflicting evidence showed that the "wisdom of the ordinance [amendments were] fairly debatable," so the Town Council's actions were not arbitrary or capricious.[9] The court further noted that, even if the court found "the zoning amendments to be arbitrary or capricious, the original zoning provisions would not prevent construction of the boat-launch project because municipal governmental functions are immune from existing zoning ordinances."[10]

Barnes failed to succeed on any arguments presented. First, the public street's purpose would be enhanced rather than encroached upon by the Boat-Launch Project. Second, the Boat-Launch Project is a governmental rather than proprietary function, thereby exempting it from regulation by zoning ordinances and subdivision regulations. Third, the conflicting evidence presented concerning the effects of the Boat-Launch Project made the wisdom of the Town Council's zoning amendments fairly debatable rather than arbitrary and capricious. Accordingly, the Alabama Supreme Court affirmed the trial court's holding.

Endnotes

1. NSGLC Research Associate; 2024 J.D. Candidate, University of Mississippi School of Law.
2. Barnes v. Town Council of Perdido Beach, No. 1210072, 2022 WL 12240411 (Ala. Oct. 21, 2022).
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Preserving History in a Changing Coastal Landscape

Stephen Deal

In nature, change is constant. That statement is especially fitting for marine environments. Sea level rise, land subsidence, and storms all have the potential to drastically alter the coastal landscape. Many coastal regions encounter situations where historic coastal settlements and buildings are threatened by the ongoing encroachments of natural forces. In some situations, environmental conditions can deteriorate to the point that total retreat or abandonment of a historic community becomes necessary. Just in the United States alone, there are 3,800 ghost towns that were abandoned in the late 19th and early 20th century.[1] These lonely settlements serve as reminders that unanticipated forces can occur, which upset long-held settlement patterns. So, it is only logical to evaluate historic properties to determine what actions may be needed to maintain the history of the nation's coast for the foreseeable future.

A Constantly Evolving Frontier

The word frontier often evokes romantic images of wagon trains and dusty, wild west towns, but the frontier is not an isolated, geographic location. It is constantly evolving in response to different environmental constraints. In a 2003 article from the Christian Science Monitor, it was noted that an accepted 19th century definition of frontier was an area with fewer than six people per square mile.[2] Going by that metric, the United States had 403 counties that met the definition of frontier in the middle of the 20th century. By the turn of the 21st century that number had fallen to 377 counties.

Though that number seems rather stable, there has been a lot of notable change in places where frontier population conditions exist. For example, at the beginning of the 21st century, the state of Arizona had gone from nine frontier counties down to two and two-thirds of the nation's frontier counties were located in the Great Plains. Even today, these numbers continue to shift. In 2019 the Northern Great Plains grew at a higher pace than the nation as a whole, driven in large part by the oil extraction boom.[3] These numbers indicate that depopulation is hardly uniform and that further study on the topic is needed to determine the underlying environmental and social factors that result in the proliferation of frontier conditions in previously stable rural counties.

When counties depopulate, the political imperative for historic preservation increases dramatically, as does the need for financial and technical assistance from higher levels of government. Continued cycles of decline and disinvestment can turn a once stable community into a kind of new frontier. This means that a regional approach is preferable when pursuing the policy goals of historic preservation.

The nation's barrier islands are frontiers of a different kind, but they are no less vulnerable to economic or environmental stressors. Changes in marine conditions or ocean hydrology can threaten a productive fishery or disrupt port activity and disasters can easily cut a coastal community off from the world, prompting drastic action. In North Carolina, Portsmouth village is a noteworthy example of how changes in the marine landscape can affect the fortunes of a coastal community. In 1860, the village of Portsmouth was home to over 500 people, 109 dwelling structures, and had over eighty-five percent of its workforce employed in sea related occupations.[4]

The town's fortunes suffered a major setback when the Hatteras Inlet to the north was opened as a new shipping passage. By the year 1880, the village's population had fallen to 227 people. In 1959, the village post office closed as there were less than 15 people remaining in the entire village. The village was fully abandoned by 1971, but local residents and

Credit: Stephen Deal

authorities were still committed to preserving the history of the village.[5] Portsmouth village eventually fell under the supervision of Cape Lookout National Seashore. National seashore staff, in conjunction with the organization Friends of Portsmouth Island, worked diligently to preserve and maintain key structures within the village.

Currently there are 20 buildings dating back to the village's heyday and 11 of these are open to the public. Today, it is hard to fathom that Portsmouth was once the site of a thriving coastal community. In 2019, Hurricane Dorian cut new inlets south of the village, eliminating access to four-wheel vehicles and requiring a 25-minute boat ride from the town of Ocracoke. The history of Portsmouth demonstrates the need for a kind of forward-looking ethos of preservation, one that can not only address preservation challenges in the present, but also forecast and anticipate future challenges that may threaten historic properties many years from now.

Preserving a Way of Life

The policy goals of historic preservation cannot simply be described as preserving old places. Historic preservation also entails preserving a way of life that has been lost to time. In coastal environments, this is perhaps best symbolized by the lighthouse. At the turn of the 20th century, there were 850 lighthouses in the United States and all of the lighthouses had to be manned by lighthouse keepers who could keep the structures in good, working order.[6]

Today, lighthouses have become archaic with the Global Positioning System (GPS) and around 48,000 federal buoys and beacons to aid in navigation.[7] The decline in lighthouses as a navigation aid means that existing structures serve not only as markers to past history, but also as symbols pointing towards a vanishing way of life. In recognition of the cultural significance of lighthouses to maritime history, the federal government passed the National Light House Preservation Act in 2000.[8] The act recognized the historic and educational value of lighthouses and set forth a process by which these properties could be transferred at no cost to federal agencies, state and local governments and other entities that could properly maintain and take care of these properties.

The strong, collective attachment people have to lighthouses as symbols of coastal history can be evidenced right here in coastal Mississippi. In Biloxi, Mississippi, the city's lighthouse is used as the city logo and is a key component of local merchandise and promotional materials.[9] Just a few miles away, in Pascagoula, the Round Island Lighthouse is another historic structure that has become strongly symbolic of the city's coastal location. Originally located on Round Island in the Mississippi Sound, the lighthouse was constructed in 1859.[10] After receiving extensive damage from Hurricane Georges in 1998 and Katrina in 2005, Pascagoula leaders decided to relocate the lighthouse to the Pascagoula River Bridge on US 90. Due to the damage received from past hurricanes, relocation of the lighthouse had to be done in phases, with a third of the structure moved in 2010. Later, another third of the structure was successfully salvaged, the city was able to move it and commence with interior and exterior renovations at the new site.[11] With funding from the Federal Emergency Management Agency, Mississippi Department of Archives and History, Mississippi Tidelands Funds, and private donations, local leaders were able to fully restore the lighthouse in 2015.

Policies to Promote Historic Preservation

Within the United States, one of the primary resources for historic preservation are the Secretary of the Interior's Standards for the Treatment of Historic Places.[12] There are four sections within the standards and each section identifies a specific action that can be undertaken to preserve historic structures. These actions are: preservation, rehabilitation, restoration, and reconstruction. If a local government is to determine what is the best course of action to take with a historic structure, it must first develop and maintain a comprehensive inventory of all historic properties under its purview.

Using GIS, it is easy to develop a comprehensive database of historic properties. The organization 1000 Friends of Florida has compiled a number of recommendations for what information an inventory should contain. Key pieces of information include: geographic location, type of resource, any distinguishing features of the property, the owner of the property and the date of its construction. Two other key items of information to track are whether a historic property is recognized on the national register of historic places and whether it is subject to the regulations of a local historic district. Being on the national register makes a property eligible for various incentives and grants and provides protection from demolition.[13]

Sometimes a property may be part of a larger historic neighborhood and designated by the local government as a historic district. A property in a local historic district is also eligible for national incentives, but, in addition to this, it is subject to a higher level of regulatory overview by the city.[14] Any changes to properties within a local historic district are governed by comprehensive design guidelines and alterations can only be permitted after a local design review board has reviewed the changes and found them to be in keeping with the district's character.

For coastal communities, another key factor to consider is what type of environmental changes may pose an imminent threat to historic structures. Over time, coastal erosion and storm surge can render a site inaccessible and undermine a property's structural integrity. In light of this, coastal communities should take advantage of long-term projections and analysis to target and prioritize funding for at-risk historic structures. To aid in this endeavor, the organization PLACE:SLR has developed an application guide that coastal communities can use to utilize the latest in sea level rise science. The full application guide entitled, *Application Guide for the 2022 Sea Level Rise Technical Report*, can be downloaded at the PLACE:SLR website.[15] One approach mentioned in the document that may be useful for historic properties is adaptation pathways.

The adaptation pathways approach identifies "tipping points", specific changes in the coastal environment, that necessitate a new mitigation strategy. These tipping points can be something measured, such as a rise in sea level, or simply an observable change in the surrounding natural environment, such as the loss of a barrier island or a major breach in a primary dune. By identifying various tipping points, local communities can plan out their mitigation actions accordingly. For example, a city could employ beach restoration to preserve a historic property for the foreseeable future, but if the property was subject to three feet of sea level rise over the next 30 years then a new, more intensive adaptation strategy would come into play, such as relocating the property further inland. The value of such an approach is that it explicitly identifies a wide variety of natural imbalances that can happen, which may threaten a historic property or group of properties.

Conclusion

For as long as civilization has existed, there has been a collective desire to leave behind a physical record of the lives people had and the achievements they accomplished. Historic preservation addresses that primal need; however, cities and towns exist in constant tension with the forces of environmental change. Environmental challenges can be particularly vexing in coastal communities, which often exist in very dynamic environments beset by tidal flooding, land subsidence and large, destructive coastal storms. In order to preserve the past, coastal communities must develop a comprehensive preservation strategy. Historic property inventories, establishing historic districts, and monitoring environmental changes affecting historic properties are all ways communities can address preservation needs and maintain a physical connection to past generations.

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